COASTAL CHARLOTTE HARBOR MONITORING NETWORK

Standard Operating Procedures
2025 Updates

Coastal & Heartland National Estuary Partnership
Technical Report 25-01
Adopted December 4, 2025

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Coastal & Heartland National Estuary Partnership

The Coastal & Heartland National Estuary Partnership (CHNEP, formerly the Charlotte Harbor National Estuary Program) is a partnership of citizens, elected officials, resource managers and commercial and recreational resource users working to improve the water quality and ecological integrity of the eight watersheds that comprise the CHNEP area including; Charlotte Harbor, Dona and Roberts Bays, Lemon Bay, San Carlos Bay, Estero Bay as well as the Peace, Myakka, and Caloosahatchee River basins. A cooperative decision-making process is used within the program to address diverse resource management concerns in the 5,400-square-mile study area.

Acknowledgements

This document is the most recent update to the original Coastal Charlotte Harbor Monitoring Network (CCHMN) Standard Operating Procedures (SOPs) approved by the Coastal & Heartland National Estuary Partnership (CHNEP) Management Conference in March 2014 (CHNEP Technical Report 02-03). Many organizations and individuals contributed to the development of the original CCHMN SOPs, as well as prior updates. The original CCHMN SOPs were built on the Southwest Florida Water Management District (SWFWMD) *A Long-Term Water Quality Monitoring Design for Charlotte Harbor, Florida* (1995) and the Coastal & Heartland National Estuary Partnership (CHNEP) *Long Term Monitoring Strategy and Gap Analysis* (2000). Updates to the 2025 CCHMN SOPs were made by CHNEP staff Nicole Iadevaia, Director of Research & Restoration and Sarina Barnard, Research & GIS Coordinator with Executive Director, Jennifer Hecker. All revisions are made in collaboration with representatives from each of the Coastal Charlotte Harbor Monitoring Network partners. They are then reviewed and adopted by the CHNEP Technical Advisory Committee (TAC). The assistance from all those who contribute their field, laboratory and data management expertise toward making the CCHMN a reliable, on-going source of technically sound region-wide estuarine water quality data is greatly appreciated by many. Thank you to each contributor.

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Purpose

This purpose of this document is to incorporate updated staff, dates, field, laboratory, and data management information into the Coastal Charlotte Harbor Monitoring Network (CCHMN) Standard Operating Procedures (SOPs). The original *Coastal Charlotte Harbor Monitoring Network Description and Standard Operating Procedures* (CHNEP Technical Report 02-03) were approved by the Coastal & Heartland National Estuary Partnership (CHNEP) Management Conference on March 19, 2004 (CHNEP, 2004; available at www.chnep.org). The original CCHMN SOPs were built on the Southwest Florida Water Management District (SWFWMD) *A Long-Term Water Quality Monitoring Design for Charlotte Harbor, Florida* (1995) and the Coastal & Heartland National Estuary Partnership (CHNEP) *Long Term Monitoring Strategy and Gap Analysis* (2000). Updates to the SOPs are made by CHNEP technical staff in collaboration with representatives from the Coastal Charlotte Harbor Monitoring Network, they are then reviewed and adopted by the CHNEP Technical Advisory Committee (TAC).

The CCHMN is a regional partnership of agencies (managed under the CHNEP) initiated in 2001 that collects monthly water quality data using consistent, technically sound sampling design. Long-term random sampling of strategically located stations allows scientific assessment of status and trends. CCHMN field and laboratory partners collect and analyze water samples from 60 randomly selected field sites throughout 10 waterbodies each month, including Lemon Bay, Cape Haze/Gasparilla Sound, Charlotte Harbor, Pine Island Sound, Matlacha Pass, San Carlos Bay, Estero Bay and the Tidal Myakka, Peace, and Caloosahatchee Rivers (Figure 3). Fifteen water quality parameters are measured and analyzed using consistent field and laboratory methods.

Data are uploaded by partners to WIN (Watershed Information Network), previously STORET (Storage and Retrieval), a standard, common public database maintained by the Florida Department of Environmental Protection (FDEP). In addition, all contributing CCHMN laboratories and field monitoring agencies participate in Southwest Florida Regional Ambient Monitoring Program (SWF RAMP) quarterly meetings to help ensure region-wide data and methodology comparability. The SWF RAMP serves as a quality assurance forum for comparing split-sample laboratory results, resolving inconsistencies in results, and discussing pertinent water quality monitoring issues throughout the region. Similarly, the CCHMN serves as a quality assurance forum for comparing field methods.

Identifying waterbody impairments, establishing pollutant limits, and monitoring progress of corrective management actions all depend on the availability of accurate, high-quality data. Protocols and procedures must be employed to ensure that data are properly collected, handled, processed, used, and maintained at all stages of the data lifecycle. CCHMN supplements other ongoing water quality monitoring programs implemented by partners, including ongoing fixed station monitoring by counties, cities, agencies, and citizen scientists.

CHNEP management activities for CCHMN include developing and updating Standard Operating Procedures and field Quality Assurance (QA) Plans, conducting annual field audits, contracting and assisting with field water quality sampling, hosting annual meetings, and participating in quarterly RAMP quality assurance meetings. These activities are developed to be consistent with FDEP QA Rules (62-160, F.A.C.).

Activities in the CHNEP are guided by the *Comprehensive Conservation and Management Plan 2025* (CCMP) and identified as a priority in the *CHNEP Monitoring Strategy* (2025) (CHNEP, 2025; available at www.chnep.org).

The CCMP identifies four Priority Actions throughout the CHNEP area relating to:

- Water Quality Improvement
- Hydrologic Restoration
- Fish, Wildlife, and Habitat Protection
- Public Engagement

The CCHMN implements the CCMP Priority Actions relating to Water Quality Improvement including:

- **Water Quality Improvement Action 1:** Support a comprehensive and coordinated water quality monitoring and assessment strategy.

- **Activity 1.1:** Assist with the consistent and efficient collection of technically-sound long-term water quality data throughout the CHNEP area, including supporting key programs like the Coastal Charlotte Harbor Water Quality Monitoring Network, partners' long-term fixed stations, and volunteer monitoring programs like the Charlotte Harbor Estuaries Volunteer Monitoring Network, Lee County Pond Watch, and the Cape Coral Canal Watch programs. Work with partners to obtain additional resources, increase efficiencies, and identify and fill sampling gaps.

- **Activity 1.2:** Support uploading and archiving of data in standard, common public databases, including FDEP's database and the CHNEP Water Atlas.

- **Activity 1.3:** Assess and report water quality status and trends to identify water quality.

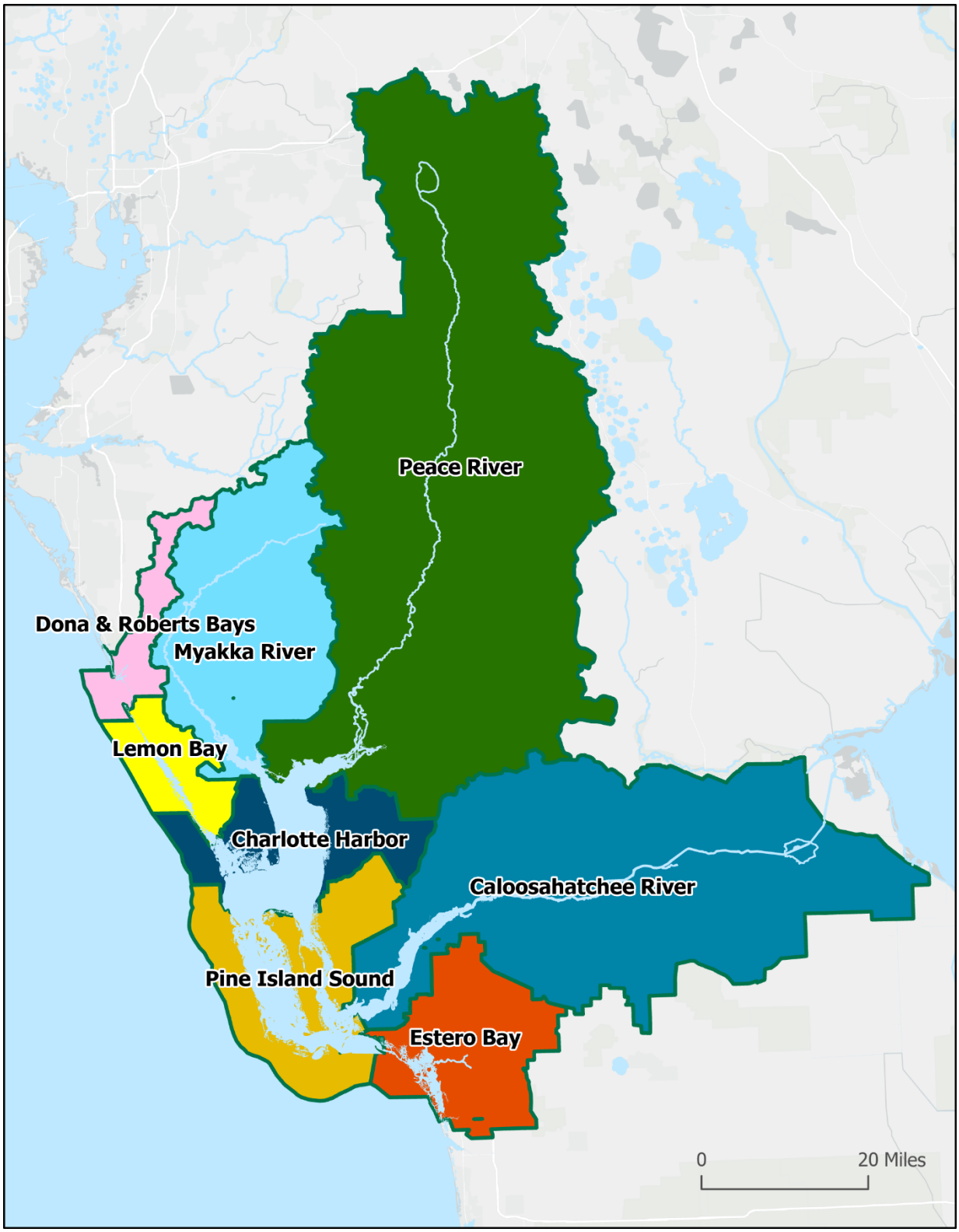
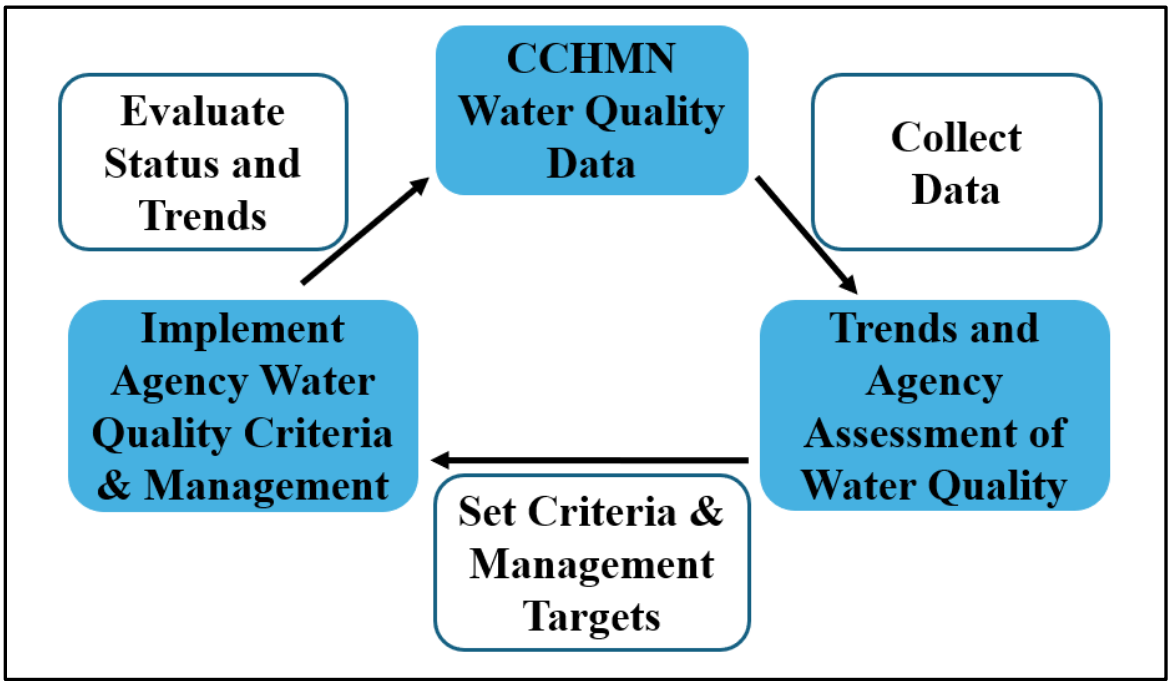


Figure 1: The basins within the CHNEP area

The original CCHMN SOPs were developed by the CHNEP with assistance from many partners from throughout the study area. CCHMN SOP Updates are made to incorporate changes to the program, field monitoring, lab sampling, or data collection/entry protocols that have occurred since the monitoring program was initiated in 2004 (updated in 2015, 2017, 2019, and 2023). The original CCHMN SOPs were built on the Southwest Florida Water Management District (SWFWMD) *A Long-Term Water Quality Monitoring Design for Charlotte Harbor, Florida* (1995) and the Coastal & Heartland National Estuary Partnership (CHNEP) *Long Term Monitoring Strategy and Gap Analysis* (2000). Updates to the SOPs are made by CHNEP technical staff in collaboration with representatives from the Coastal Charlotte Harbor Monitoring Network, SOPs are reviewed at the CCHMN Annual partners meeting, hosted by CHNEP. Updates to the technical documents are then reviewed and adopted by the CHNEP Technical Advisory Committee (TAC) and made available on the CHNEP Water Atlas (https://chnep.wateratlas.usf.edu/water-quality-trends/). The CCHMN SOPs ensure continued reliable, consistent, technically sound water quality data collection throughout the estuarine regions of the CHNEP study area. The basins within the CHNEP area are shown in Figure 1.

The water quality data provided by the CCHMN is an essential component of many water quality assessments and resource management decisions throughout the CHNEP estuarine and tidal waters. The data is critical for linking development of water quality criteria with evaluation and assessment of waterbodies to determine if they are meeting regulatory requirements (Figure 2).



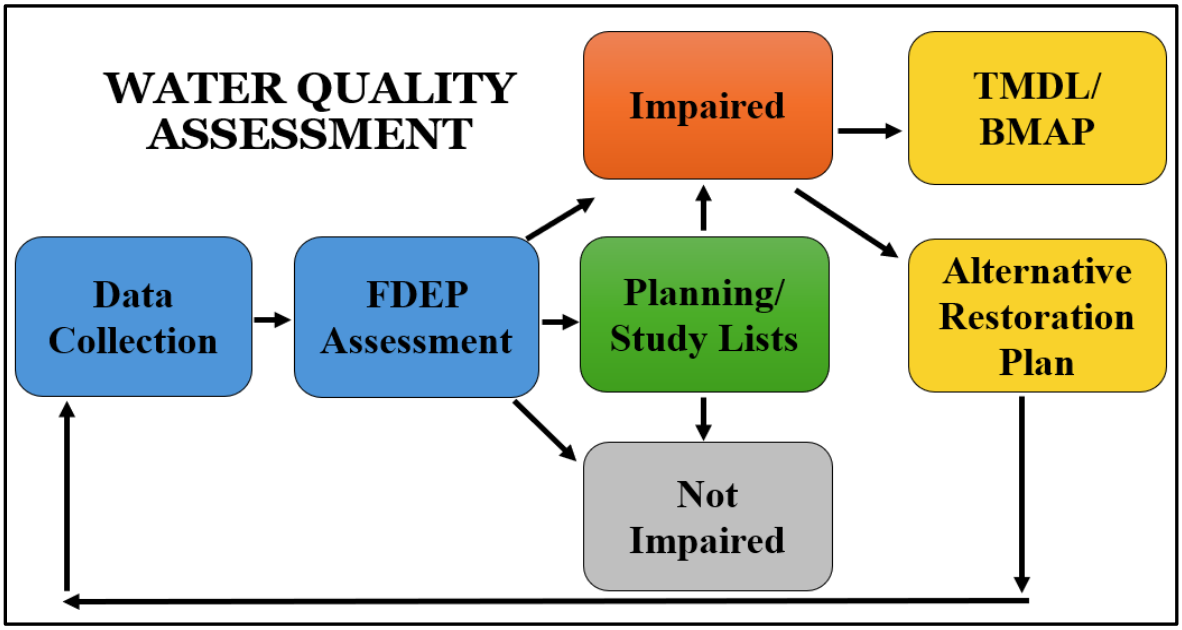


Figure 2: Uses of CCHMN Data

Specific uses of the CHNEP water quality data include: Determination of Status and Trends & Management:

- CHNEP Water Atlas Water Quality Trends, Water Quality Dashboard and Preliminary Numeric Nutrient Criteria Calculator (https://chnep.wateratlas.usf.edu/, updated annually),
- Water Quality Trends and Eutrophication Indicators in a Large Subtropical Estuary: A Case Study of the Greater Charlotte Harbor System in Southwest Florida (Medina et al, 2025),
- CHNEP Water Quality Status and Trends (Janicki Environmental, 2007),
- CHNEP Water Quality Targets (CHNEP, 2013),
- CHNEP Numeric Nutrient Criteria (Janicki Environmental, 2011),
- CHNEP Optical Model development (Dixon et al, 2014),
- CHNEP Comprehensive Conservation Management Plan and Monitoring Strategy (CHNEP, 2025),
- SWFWMD Charlotte Harbor SWIM Plan (Garcia et al, 2020),
- State Impaired Waters and TMDL determinations,
- State BMAP processes, and
- Water Management District Minimum Flows and Levels (MFLs).

The CCHMN is currently funded by a partnership of Southwest Florida Water Management District (SWFWMD), Charlotte County, Lee County, the City of Cape Coral, Florida Department of Environmental Protection (FDEP), and the CHNEP. Field sampling has been conducted by the following entities: the Florida Fish and Wildlife Conservation Commission (FWC) Charlotte Harbor Field Laboratory, the City of Cape Coral, FDEP Environmental Assessment and Restoration South Regional Operations, the Southwest Florida Water Management District, and Lee County Environmental Laboratory. Laboratory analyses have been conducted by the Southwest Florida Water Management District Charlotte County (contract laboratory), City of Cape Coral Environmental Resources Division and Lee County Environmental Laboratory.

The surface water quality data collected for this partnership project is entered into the state databases, including Florida WIN (Watershed Information Network), formerly Florida STORET (STOrage and RETrieval), for use in: Development and assessment of water quality criteria, including Site Specific Alternative Criteria (SSAC); Assessment of Florida surface waters for purposes of Impaired Waters Rule (IWR) determinations; Development of Total Maximum Daily Loads (TMDLs); and Basin Management Action Plan (BMAP) implementation. As data from this program is used for assessment during the FDEP Impaired Waters Listing process, it supports the Clean Water Act Section 303(d). A portion of the upper Charlotte Harbor data is uploaded to SWFWMD WMIS (Water Management Information System) and its replacement WISKI, available for download through the SWFWMD Environmental Data Portal. CCHMN data is also uploaded to the U.S. Environmental Protection Agency (EPA) federal database-Water Quality eXchange (WQX) and made available for download through the US EPA Water Quality Portal (WQP). All of this data is made available viewing and download and is analyzed for trends aggregated by waterbody, basin, and watershed along with other environmental indicator data and regulatory thresholds on the CHNEP Water Atlas (http://www.chnep.wateratlas.usf.edu/).

The CCHMN background information, study design and field methods are described briefly in the following sections. For additional detail, please refer to the *Coastal Charlotte Harbor Monitoring Network Description and Standard Operating Procedures* (CHNEP, 2004).

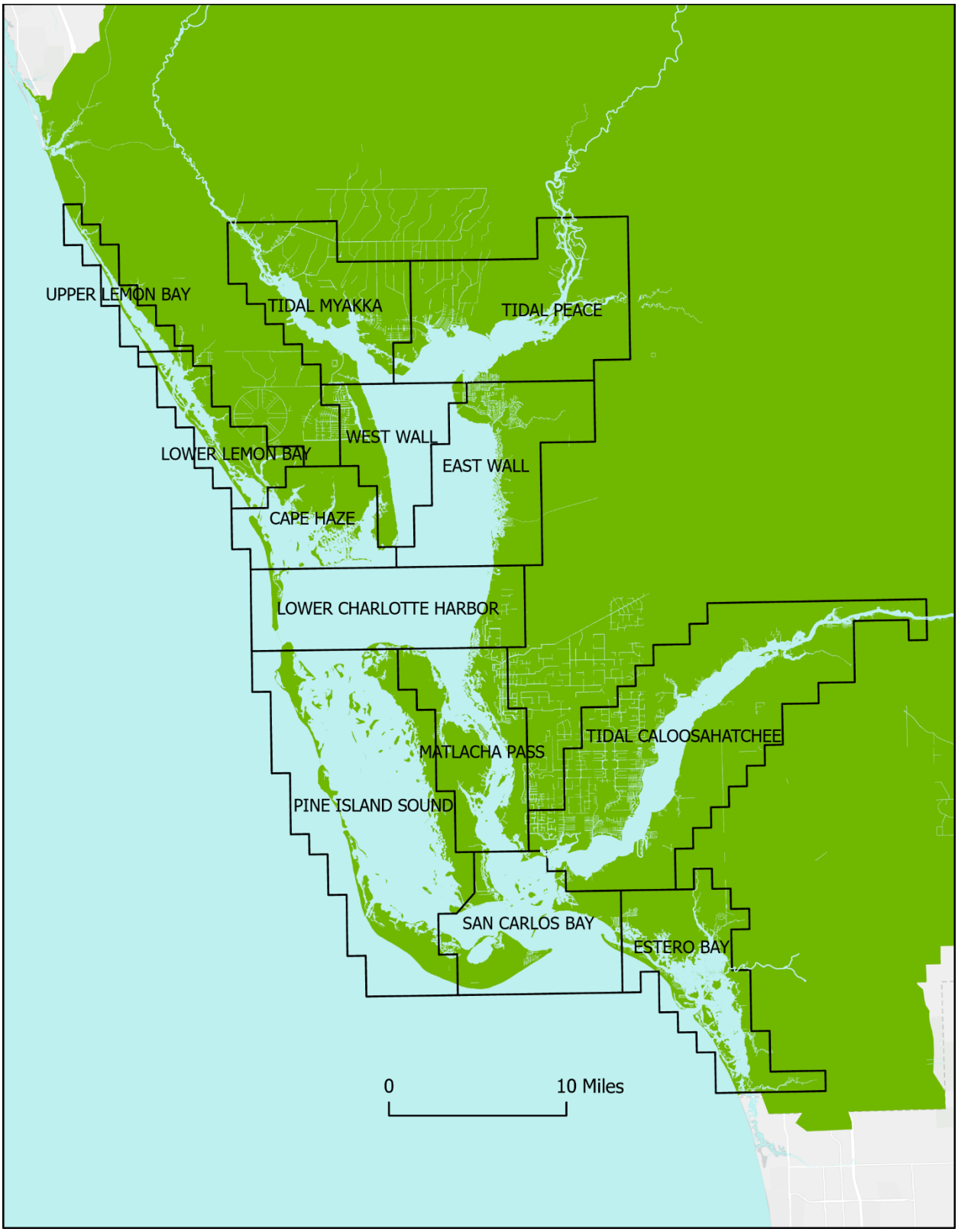


Figure 3: CCHMN Water Quality Sampling Strata

CCHMN field and laboratory partners collect and analyze water samples from 60 randomly selected field sites throughout 10 waterbodies each month.

Background

The original CCHMN SOPs were built on the SWFWMD *A Long-Term Water Quality Monitoring Design for Charlotte Harbor, Florida* (1995) and the CHNEP *Long Term Monitoring Strategy and Gap Analysis* (2000). The CHNEP Monitoring Strategy was updated most recently in 2025, additions have been made in the section below to reflect those (CHNEP, 2025).

The purpose of the CHNEP Long-Term Monitoring Strategy was to track status and trends of fish and wildlife habitats well as hydrologic and water quality conditions for southwest Florida estuaries and watersheds in the CHNEP area (including Charlotte Harbor, Upper and Lower Lemon Bays, Dona and Roberts Bays, Pine Island Sound, Matlacha Pass, San Carlos and Estero Bays, as well as the Peace, Myakka, and Caloosahatchee River estuaries). The strategy recommended a stratified, random sampling design based on the U.S. Environmental Protection Agency's (EPA) Environmental Monitoring and Assessment Program (EMAP) for the region's coastal water quality programs. The objectives of long-term monitoring strategy were to provide unbiased data that answer the following water quality questions:

1. Is water quality changing through time for a specific water body?
2. Did water quality change as the result of implementing some management practice?
3. Did water quality change by some specific target level?

The CHNEP Long Term Monitoring Strategy was developed based on a consensus approach and review of existing guidance, including EPA's Environmental Monitoring and Assessment Program (EMAP) approach. EMAP used a stratified-random sampling protocol to provide statistically unbiased results for the coastal areas.

These guiding questions intended to frame the water quality monitoring strategy were modified slightly in the 2020 CHNEP Monitoring Strategy update:

1. Is water quality improving, declining, or remaining stable?
2. Are nutrient concentrations above or below established targets?
3. Is water clarity above or below established targets?

The CCHMN was created to fill gaps in coastal water monitoring and initiate a unified approach throughout the study area. Based on extensive scientific input, the estuaries and tidal rivers of the CHNEP were divided into 13 regions of relatively homogeneous water quality and habitat conditions and overlaid with the square mile sampling grids utilized by the FWC Fish and Wildlife Research Institute (FWRI). Within each stratum, five grids are randomly selected each month and sampling locations (latitude and longitude) within each grid are randomly selected. This allows each stratum to be monitored at 60 locations each year. The details of how and why the strata, grids, sampling frequency, sampling protocols, metadata, data analysis methods and core analytes were determined are included in the CHNEP Coastal Charlotte Harbor Monitoring Network Description and Operating Procedures (CHNEP, 2004).

One of the major goals of the CHNEP is to help facilitate inter-agency cooperation and coordination to utilize the region's assets for more collaborative natural resources management and research, including the area's monitoring programs. Charlotte Harbor covers 270 square

miles and the CHNEP area extends over an area of 5,400 square miles. The program area includes all or part of ten counties, two water management districts, two FDEP districts, and many cities and towns. This large service area and the interconnected jurisdictions of the public and private institutions have created both management opportunities as well as critical gaps in the complex legal and organizational framework.

Water quality monitoring programs in the region usually consist of fixed stations that are designed to sample for analytes and in areas that are of interest to the various monitoring agencies. For example, some state monitoring programs consist of background sites upriver of a point-source discharge and then others that are placed downstream of this discharge in the contaminant plume to estimate the pollutant loadings to the water body from this point-source. This monitoring design only lends itself to assumptions of the point-source and its immediate effects on that area of the water body. This data is useful for certain purposes, but it would be problematic statistically to make assumptions about the larger downstream water body itself from the use of the data collected from this program. In addition, between the various monitoring agencies, the number of individual monitoring sites, the frequency of the collection and the sampled analytes at each site are highly variable, depending on the resources of each individual agency. Monitoring agencies also often use different protocols for lab analysis and sample collection. These inconsistencies can result in data gaps and incomparable data across basins. Inter-governmental coordination of field sampling methodologies, monitoring sites and laboratory methods throughout the southwest Florida region benefited by the creation of the Southwest Florida Regional Ambient Monitoring Program (SWF RAMP) and the CCHMN. The SWF RAMP meets quarterly to conduct split sampling for comparisons, compare split sampling laboratory results, resolve inconsistencies in results and discuss relevant emerging issues. CCHMN partners participate in field audits and meet annually to discuss methodologies and resolve inconsistencies.

The CCHMN began implementation in 2001 as a cooperative monitoring network to fill gaps in water quality data in the CHNEP estuaries using a stratified, random sampling design. Initially, five strata were sampled (Tidal Peace and Myakka Rivers, Lemon Bay and Charlotte Harbor East Wall and West Wall). In 2002, seven additional strata were added (Lower Lemon Bay, Lower Charlotte Harbor, Pine Island Sound, Matlacha Pass, Tidal Caloosahatchee River, San Carlos Bay and Estero Bay). Since the time the CCHMN was implemented, field and laboratory partners and funding sources have changed, but continue to work together under the umbrella of the CCHMN to ensure collection of technically sound water quality using consistent methods throughout the CHNEP estuaries.

The current CCHMN project design includes monthly sampling within 13 estuary strata, with five randomly selected grids and sites sampled in each stratum each month. This allows for data to be collected at 60 sites per stratum per year as suggested by the CHNEP Long Term Monitoring Strategy. The sampling design results in approximately normal data distributions allowing for parametric statistical analyses to be conducted for robust comparisons of means between strata, between seasons (wet and dry), and between years. Strata were selected to account for homogeneous and heterogeneous conditions in the water body. A single sample will be collected at 0.5 meters below the surface for those locations where the bottom depth is less than 3.0 meters. For locations where the total depth is greater than 3.0 meters, two samples will be collected (0.5 meters below the surface and 0.5 meters above the bottom). These grab samples represent the conditions that exist at the moment the sample is collected and do not necessarily

represent conditions at any other time, this is the preferred method of sampling for a snapshot of the water quality at a particular instant in time.

Existing Ambient Water Quality Monitoring Programs in CHNEP Area (CHNEP Long Term Monitoring Strategy)

The CCHMN supplements other ongoing ambient water quality monitoring programs implemented by partners within the region, including ongoing fixed station monitoring by counties, cities, agencies, and volunteer programs as well as continuous monitoring stations maintained by agencies and non-profit partners. Partners and programs within the region include, but are not limited to:

U.S. Environmental Protection Agency (EPA)

The EPA initiated a monitoring effort in the Southwest Florida area, formerly called Coastal 2000. The objectives of the Coastal 2000 National Coastal Survey are: (1) to create an integrated comprehensive coastal monitoring program across the Nation's coastlines to assess the condition of the estuarine and coastal waters at the National, State, and Tribal scales; (2) to estimate the condition of estuarine resources for the United States, the 24 coastal states, Puerto Rico, and appropriate coastal Tribal Nations; and (3) to complete this objective with as little modification to existing State programs as possible. In 2000-2001, all 24 coastal states in the United States, and Puerto Rico were sampled to estimate the condition of their estuarine resources. The minimum number of sampling locations in each state and Puerto Rico was 50 sites located through a probabilistic design. The EPA, through an agreement with FWC Florida Fish and Wildlife Research Institute (FWRI) collected biotic condition indicator, exposure indicator, habitat indicator and stressor indicator information for Charlotte Harbor. Depending on resources, the Harbor will be re-sampled for the Coastal Assessment in future years. More information is available at: http://www.epa.gov/emap/index.html.

National Oceanic and Atmospheric Administration (NOAA)

NOAA's Harmful Algal Bloom Observing System helps visualize blooms and changes in environmental conditions. It provides scientists and the public with a data-driven resource for HAB events. Cell counts and environmental information are distributed via data files and an interactive ArcGIS map. HABSOS strives to provide an accurate picture of harmful algal bloom location and quantity by using the latest sample data. More information is available at: https://habsos.noaa.gov/.

United States Geological Survey (USGS)

Provides data through the National Water Information System (NWIS) http://waterdata.usgs.gov/nwis for flow rates and water levels in streams, lakes, and wells, along with some chemical and physical data. This uses some continuous internal-logging monitoring systems, in-situ monitoring systems, and flow-through monitoring systems.

Florida Department of Health (FDOH)

Beach water samples are collected by County Health Departments every two weeks. They are analyzed for Enterococci bacteria. High concentrations of these bacteria may indicate the presence of microorganisms that could cause disease, infections, or rashes. Health advisories or warnings are issued if these conditions are confirmed. Latest beach advisories are accessible via the Florida Healthy Beaches website: https://www.floridahealth.gov/environmental-health/beach-water-quality/.

Florida Department of Agriculture and Consumer Services (FDACS)

FDACS Shellfish Harvest Area Classification Program

FDACS routinely monitors shellfish harvesting areas for the presence of fecal coliform bacteria. Each year FDACS examines thousands of water samples. The goal is to provide the most shellfish harvesting area possible while protecting the public from shellfish-borne illness. FDACS collects and analyzes data from 1,200 bacteriological sampling stations in 38 shellfish harvesting areas encompassing 1.3 million acres. Water samples at fixed stations throughout a harvest area are analyzed for fecal coliform, DO, salinity, temperature and pH. In this context, the term shellfish is limited to bivalve mollusks such as oysters, clams, scallops and mussels. More information is available at: https://www.fdacs.gov/Agriculture-Industry/Aquaculture/Shellfish-Harvesting-Area-Classification.

FDACS Best Management Practices (BMP) Program

For the purposes of the FDACS' Best Management Practices (BMP) program, a BMP is defined by law as a means, a practice or combination of practices determined by the coordinating agencies, based on research, field testing and expert review, to be the most effective and practicable on-location means, including economic and technological considerations, for improving water quality in agricultural and urban discharges. According to Section 373.4595(2)(a), Florida Statutes, BMPs for agricultural discharges must reflect a balance between water quality improvements and agricultural productivity. More information is available at: https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Best-Management-Practices.

Florida Department of Environmental Protection (FDEP)

FDEP Aquatic Preserves Continuous Water Quality Datasondes

The FDEP Charlotte Harbor and Estero Bay Aquatic Preserves collect continuous water quality data using datasondes deployed in-situ at 9 fixed stations in Charlotte Harbor, Matlacha Pass and Estero Bay. The datasondes are fixed to pilings 0.5 m off the bottom and data is recorded every 15 minutes for 7 parameters, including temperature, turbidity, depth, pH, conductivity, salinity and dissolved oxygen. The datasondes are calibrated before deployment and remain on site for two to four weeks before being retrieved and replaced, and the data downloaded. The continuous data provides additional temporal detail to augment other existing monthly water quality monitoring programs. The FDEP continuous water quality datasonde program began in 2005 and additional information is available at: https://chnep.wateratlas.usf.edu/aquatic/#aquatic-preserve-program and https://floridaapdata.org/.

Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network (CHEVWQMN)

The CHEVWQMN is a fixed station, estuarine, monthly water quality monitoring program managed by the FDEP Charlotte Harbor and Estero Bay Aquatic Preserves in Punta Gorda, Florida. There are approximately 46 sites from Lemon Bay through Estero Bay. Monitoring is conducted synoptically, on the first Monday of each month within 1

hour of sunrise, by over 100 trained volunteers. The program started in 1996, and more information is available at: http://www.chnep.wateratlas.usf.edu/chevwqmn/.

FDEP Watershed Monitoring Program

The FDEP formed the Integrated Water Resources Monitoring Network Committee in 1996 to develop strategies and techniques for implementing an integrated monitoring plan that would combine surface water, groundwater, and biological monitoring. The EPA, FDEP, Water Management Districts, and local governments were all asked to participate. The program subsequently established a three-tiered assessment approach. Tier 1 Status Network uses a stratified, random sampling design to characterize the overall health of Florida's water resources and observe possible trends. Tier 2 monitoring programs consist of strategically placed fixed sampling stations with the goal of further characterizing water body segments on the 303(d) list. Tier 3 monitoring programs function mainly as ongoing compliance monitoring programs and will determine if permitted facilities are in compliance with their permits. This monitoring tier provides in-depth information on individual water body segments and yields the basis for evaluating the effectiveness of the management choices relating to facilities. The program was initiated in 1996, and more information is available at: https://floridadep.gov/dear/watershed-monitoring-section (main page).

Florida Fish and Wildlife Conservation Commission (FWC)

The Florida Fish and Wildlife Conservation Commission (FWC) monitors red tide events, publishes status reports, and coordinates routine and event-response monitoring with state agencies, local governments, and Mote Marine Laboratory. They also provide data to the University of South Florida (USF) College of Marine Sciences, which forecasts red tide movements using the West Florida Shelf Regional Ocean Modeling System; to NOAA's Harmful Algal Bloom Observing System, which helps visualize blooms and changes in environmental conditions; and to NOAA's Harmful Algal Blooms Operational Forecast System, which shares information to other groups. More information is available at: https://myfwc.com/research/redtide/monitoring/about/; https://myfwc.com/research/redtide/monitoring/database/.

South Florida Water Management District (SFWMD)

The SFWMD established a water quality monitoring program in the Caloosahatchee River in April 1999. Four fixed sites are sampled on a monthly frequency through a contract with Lee County Environmental Lab (the SFWMD has sampled eight sites off and on since the late 1980s; the four chosen for this program were part of the original eight sites). Water quality data are used to produce annual technical reports on the current status and trends of several nutrients and physical attributes of the system, provide supporting data for water supply modeling, and contribute to a growing body of regional data made available to all interested parties. More information is available at: http://www.sfwmd.gov/caloosahatchee.

Southwest Florida Water Management District (SWFWMD)

This program was initiated in 1997 and currently monitors 11 fixed stations in the Peace River basin and five fixed stations in the Myakka River, either monthly or every other month. The District also collects field data for six fixed sites on a quarterly basis in Flatford Swamp in the upper Myakka watershed. SWFWMD also had numerous monthly sampled, fixed sites within the

harbor itself that were revamped into the program described herein. More information is available at: http://www.swfwmd.state.fl.us/data/water-quality/.

Peace River Manasota Regional Water Supply Authority (PRMRWSA)

The PRMRWSA's Hydrobiological Monitoring Program (HBMP) was initiated in 1976 and was developed by the SWFWMD and General Development Utilities, Inc. (GDU) for GDU's Peace River Regional Water Supply Facilities original consumptive use permit (1975). The PRMRWSA obtained ownership and operation of the facility in 1991. The HBMP was designed to evaluate the impacts and significance of natural salinity changes on the aquatic fauna and flora in the lower Peace River and upper Charlotte Harbor and to determine if freshwater withdrawals by the Peace River Facility could be shown to alter these patterns. The program currently includes 3 U.S. Geological Survey (USGS) water level recorders (Harbour Heights, Peace River Heights and Peace River Facility Intake) which provide surface and bottom conductivity at 15-minute intervals. The PRMRWSA also has 8 continuous recorders along the river which provide subsurface conductivity at 15-minute intervals. Monthly chemical and physical water quality measurements are conducted at four "moving" salinity-based isohaline locations (0, 6, 12 and 20 ppt) along a river kilometer centerline, running from the mouth of the Peace River upstream to Horse Creek and downstream to Boca Grande Pass. Monthly water column profiles are conducted at 16 locations along a transect running from the river mouth to the Peace River Facility. Chemical water quality samples are collected at five of these locations. Both the "moving" and fixed stations include physical *in situ* water column profile measurements (temperature, dissolved oxygen, pH, conductivity and salinity) at 0.5-meter intervals from the surface to the bottom, plus light attenuation. More information is available in the HBMP Annual Data Reports or 5-year HBMP Summary Report found in the southwest Florida Water Atlas system and also as a public document at SWFWMD or PRMRWSA.

Sanibel-Captiva Conservation Foundation (SCCF)

SCCF's River, Estuary and Coastal Observing Network (RECON) is a network of water quality sensors deployed throughout the Caloosahatchee River and estuary to provide real-time, water quality data to scientists, policy makers, and the general public. RECON was established in 2007 to understand the dynamic and changing conditions in the Caloosahatchee partly caused by extreme freshwater releases from Lake Okeechobee and the Caloosahatchee watershed. The extensive watershed (1,400 square miles) and Lake Okeechobee (4,400 square miles) each contribute water that flows into the Caloosahatchee estuary and the Gulf of Mexico. Large volumes of freshwater runoff can cause lower salinities and have led to degradation of essential fish habitat, such as oysters and seagrass. RECON is used in all ongoing research projects at the Marine Laboratory to better understand the effects of disturbances on marine plants and animals. The data generated from RECON allows scientists to monitor conditions related to water quality and resource management such as the alteration of underwater light that sustains seagrass, changes in salinity due to freshwater releases or lack of, resulting in reduced biodiversity, elevated chlorophyll and colored dissolved organic matter (CDOM) indicative of enhanced nutrient levels, and low oxygen conditions (hypoxia). More information is available at: https://recon.sccf.org/.

FGCU

The FGCU Vester Field Station's water quality monitoring network across southwest Florida is a funded project through the Southeast Coastal Ocean Observing Regional Association (SECOORA) that supports four stationary locations equipped with YSI EXO2 datasondes to

collect temperature, conductivity, salinity, pH, turbidity, DO, depth, FDOM, and total algae every 10 minutes. This data is used for many research projects at the Vester Field Station, such as oyster monitoring, seagrass monitoring, and Florida red tide monitoring. Students can use this data for their own research projects for classes as well as faculty to teach about local water quality issues. Local beach goers and boaters can use this data to look at current water quality conditions before going out on the water. More information is available at: https://www.fgcu.edu/thewaterschool/facilities/vester-field-station/. Real-time data on WQ Data Live: https://www.wqdatalive.com/public/1348.

Charlotte County

Charlotte County Utilities conducts fixed station bi-monthly groundwater quality monitoring at approximately 85 sites, which are tidally influenced, within the County's jurisdiction. Sampling at some sites began in 2012. In addition, Charlotte County Public Works conducts quarterly surface water fixed station monitoring at 5 sites in South Gulf Cove. More information is available at: http://www.charlottecountyfl.com/CCU/WaterQuality/index.asp.
Charlotte County also conducts fixed station watershed water quality monitoring at 62 stations throughout Charlotte County through the Charlotte County Project Plan for Ambient Surface Water Monitoring Program. The data is collected monthly, this program began in 2022.

City of Punta Gorda

The City of Punta Gorda Utilities Department conducts monthly water quality monitoring at fixed, freshwater sites as required for the City's Water Treatment Facility consumptive use permit with the SWFWMD. The program monitors 6 fixed sites in Shell Creek and the Peace River. The program began in 1991 and is coordinated with monitoring conducted by the Peace River Manasota Regional Water Supply Authority (PRMRWSA) on a monthly frequency.

Sarasota County

The Sarasota County Stormwater Environmental Utility conducts monthly ambient water quality monitoring of bays, creeks and the Myakka River. County bays are divided into eight segments. Each segment has one sample taken from each of five polygons and has data going back to 1995. Sixteen coastal creeks have been monitored since 2007. More information is available at: http://www.sarasota.wateratlas.usf.edu/.

City of North Port

The City of North Port conducts monthly water quality monitoring at 10 fixed stations as part of their SWFWMD water use permit (WUP) Hydrobiological (HB) monitoring program and the National Pollutant Discharge Elimination System (NPDES) program. The HB monitoring includes 2 freshwater sites (Cocoplum Canal and Myakkahatchee Creek upstream of the City's main dam) and 8 brackish water sites in the tidal portions of the Myakkahatchee Creek downstream of the City's main dam and the Myakka River. Data is collected for 22 parameters including nutrients. The monitoring program began in 2006 and more information is available at by contacting the City's Stormwater Manager via http://www.cityofnorthport.com/contact-us .

Lee County

The Lee County Environmental Laboratory conducts fixed station, monthly water quality monitoring at approximately 28 estuarine sites in Pine Island Sound, Matlacha Pass and Estero

Bay, and 48 freshwater sites within the County's jurisdiction. Sampling at some sites began in 2002 and more information is available at: https://www.leegov.com/naturalresources/EnvLab.

Pond Watch

Pond Watch is a fixed station, stormwater pond, monthly water quality monitoring program managed by the Lee County Hyacinth Control District in Lehigh Acres, Florida. There are approximately 65 sites in Lee County stormwater ponds. Monitoring is conducted on the second Monday of each month by over 75 trained volunteers. The program began in 1995 and more information is available at: https://chnep.wateratlas.usf.edu/pond-watch-program/.

City of Cape Coral

The City of Cape Coral Environmental Resources Division conducts monthly water quality monitoring at approximately 35 fixed stations within the City's jurisdiction. The program began in 1989 and more information is available at: http://www.capecoral.net/department/public_works/environmental_resources_division.php#.VYxpemfbKEU. The City of Cape Coral also conducts water quality monitoring for the LeHigh Acres Municipal Services Improvement District (LA-MSID).

Canalwatch

The Canalwatch program is a fixed station, canal, monthly water quality monitoring program managed by the City of Cape Coral Environmental Resources Division in Cape Coral, Florida. There are approximately 45 sites in the Cape Coral canals. Monitoring is conducted on the first Wednesday of each month by over 50 trained volunteers. The program began in 1995 and more information is available at: https://chnep.wateratlas.usf.edu/canalwatch/.

City of Sanibel

The City of Sanibel's surface water quality monitoring program began in 2002 and has provided a data set from which trends and seasonal variability have been established. The data that has been gathered has allowed the City to make informed and sound decisions regarding water quality improvement and protection. More information is available at: https://www.sanibelcleanwater.org/ and https://www.mysanibel.com/253/Protecting-Our-Water-Quality.

City of Fort Myers

The City of Fort Myers Stormwater Management Division exists to achieve and maintain a high level of drainage and flood protection for all citizens and to monitor, improve, and maintain water quality in compliance with state and federal permit requirements.

City of Bonita Springs

The City of Bonita Springs began a stormwater monitoring program in 2006. Surface water sampling is conducted on behalf of the City by Johnson Engineering.

Manatee County

The Manatee County Air and Watershed Management program conducts fixed station, freshwater, monthly water quality monitoring at two permanent sites within the County's

jurisdiction. Temporary sites were added as needs indicated. Monitoring records from the oldest site extends back to 1997. More information is available at: http://www.manatee.wateratlas.usf.edu/river/?wbodyatlas=river&wbodyid=14609.

Polk County

Polk County Parks and Natural Resource Division conducts fixed station, freshwater, quarterly water quality monitoring and laboratory analysis for eight sites on the Peace River and its tributaries, and in 84 public access lakes in the Peace River watershed within the County's jurisdiction. The ambient monitoring program began in 1985. Although the County program is not coordinated with monitoring conducted by the Florida LakeWatch Program, water quality data from a variety of sources can be downloaded from the Polk County Water Atlas. These data and additional information are available at: http://www.polk.wateratlas.usf.edu/.

City of Winter Haven

The City of Winter Haven's Natural Resources Division monitors 35 lakes within the City for water quality, biology, and hydrology metrics related to lake health. Data is collected on Chlorophyll-a, Nitrogen, and Phosphorus concentrations to assess lake water quality. The data is summarized and evaluated using a City staff developed Lake Health Index which assigns a weighted score for each component of lake health presented, and averages into a total score ranking from 0-3. This lake health score was not developed to be an official evaluation metric, but is an internal tool used to compare lake trends over time. It is not all inclusive of the many factors that go into a healthy lake and is subject to change year to year based on different annual environmental conditions. More information is available at: https://www.mywinterhaven.com/264/Annual-Lakes-Report.

City of Lakeland

The City of Lakeland's Lakes and Stormwater Division and Polk County Natural Resources actively monitor water quality on 15 of the major lake systems for physical, chemical, bacteriological and/or biological parameters. Water samples from the lakes are routinely collected and analyzed in a laboratory. Scientists at the City and the County frequently review lab results to monitor for any changes in water quality. These data are available on the CHNEP Water Atlas: https://chnep.wateratlas.usf.edu/.

Florida LAKEWATCH

Florida LAKEWATCH is a citizen volunteer lake monitoring program that facilitates "hands-on" citizen participation in the management of Florida lakes, estuaries, rivers and springs through monthly monitoring activities. Coordinated through the University of Florida's Institute of Food and Agricultural Sciences/FFGS Fisheries and Aquatic Sciences, the program has been in existence since 1986. In 1991, the Florida Legislature recognized the importance of the program and established Florida LAKEWATCH in the state statutes (Florida Statute 1004.49.). LAKEWATCH is now one of the largest lake monitoring programs in the nation with over 1800 trained citizens currently monitoring 525 lakes, 175 estuary stations, 125 river stations, 20 coastal dune lakes, and 10 spring runs in 57 counties. More information is available at: https://lakewatch.ifas.ufl.edu/ and the data is available on the CHNEP Water Atlas: https://chnep.wateratlas.usf.edu/.

Mote Marine Laboratory & Aquarium

Mote's Beach Conditions Reporting System (BCRS) provides several types of information about beach locations and other recreational waterways in Florida and other coastal states. The BCRS is a valuable tool during Florida red tide events, communicating the presence of dead fish, respiratory irritation among beachgoers, water color, and wind direction. In the absence of red tide and other events, the BCRS continues to serve as a valuable source of information for beachgoers in Florida and beyond. Check out the Mote BCRS at: https://visitbeaches.org/map.

Suncoast Waterkeeper

The Suncoast Waterkeeper (SCWK) conducts regular weekly monitoring of bacterial levels in 11 recreational sites throughout the Suncoast. These sites are used for recreational purposes but are not tested by the government. The Benchmark EnviroAnalytical lab examines the samples for harmful Enterococci bacteria. The data and additional information are available at: https://www.suncoastwaterkeeper.org/safetoswim.

Beginning in August 2021, surface water grab samples were collected at areas identified by partners and scientific advisors at locations that may be receiving high levels of nitrogen pollution from the surrounding land. Samples were collected every two weeks for one year. Some sites are no longer monitored due to their initial low concentrations and Suncoast Waterkeeper's limited resources. New sites were selected in September 2022. Currently, 12 sites are monitored monthly for all types of nitrogen (ammonia, nitrite-nitrate, and organic nitrogen). These combined types are reported as total nitrogen in milligrams per liter (mg/L). All samples were analyzed at Benchmark EnviroAnalytical, a National Environmental Laboratory Accreditation Program (NELAP)-certified lab in Palmetto, Florida.

Calusa Waterkeeper

The Calusa Waterkeeper (CWK) staff and volunteer rangers routinely conduct independent testing of several Lee County waterways for Enterococci bacteria. Test results are determined in their independent lab and at Florida Gulf Coast University (FGCU) depending on the number of samples. Calusa Waterkeeper's close watch of local creeks has compelled more monitoring by the Florida Department of Environmental Protection. Water samples are collected monthly at 14 sites along the Caloosahatchee River, 10 sites surrounding Estero Bay, and 5 sites throughout Pine Island/Matlacha. The data and additional information is available at: https://calusawaterkeeper.org/issues/bacteria-monitoring/.

Mosaic Fertilizer, LLC

Mosaic conducts surface water quality monitoring at over 250 monitoring locations for over 100 water quality parameters. Samples are collected daily, weekly, monthly, quarterly, semi-annually, and annually based on different permitted compliance requirements. All surface water systems are monitored by Mosaic, must meet or exceed the FDEP Class III standards for surface water quality as set forth in FAC 62-52.530. Mosaic also conducts continuous water quality monitoring via data logging instrumentation. Additionally, Mosaic participates in the Horse Creek Stewardship Program (HCSP), which was established in 2003 and is a highly successful program that provides ongoing monitoring of water quantity and quality at permanent stations along the Horse Creek System, which stretches from Hardee to DeSoto counties. In addition to monthly quality sampling, monitoring activities also include biological sampling three times per year at every station.

Coastal Charlotte Harbor Monitoring Network Study Design

Sampling Design

The CHNEP estuaries are divided into 13 strata and further broken down into square nautical mile grids, based on those used by the FWC FWRI. This was decided after extensive review by the CHNEP Technical Advisory Committee (see CHNEP Long Term Monitoring Strategy, 2004). Each stratum has relatively homogeneous water quality conditions.

Within 12 of the strata, five sampling sites are randomly selected for each stratum monthly, a requirement of the program is that only one sample can be taken within a square nautical mile grid in a selected stratum each month. This is done to ensure a minimum distance between sampling sites to meet requirements for both FDEP QA Rules (62-160, F.A.C.) and CCHMN SOPs stratified random sampling design. The CCHMN collects five samples at five sites per month, adding up to 60 samples per stratum per year, or 720 sites total throughout the CHNEP estuaries. Sarasota County contracts Mote research laboratory (contract laboratory) to conduct water quality monitoring in the final stratum (Upper Lemon Bay) monthly through their ambient monitoring program, however they do not participate in the CCHMN directly, as the program and site selection is not in conformance with the current CCHMN SOPs. Instead, the program uses the hexagonal grids for each of the county bay segments including Upper Lemon Bay. 5 random sites are sampled in Upper Lemon Bay each month, however randomization of the sample sites within Upper Lemon Bay was done only once, so each site is re-sampled every year in the same month as the preceding years. This data is still included in assessments and trend analyses.

CCHMN strata are shown in Figure 4 and include:

- Upper Lemon Bay
- Lower Lemon Bay
- Cape Haze/Gasparilla Sound
- Tidal Myakka River
- Tidal Peace River
- Charlotte Harbor West Wall
- Charlotte Harbor East Wall
- Lower Charlotte Harbor
- Pine Island Sound
- Matlacha Pass
- Tidal Caloosahatchee River
- San Carlos Bay
- Estero Bay

The square mile grids and numbers for each stratum are shown in Figure 5.

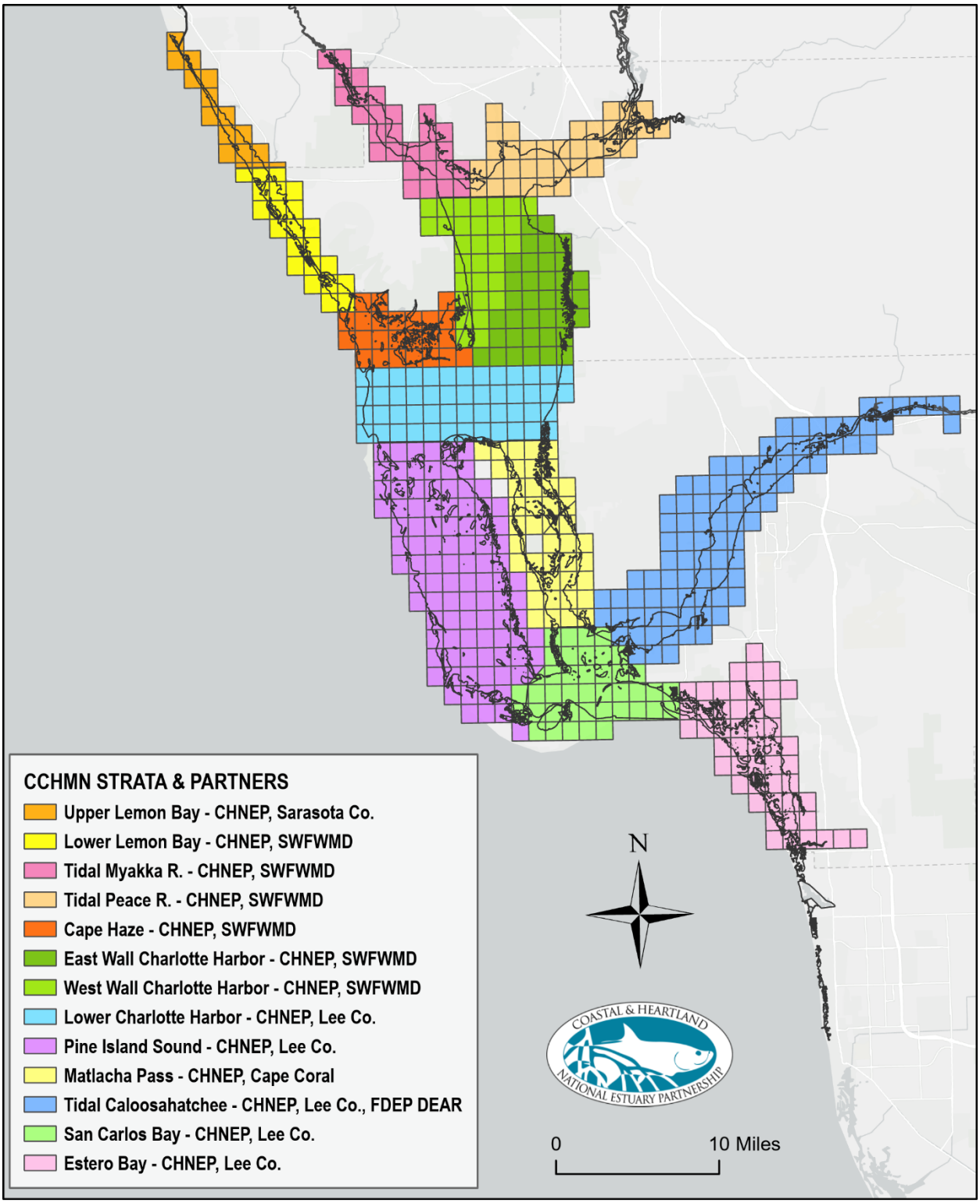


Figure 4: CCHMN Strata and Partners

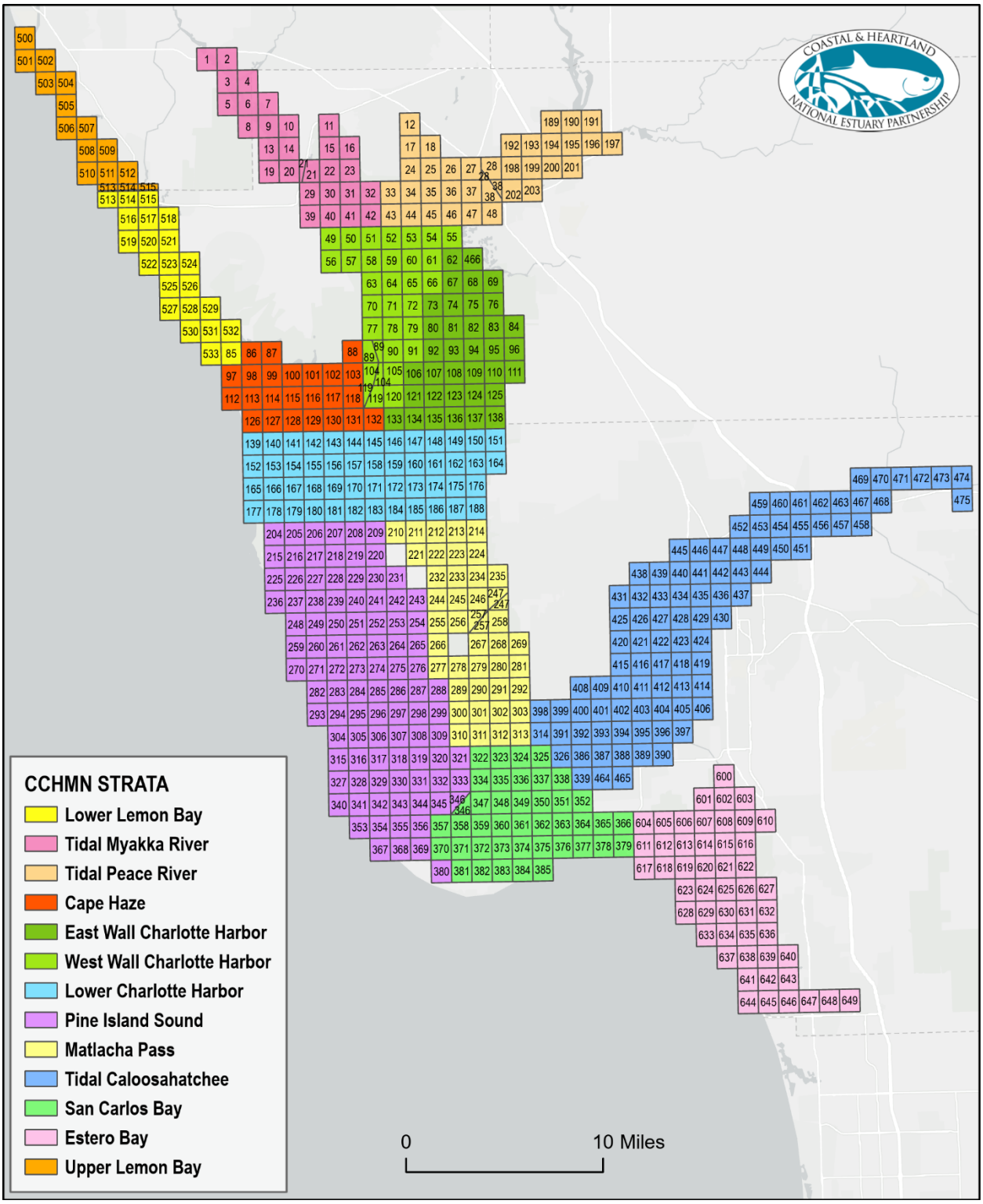


Figure 5: CCHMN Strata and Grid Numbers

CCHMN Core Water Quality Analytes for Estuaries and Tidal Rivers

The CCHMN core water quality analytes measured and collected in estuaries and tidal rivers collected according to FDEP 2017 SOPs (Effective 4/16/2018) Field testing overall – FT 1000 include:

Measured In-Situ:

- Depth (m)
- Secchi disc (m)
- Light attenuation (PAR; k) (suspended 2023)
- Temperature (ºC) (FT 1400)
- Salinity (ppt) (FT 1300)
- Specific conductance (µS) (FT 1200)
- Dissolved oxygen (DO) (mg/L) (FT 1500)
- pH (pH units) (FT 1100)

Water Samples Collected for Laboratory Analyses:

- Color (PCU) (Standard Method (SM) 2120B, SM2120C 2011)
- Specific Conductance (µS) (not done in lab unless field QC fails, SM 2150B 2011)
- Turbidity (NTU) (SM 2130B, EPA180.1)
- Total suspended solids (TSS) (mg/L) (SM 2540D 2015, SM 2540D, SM 2540D, EPA160.2)
- Total organic carbon (TOC) (mg/L) (SM 5210B, SM 5310B 2011)
- Chlorophyll a (mg/L) (corrected for phaeophytin) (SM 1200H, SM 1200M, EPA445.0, Strickland & Parsons, SM10200H 2011)
- Total nitrogen (TN) (mg/L) (calculated from TKN + NOX)
- Total Kjeldahl nitrogen (TKN-N) (mg/L) (SM 4500NH3F, EPA351.2)
- Total ammonia nitrogen (mg/L) (SM 4500NH3F, SM4500NH3G, SM4500NH3H, SM184500NH3C, EPA350.1)
- Total nitrite plus nitrate nitrogen (mg/L) (SM4500NO3F, SM184500N3, EPA353.2)
- Dissolved orthophosphate (OP) (mg/L) (SM4500PE, SM184500PF, EPA365.1, EPA365.3)
- Total phosphorus (TP) (mg/L) (SM184500PF, SM4500PE, EPA365.1, EPA365.3, EPA365.4)

For water quality samples, a single sample will be collected at 0.5 meters below the surface for those locations where the bottom depth is less than 3.0 meters. For locations where the bottom depth is greater than 3.0 meters, two samples will be collected (0.5 meters below the surface and 0.5 meters above the bottom). Light attenuation will be taken for sites greater than 1.3 meters deep (when collected).

Field Sampling and Laboratory Analysis Responsibilities

CCHMN field and laboratory partners (updated 2025 Figure 4) include:

- Upper Lemon Bay - field sampling and laboratory analyses by Mote on behalf of Sarasota County Environmental Services.
- Lower Lemon Bay field sampling and laboratory analyses Southwest Florida Water Management District (current) field sampling by FWRI and laboratory analyses by Charlotte County contract laboratory (Benchmark Laboratory) (2001-2025).
- Cape Haze/Gasparilla Sound - field sampling and laboratory analyses Southwest Florida Water Management District (current) field sampling by FWRI and laboratory analyses by Charlotte County contract laboratory (Benchmark Laboratory) (2001-2025).
- Tidal Myakka River - field sampling and laboratory analyses Southwest Florida Water Management District (current) field sampling by FWRI and laboratory analyses by Charlotte County contract laboratory (Benchmark Laboratory) (2001-2025).
- Tidal Peace River - field sampling and laboratory analyses Southwest Florida Water Management District (current) field sampling by FWRI and laboratory analyses by Charlotte County contract laboratory (Benchmark Laboratory) (2001-2025).
- Charlotte Harbor West Wall - field sampling and laboratory analyses Southwest Florida Water Management District (current) field sampling by FWRI and laboratory analyses by Charlotte County contract laboratory (Benchmark Laboratory) (2001-2025).
- Charlotte Harbor East Wall - field sampling and laboratory analyses Southwest Florida Water Management District (current) field sampling by FWRI and laboratory analyses by Charlotte County contract laboratory (Benchmark Laboratory) (2001-2025).
- Lower Charlotte Harbor - field sampling and laboratory analyses by Lee County Environmental Laboratory (current); field sampling by FWRI (2001-2023).
- Pine Island Sound – field sampling and laboratory analyses by Lee County Environmental Laboratory.
- Matlacha Pass – field sampling and laboratory analyses by the City of Cape Coral.
- Tidal Caloosahatchee River – field sampling by FDEP Division of Environmental Assessment and Restoration (DEAR), South Regional Operations and laboratory analyses by Lee County Environmental Laboratory.
- San Carlos Bay – field sampling and laboratory analyses by Lee County Environmental Laboratory.
- Estero Bay – field sampling and laboratory analyses by Lee County Environmental Laboratory.

Field sampling will be conducted according to the CCHMN Field Sampling Procedures described in the following sections. All laboratories involved in the CCHMN will follow all applicable federal and state guidelines for quality assurance and quality control of water quality analyses, including the use of appropriate duplicate samples and equipment blanks. It is strongly recommended that these laboratories be certified by The NELAC Institute (TNI) and meet FDEP laboratory certification requirements, pursuant to Chapter 62-160, FAC (DEP QA Rule).
It is also strongly recommended that all field sampling be conducted according to FDEP 2017 SOPs (Effective 4/16/2018). Water Samples Collected for Laboratory Analyses – FS 1000, FS 2000, FS 2100. (https://floridadep.gov/dear/quality-assurance/content/dep-sops)

Project Roles

CHNEP serves as coordinator for the Network. CHNEP houses and updates Standard Operating Procedures and Quality Assurance Project Plan Documents and works with CHNEP TAC and CCHMN partner agencies to make agreed upon changes to SOPs and QAPP to keep documents and practices current. CHNEP also directly funds sampling efforts to fill data gaps, hosts Annual CCHMN partners meeting, conducts field sampling audits, attends Southwest FL RAMP meetings, uploads data into CHNEP Water Atlas and funds maintenance and trend analysis features on CHNEP Water Atlas pages on behalf of partners. Each month, CCHMN partners will be responsible for selecting random sampling grids and sites, conducting field measurements and recording results on field data sheets, collecting water quality samples, transporting samples to the laboratories for analysis, communicating field collection issues and quality assurance items to lab for continued refinement, communicating lab analyses issues and quality assurance items to field samplers for continued refinement, downloading data and providing copies of the field data sheets and data bases to appropriate data managers. To ensure data comparability for the CCHMN project, CCHMN quality assurance activities that are implemented in addition to quality assurance measures required to meet state and federal standards as mentioned above include: annual field audits conducted with each sampling partner; field and laboratory partner participation in the Southwest FL RAMP quarterly meetings and split-sample analyses; and CHNEP Management Conference review of data and statistical methods during regular water quality status and trends reporting. It is anticipated that further quality assurance measures will be implemented in the future as needed.

Field Audits

CHNEP will be responsible for performing annual field audits for sample collection for each sampling agency. The results of these audits will be presented at an annual CCHMN meeting for this express purpose as well as resolve outstanding issues.

Data Ownership

The data owner for each stratum will be responsible for data handling and uploading their respective data into state and federal water quality databases. The current data owners for each of the CCHMN strata are:

- Upper Lemon Bay – Sarasota County
- Lower Lemon Bay – SWFWMD (current); SWFWMD and Charlotte County (2001-2025)
- Cape Haze/Gasparilla Sound – SWFWMD (current); SWFWMD and Charlotte County (2001-2025)
- Charlotte Harbor East Wall – SWFWMD (current); SWFWMD and Charlotte County (2001-2025)
- Charlotte Harbor West Wall – SWFWMD (current); SWFWMD and Charlotte County (2001-2025)
- Tidal Myakka River – SWFWMD (current); SWFWMD and Charlotte County (2001-2025)
- Tidal Peace River – SWFWMD (current); SWFWMD and Charlotte County (2001-2025)
- Lower Charlotte Harbor – Lee County Environmental Laboratory
- Pine Island Sound – Lee County Environmental Laboratory
- Matlacha Pass – Cape Coral Environmental Resources
- Tidal Caloosahatchee River – Lee County Environmental Laboratory

- San Carlos Bay – Lee County Environmental Laboratory
- Estero Bay – Lee County Environmental Laboratory

Data owners may assign the uploading of data to federal, state and water management district water quality databases to the certified lab undertaking the laboratory analysis of their field samples as part of a contract, but the data owner is ultimately responsible for ensuring this process is fulfilled. Data owners will also collaborate to the best of their ability to standardize data formatting.

Links to the CCHMN data on agency and other websites include:

- Florida DEP WIN (Watershed Information Network): https://prodenv.dep.state.fl.us/DearWin/public/welcomeGeneralPublic?calledBy=GENERALPUBLIC,
- Florida DEP STORET (Replaced with Florida DEP WIN): https://prodapps.dep.state.fl.us/dear-spa/public/welcome,
- EPA Water Quality Portal (WQP) https://www.waterqualitydata.us/,
- SWFWMD Environmental Data Portal: https://www.swfwmd.state.fl.us/resources/data-maps/environmental-data-portal,
- CHNEP Water Atlas: https://chnep.wateratlas.usf.edu/
- Data Availability of curated CCHMN water quality dataset 2001-2021, is available at https://osf.io/wdz45/ (Medina, 2024),
- Florida Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR): https://data.florida-seacar.org/programs/details/513.

Data Management

The CCHMN data will be maintained and uploaded to federal, state and water management district water quality databases by data owners. The data will be available to public and partnering agencies at all times. The University of South Florida staff will upload CCHMN data to the CHNEP Water Atlas website (http://www.chnep.wateratlas.usf.edu/) through a contract maintained with the CHNEP to facilitate public access to the data.

Table 1: CCHMN Data Source Crosswalk: SWFWMD

CCHMN Strata	Collection/Analysis	Funder	Data Owner/ Uploader	STORET 1998-2000 Org | Project	STORET 2001-2016 Org | Project	WIN 2017-2025 Org | Project
Lower Lemon Bay	FWC-FWRI/ Charlotte Co	CHNEP/ SWFWMD	SWFWMD	STORET_SWFMDDEP | CHARLOTT	STORET_CHNEPLLB | CHNEPLLB	WIN_21FLSWFD | W526*
Tidal Myakka River	FWC-FWRI/ Charlotte Co	CHNEP/ SWFWMD	SWFWMD	STORET_SWFMDDEP | CHARLOTT	STORET_CHNEPTMR | CHNEPTMR	WIN_21FLSWFD | W526*
Tidal Peace River	FWC-FWRI/ Charlotte Co	CHNEP/ SWFWMD	SWFWMD	STORET_SWFMDDEP | CHARLOTT	STORET_CHNEPTPR | CHNEPTPR	WIN_21FLSWFD | W526*
East Wall	FWC-FWRI/ Charlotte Co	CHNEP/ SWFWMD	SWFWMD	STORET_SWFMDDEP | CHARLOTT	STORET_CHNEPCHE | CHNEPCHE	WIN_21FLSWFD | W526*
West Wall	FWC-FWRI/ Charlotte Co	CHNEP/ SWFWMD	SWFWMD	STORET_SWFMDDEP | CHARLOTT	STORET_CHNEPCHW | CHNEPCHW	WIN_21FLSWFD | W526*
Cape Haze	FWC-FWRI/ Charlotte Co	CHNEP/ SWFWMD	SWFWMD	STORET_SWFMDDEP | CHARLOTT	STORET_CHNEPCHP | CHNEPCHP	WIN_21FLSWFD | W526*

CCHMN Strata	Collection/Analysis	Funder	Data Owner/ Uploader	WIN 2026-Present Org | Project
Lower Lemon Bay	SWFWMD	SWFWMD	SWFWMD	WIN_21FLSWFD | W526*
Tidal Myakka River	SWFWMD	SWFWMD	SWFWMD	WIN_21FLSWFD | W526*
Tidal Peace River	SWFWMD	SWFWMD	SWFWMD	WIN_21FLSWFD | W526*
East Wall	SWFWMD	SWFWMD	SWFWMD	WIN_21FLSWFD | W526*
West Wall	SWFWMD	SWFWMD	SWFWMD	WIN_21FLSWFD | W526*
Cape Haze	SWFWMD	SWFWMD	SWFWMD	WIN_21FLSWFD | W526*

CCHMN Strata	EPA WQX 1998-2000 Org | Project	EPA WQX 2001-2008 Org | Project	EPA WQX 2010-2016 Org | Project	EPA WQX 2017-Present Org | Project	SWFWMD EDP ID | Project
Lower Lemon Bay	SWFMDDEP | CHARLOTT	CHNEPLLB | CHNEPLLB	CHNEPLLB_WQX | AWQM	WIN_21FLSWFD | W526	SWFWMD SID | Planning - Charlotte Harbor National Estuary Program CMP
Tidal Myakka River	SWFMDDEP | CHARLOTT	CHNEPTMR | CHNEPTMR	CHNEPTMR_WQX | AWQM	WIN_21FLSWFD | W526	Planning - Charlotte Harbor National Estuary Program CMP
Tidal Peace River	SWFMDDEP | CHARLOTT	CHNEPTPR | CHNEPTPR	CHNEPTPR_WQX | AWQM	WIN_21FLSWFD | W526	Planning - Charlotte Harbor National Estuary Program CMP
East Wall	SWFMDDEP | CHARLOTT	CHNEPCHE | CHNEPCHE	CHNEPCHE_WQX | AWQM	WIN_21FLSWFD | W526	Planning - Charlotte Harbor National Estuary Program CMP
West Wall	SWFMDDEP | CHARLOTT	CHNEPCHW | CHNEPCHW	CHNEPCHW_WQX | AWQM	WIN_21FLSWFD | W526	Planning - Charlotte Harbor National Estuary Program CMP
Cape Haze	SWFMDDEP | CHARLOTT	CHNEPCHP | CHNEPCHP	CHNEPCHP_WQX | AWQM	WIN_21FLSWFD | W526	Planning - Charlotte Harbor National Estuary Program CMP

NOTES
This data was uploaded and appears as 'fixed station' data by grid from 1998-2020 but was still collected using the stratified random design. To analyze data 1998-2020 this will mean aggregating the 'fixed station' grids by stratum using the 6-digit station IDs. Post 2020, this data can be treated the same as the other CCHMN data which is aggregating all points collected by the identified agency for this CCHMN project by strata. Each sample collected is given it's own unique station ID such as 670109-01.

Table 2: CCHMN Data Source Crosswalk: Lee County

CCHMN Strata	Collection/Analysis	Funder	Data Owner/ Uploader	STORET 2003-2005 Org | Project	STORET 2005-2017 Org | Project	WIN 2017-Present Org | Project
Lower Charlotte Harbor	FWC / Lee Co	CHNEP / Lee Co	Lee Co	STORET_CHNEPCHB | AWQM	STORET_21FLEECO | AWQM	WIN_21FLEECO | CHNEP
Pine Island Sound	Lee Co	Lee Co	Lee Co	STORET_CHNEPPIS | AWQM	STORET_21FLEECO | AWQM	WIN_21FLEECO | PI-RANDOM
San Carlos Bay	Lee Co	Lee Co	Lee Co	STORET_CHNEPSCB | AWQM	STORET_21FLEECO | AWQM	WIN_21FLEECO | SC-RANDOM
Estero Bay	Lee Co	Lee Co	Lee Co	STORET_CHNEPEB | AWQM	STORET_21FLEECO | AWQM	WIN_21FLEECO | EB-RANDOM
Tidal Caloosahatchee River	FDEP / Lee Co	FDEP / Lee Co	Lee Co	STORET_CHNEPTCR | AWQM	STORET_21FLEECO | AWQM	WIN_21FLEECO | CRNEP

CCHMN Strata	EPA WQX 2003-2005 Org | Project	EPA WQX 2005-2017 Org | Project	EPA WQX 2018-Present Org | Project
Lower Charlotte Harbor	CHNEPCHB | AWQM	CHNEPCHB | AWQM	21FLEECO_WQX | CHNEP
Pine Island Sound	CHNEPPIS | AWQM	CHNEPPIS | AWQM	21FLEECO_WQX | PI-RANDOM
San Carlos Bay	CHNEPSCB | AWQM	CHNEPSCB | AWQM	21FLEECO_WQX | SC-RANDOM
Estero Bay	CHNEPEB | AWQM	CHNEPEB | AWQM	21FLEECO_WQX | EB-RANDOM
Tidal Caloosahatchee River	CHNEPTCR | AWQM	CHNEPTCR | AWQM	21FLEECO_WQX | CRNEP

NOTES

This data was uploaded and appears as 'fixed station' data by grid from 2002-2005 but was still collected using the stratified random design. To analyze data 2002-2005 this will mean aggregating the 'fixed station' grids by stratum using the 3-digit station/grid IDs. Post 2005, this data can be treated the same as the other CCHMN data which is aggregating all points collected by the identified agency for this CCHMN project by strata. Each sample collected is given its own unique station ID such as AD11586.

Table 3: CCHMN Data Source Crosswalk: City of Cape Coral

CCHMN Strata	Collection/Analysis	Funder	Data Owner/ Uploader	STORET 2002-2016 Org | Project	WIN 2017-Present Org | Project
Matlacha Pass	City of Cape Coral	City of Cape Coral	City of Cape Coral	STORET_CHNEPMP | CHNEPMP	WIN_CHNEPMP | CHNEPMP

CCHMN Strata	EPA WQX 2002-2016 Org | Project	EPA WQX 2017-Present Org | Project
Matlacha Pass	CHNEP CHNEPMP_WQX | CHNEPMP_WQX	CHNEP CHNEPMP_WQX | CHNEPMP_WQX

NOTES
None

Table 4: CCHMN Data Source Crosswalk: Sarasota County

CCHMN Strata	Collection/Analysis	Funder	Data Owner/ Uploader	STORET 2002-2016 Org | Project	WIN 2017-Present Org | Project
Upper Lemon Bay	Mote	Sarasota Co	Sarasota Co	21FLSARA | BAYRIVER	WIN_21FLSARA | BAYRIVER

CCHMN Strata	EPA WQX 2002-2016 Org | Project	EPA WQX 2017-Present Org | Project
Upper Lemon Bay	21FLSARA | BAYRIVER	21FLSARA_WQX | BAYRIVER

NOTES
Sarasota County contracts Mote research laboratory (contract laboratory) to conduct water quality monitoring in the Upper Lemon Bay stratum monthly through their ambient monitoring program, however they do not participate in the CCHMN as the program and site selection is not in conformance with the current CCHMN SOPs. Instead, the program uses the hexagonal grids for each of the county bay segments including Upper Lemon Bay. 5 random sites are sampled in Upper Lemon Bay each month, however randomization of the sample sites within Upper Lemon Bay was done only once, so each site is re-sampled every year in the same month as the preceding years. This data may still be pulled for trend analysis for the probabilistic sampling design.

Data Analysis

The CHNEP will regularly analyze the CCHMN data and make the results publicly available through the CHNEP Website Water Atlas website (http://www.chnep.wateratlas.usf.edu/). In addition, information about the CCHMN project and 10-year time series analyses of all collected parameters, are available on the CHNEP Water Atlas (http://www.chnep.wateratlas.usf.edu/water-quality-trends/).

Water quality status and trends reports incorporating the CCHMN data include:

- CHNEP Water Quality Status and Trends (Janicki Environmental, 2007)
- CHNEP Water Quality Targets (CHNEP, 2013)
- CHNEP Numeric Nutrient Criteria (Janicki Environmental, 2011)
- CHNEP Optical Model development (Dixon et al, 2014)
- Water Quality Trends and Eutrophication Indicators in a Large Subtropical Estuary: A Case Study of the Greater Charlotte Harbor System in Southwest Florida (Medina et al, 2025), Data Availability of curated CCHMN water quality dataset for this analysis (2001-2021), is available at https://osf.io/wdz45/overview (Medina, 2024).
- CHNEP Water Atlas: https://chnep.wateratlas.usf.edu/,
    - Water Quality Trends: (Updated Annually): https://www.chnep.wateratlas.usf.edu/water-quality-trends,
    - Water Quality Dashboard: https://chnep.wateratlas.usf.edu/water-quality-dashboard/,
    - Preliminary Numeric Nutrient Criteria Calculator: https://chnep.wateratlas.usf.edu/nnc-calculator/,
    - Maps/Data: https://chnep.wateratlas.usf.edu/maps/maps-and-data/,
    - Waterbody Pages –
        - Upper Lemon Bay: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000436/upper-lemon-bay,
        - Lower Lemon Bay: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000130/lower-lemon-bay,
        - Charlotte Harbor (including Cape Haze/Gasparilla Sound, East Wall, West Wall, and Lower Charlotte Harbor): https://chnep.wateratlas.usf.edu/waterbodies/bays/9000388/,
        - Tidal Peace River: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000309/tidal-peace-river,
        - Tidal Myakka River: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000353/tidal-myakka-river,
        - Pine Island Sound: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000132/pine-island-sound,
        - Matlacha Pass: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000099/matlacha-pass,

- San Carlos Bay: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000111/san-carlos-bay.
- Tidal Caloosahatchee River: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000108/lower-tidal-caloosahatchee-river, https://chnep.wateratlas.usf.edu/waterbodies/bays/9000093/middle-tidal-caloosahatchee-river, https://chnep.wateratlas.usf.edu/waterbodies/bays/9000091/upper-tidal-caloosahatchee-river,
- Estero Bay: https://chnep.wateratlas.usf.edu/waterbodies/bays/9000142/estero-bay.

Participation in the Regional Ambient Monitoring Program (RAMP)

All participating CCHMN laboratories and field monitoring agencies will participate in Southwest Florida Regional Ambient Monitoring Program (Southwest FL RAMP) quarterly meetings and inter-laboratory split-sample exercises to help ensure data comparability region-wide. The SWF RAMP serves as a quality assurance forum for comparing split-sample laboratory results, resolving inconsistencies in results and discussing pertinent water quality monitoring issues throughout the region. The mission of RAMP is to foster cooperative participation of regional monitoring program staff to improve comparability of surface water sample collection, in situ field measurements, and laboratory methods used by surface water quality monitoring programs in Southwest Florida marine and freshwater systems. https://tbep.org/about-tbep/boards-committees/technical-advisory-committee/

Coastal Charlotte Harbor Monitoring Network Field Sampling Procedures for Sample Collection

A. Site Selection:

- Five sites per stratum will be sampled each month. Site locations will be chosen and mapped prior to field sampling.
- Site locations will be randomly selected each month. The five sites for each strata will be in five different grids (this ensures a minimum distance between sampling locations).
- Access will be left up to the sampling group. Ease of access should not be the main criteria for sampling site choice.
- Care should be taken not to disturb sediments when motoring to the sampling sites (especially shallow water sites).
- Alternate sites can be chosen if the water depth at the site is too shallow, or it is not possible to access the site. Minimum depth = 1.0 m in Charlotte Harbor, tidal Peace and Myakka rivers; 0.7 m in Lemon, San Carlos and Estero Bays, Pine Island Sound, Matlacha Pass and tidal Caloosahatchee River.
- If alternate sites are sampled, sampling must not be done more than once per grid, the grid must remain in the same region or strata, the closest grid to the original grid should be chosen unless conditions in surrounding grids are similar.
- Representative sampling locations and depths shall be selected to account for homogeneous and heterogeneous conditions in the waterbody.

B. Sample Acquisition:

There are several requirements that are common to all types of surface water sampling events and are independent of technique. Several of these requirements are concerned with sample parameters that are inherently difficult to sample. In addition to the below procedures, overall care must be taken regarding equipment handling, container handling/storage, decontamination, and record keeping. Water samples will be collected according to FDEP 2017 SOPs (Effective 4/16/2018) Summary Field Procedures (FS 2100 Surface Water Sampling and FS 2000 General Aqueous Sampling):

- Grab samples represent the conditions that exist at the moment the sample is collected and do not necessarily represent conditions at any other time. Grab sampling is the preferred method of sampling for a snapshot of the water quality at a particular instant in time.
- Depth Grab Samples will be taken using a using a horizontal sampling device such as a Kemmerer, Van Dorn, Alpha and Beta Sampler, Niskin (or equivalent) used for Specific depth grab sampling.
- A sample grab it taken at 0.5 m below the surface for all sites. Measure the water column to determine maximum depth and sampling depth(s) prior to lowering the sampling device. Before collecting the first sample, rinse the sampling device with ample amounts of site water. Discard rinse away from and downstream of the sampling location. At 0.5 m, send the messenger weight down to trip the closure mechanism.
- If the sample site is >greater than or equal to 3.0 m, then an additional sample is taken at 0.5 m above the bottom following the same procedure.

- The sample collection equipment and non-preserved containers shall be rinsed three times with sample water before the actual sample is taken. Discard rinse away from and downstream of the sampling location.
- Once the sampling device is triggered and sample is trapped, the sample is brought on board.
- The proper order for filling sample bottles is as follows: non-preserved, preserved, and finally filtered samples and Fecal Indicator Bacteria (FIB) samples- if collected.
- Samples chemically preserved or filtered within 15 minutes of collection using a 0.45 um pore size for the filter. If field preserved, test pH, by pouring a small amount of water onto a piece of pH paper. Do not put test strip in container.
- Filtered samples (Orthophosphate) shall be collected by a peristaltic pump or syringe-filter combination. All filters will be 0.45 microns. Rinse equipment used for filtered sample with DI water after each sample.
- The tubing for the peristaltic pump is rinsed with the sample water (through the spigot). If using a syringe, the syringe shall be rinsed 3 times with sample water prior to collecting the sample.
- If a 40mL vial is used to collect Total Organic Carbon (TOC) samples, bottles should be filled to include a convex meniscus shall not contain head space. Small bubbles smaller than pea-size are permissible. The most effective way to accomplish this is to collect the sample with the sample bottle tilted toward the spigot of the Alpha or Niskin bottle, not straight up and down. If TOC is collected from regular plastic bottle, some headspace is acceptable.
- Ensure all caps are tightened prior to placing sample bottles in ice chests.
- Once filled, all bottles shall be put on wet ice in sampling coolers within 15 minutes, according to FDEP protocols.

C. Blank, Duplicate and Split Samples:

Equipment blanks, duplicates, and split samples will be collected according to FDEP 2017 SOPs (Effective 4/16/2018) Summary Field Procedures (FS 2100 Surface Water Sampling):

- An equipment blank will be taken every sampling trip.
- Optional: (preferred) Duplicate is collected every 10 sites or one every sampling trip.
- Optional: (preferred) Split samples for the testing the precision of lab analysis.

D. Use of Protective Gloves:

Optional: (preferred) FDEP recommends wearing protective gloves when conducting all sampling, but their use is not mandatory. Use gloves if sampler has come in contact with potential contaminants (i.e., sunscreen lotion, outboard motor oil). If protective gloves are used, they shall be clean, new, and disposable. These should be changed after collecting all the samples at a site, prior to the next sampling site. According to FDEP 2017 SOPs (Effective 4/16/2018) Summary Field Procedures (FS 1000 General Sampling Procedures).

E. Container and Equipment Rinsing:

When collecting aqueous samples, the sample collection equipment and non-preserved containers shall be rinsed three times with sample water before the actual sample is taken. This protocol shall not be followed for sample containers with pre-measured preservatives in

the container (acidified bottles). According to FDEP 2017 SOPs (Effective 4/16/2018) Summary Field Procedures (FS 2100 Surface Water Sampling).

F. Dedicated Equipment Storage:

All dedicated equipment shall be stored in a clean and controlled environment, protected from dirt and other sources of TN, TP, and TSS contaminants. According to FDEP 2017 SOPs (Effective 4/16/2018) Summary Field Procedures (FS 1000 General Sampling Procedures).

G. Fuel-powered Equipment and Related Activities:

All sampling is done away from fuel-powered equipment activities. Samplers will make every effort to observe winds, currents, sediment disturbed by the boat and other parameters to ensure no contamination. According to FDEP 2017 SOPs (Effective 4/16/2018) Summary Field Procedures (FS 1000 General Sampling Procedures).

H. Preservation:

All certified labs participating in the CCHMN shall provide sample bottles to the sampling entity, ready for use. Samplers use an intermediate device to transfer the samples into the bottles. Some laboratories provide pre-preserved bottles, in which case no further preservative is added by samplers. If preservative needs to be added by samplers in the field, it should be added within 15 minutes of collection. Samplers or a certified laboratory should check the pH of the acid preserved samples (except for the TOC bottle with no air space) to make sure the pH <2. According to DEP SOP FS 2001, section 3.5.

I. Decontamination:

Cleaning / Decontamination will be conducted according to FDEP 2017 SOPs (Effective 4/16/2018) (FC 1000 Cleaning / Decontamination Procedures)

- All certified labs participating in the CCHMN shall provide clean sample bottles to the sampling entity, ready for use. Sample containers can be certified clean or from a laboratory that is accredited under the National Environmental Laboratory Accreditation Program (NELAP) that follows the container cleaning procedures outlined in FC 1320.
- Optional: (preferred) FDEP recommends wearing protective gloves when conducting all sampling, but their use is not mandatory. Use gloves if sampler has come in contact with potential contaminants (i.e., sunscreen lotion, outboard motor oil). If protective gloves are used they shall be clean, new, and disposable. These should be changed after collecting all the samples at a site, prior to the next sampling site.
- All equipment shall be cleaned in a controlled environment and transported to the field pre-cleaned and ready to use. All equipment must be immediately rinsed with water after use, as specified below. Field cleaned equipment (pump tubing and re-usable filters) shall be cleaned between samples.
- Depth grab horizontal sample device and sample bottles shall be rinsed with ambient sample water between samples, while equipment used for the filtered sample including the pump tubing and re-usable filters shall be cleaned with deionized water between samples.
- Proper cleaning protocol, upon return to the field lab, is followed.

- Use Luminox (or a non-phosphate solvent based equivalent), Liqui-Nox (or a non-phosphate equivalent) or Alconox (or equivalent).
- Analyte free water source: Deionized used for blank preparation and the final decontamination water rinse.
- All samples are immersed in wet ice within 15 minutes of sample collection. Hold times meet FDEP SOPs (Table FS 1000-4).

J. Calibration of Equipment:

Water samples will be collected according to FDEP 2017 SOPs (Effective 4/16/2018) (FT 1000 General Field Testing and Measurement Procedures):

- Ensure that the field testing for in-situ measurements with multi-parameter sonde is preceded by an acceptable Perform Initial Calibration (IC) and Initial Calibration Verification (ICV) and followed by an acceptable Continuing Calibration Verification (CCV) within 24 hours.
- If a CCV fails to meet acceptance criteria- Reattempt the CCV again, then report all results between the last acceptable calibration verification and the failed calibration verification as estimated (report the value with a "J"). Include a narrative description of the problem in the field notes.
- Document information about standards and reagents used for calibrations, verifications, sample measurements, and maintenance.
- Manufacturers' suggested maintenance activities and any repairs are performed and documented for all applicable equipment and instruments FS 2100 Audit Checklist.

K. Data Measurements and Recording:

General Sampling Procedures will be conducted according to FDEP 2017 SOPs (Effective 4/16/2018) (FS 1000 General Sampling Procedures). Each member of the field sampling team will conduct the same tasks throughout the sampling event. One field sampler will record environmental parameters, light attenuation measurements (if collected), multi-parameter sonde readings, Secchi disks values and any other pertinent information needed. A minimum of two people be assigned to a field team/To ensure sampling precision, each member should continue to assume the same duties for the entire sampling trip, especially secchi disk readings.

- Document all activities related to a sampling event, including sample collection, equipment calibration, equipment cleaning and sample transport.
    - Documentation Requirements includes names of personnel, type(s) of sampling equipment used, date and time of collection (48hr hold time), ambient field conditions, location and matrix, record of quality control samples, samples labeled individually with preservation info, depth, decontamination in SOP or recorded, Chain of Custody (COC) records, equipment used, documentation of equipment maintenance and calibration or SOPs.
- Complete the sample container label and stick firmly on the container.
- Take samples near the bow, away and upwind from any gasoline outboard engine. Avoid disturbing sediments in immediate area of sample collection.

- Secchi disk depths shall be taken on shady side of boat without the use of sunglasses, and light meter readings (if collected) will be taken on sunny side of boat.
- Designate the identity of specific instrumentation (including multi-parameter sonde) in the documentation with a unique description or code for each instrument unit employed.
- Multi-parameter sonde values (pH, DO, salinity, pH, and temperature) shall be recorded to the nearest 0.01 values, except conductivity, which is recorded to the nearest unit.
- Values shall be measured and recorded at 0.5 m below the surface at all sites.
- Values shall be measured and recorded at 0.5 m above the bottom for sites deeper than 1 m depths.
- Values may also optionally (preferred) be measured and recorded at 1 m depth profiles throughout the water column at sites above 1.5 m.
- Depths shall be recorded from the sonde probes, not the bottom of the instrument , not the bottom of the instrument (i.e. the bottom of the probe guard).
- Bottom composition information (mucky, sandy, submerged aquatic vegetation, hard bottom or unknown) will be recorded.
- In situ weather conditions including windspeed, cloud cover, air clarity, tide stage, and wave height will be recorded.
- Document on the lab transmittal form and in field records about any relevant observations on site conditions that may impact the sample or problems. This includes documentation that sample is representative of conditions & rain in the past 24 hrs for samples taken after an event.
- Use a Chain of Custody form or other transmittal record to document sample transfers to other parties and hold times.

L. Light Measurements: (Suspended 2023)

Collection of light attenuation data was suspended in 2023, understanding partners would focus on other measures that capture water clarity including chlorophyll-A, color, turbidity, and Secchi depth. This section remains in the CCHMN SOPs should partners wish to resume collection of light attenuation data.

Light attenuation in the water column is measured by gathering information on Photosynthetically Active Radiation (PAR) using LI-COR quantum sensors. This data will be gathered by CCHM procedures using the specified equipment and procedures outlines below. This information can be used to update/calibrate an empirical Optical Model used to inform and updated the Water Clarity Reporting Tool, both the model and the reporting tool were developed specifically for CHNEP and the Charlotte Harbor region (Dixon and Wessel, 2014).

- Underwater sensors may be 2 pi (flat) or 4 pi (round). It is preferable to use similar sensors throughout the CCHMN, but 2 pi sensors may be used in the SWFWMD strata, and 4 pi sensors may be used in the SFWMD strata.
- Underwater light meters will be mounted 0.5 m apart on a PVC pole frame with depths accurately and clearly marked.
- Before each sampling event, the light meter underwater sensor readings will be validated by taking simultaneous readings in the air and recording the values for each sensor on the data sheet, so that the readings may be used as correction factors during data analysis as

needed. The most effective way to accomplish this is to hold the PVC frame out of the water, pointed directly towards the sun away from your body or any other objects. If both sensors' reading are within 5% of one another while performing this validation, there is no need to send meters for manufacturer calibration.

- The light meter data logger will be set to average readings every 5 seconds and the data will be recorded after the readings stabilize (about 30 seconds).
- A data qualifier will be used to record bottom composition information (mucky, sandy, submerged aquatic vegetation, hard bottom or unknown), especially when using a 4 pi sensor over white, sandy sediments.
- During field sampling at each site, underwater light meter measurements will be recorded simultaneously with the PVC pole frame held vertically in the water without shading the sensors by the boat, equipment, submerged aquatic vegetation or algae. Air sensor measurement(s) will be recorded simultaneously with corresponding underwater readings while placed on a level surface on the boat.
- In rough waves, the PVC pole frame with the underwater sensors will be held with the appropriate depth mark held as stable as possible at the water surface. The most effective way to accomplish this is to have the person holding the PVC pole frame lean over the water, ensuring all safety precautions have been met, and act as a "gimbal" as the boat moves under them.
- **For sites below or equal to 2.0 m**, light meter measurements will utilize one air measurement and two underwater light measurements taken simultaneously at depths of 0.5 m and 1.0 m below the surface.
- **For sites greater than 2 m**, light meter measurements will utilize one air measurement and two underwater measurements collected simultaneously. Underwater light measurements will be taken at depths of 0.5 m and 1.0 m below the surface and 0.5 m and 1.0 m above the bottom.
- **For sites greater than or equal to 3 m** (Optional), light meter measurements will utilize one air measurement and two underwater measurements collected simultaneously. Underwater light measurements will be taken at depths of 0.5 m and 1.0 m below the surface, 0.5 m and 1.0 m above the bottom or the lowest depth the light measurement pole can reach. **and at 1.0 m increments between the surface and bottom.**

Table 5: Depths for Light Attenuation Data Collection

Water Depth (m)	Light Meter Measurement Depths (m)			
	1	2	3	Air
1.3 - 2.0	0.5/1.0	-	-	Optional
2.1	0.5/1.0	1.1/1.6	-	Required
2.2	0.5/1.0	1.2/1.7	-	Required
2.3	0.5/1.0	1.3/1.8	-	Required
2.4	0.5/1.0	1.4/1.9	-	Required
2.5	0.5/1.0	1.5/2.0	-	Required
2.6	0.5/1.0	1.6/2.1	-	Required
2.7	0.5/1.0	1.7/2.2	-	Required
2.8	0.5/1.0	1.8/2.3	-	Required
2.9	0.5/1.0	1.9/2.4	-	Required
3.0	0.5/1.0	1.5/2.0	2.0/2.5	Required
>3.0	0.5/1.0	1.5/2.0	2.0/2.5	Required

M. Sample Transport:

Each laboratory will provide sampling field staff with clean pre-labeled bottles and equipment as needed. Field sampling staff will arrange for water samples to be delivered to the laboratory within that allotted sample holding time. Sample transport will follow appropriate Chain of Custody procedures between field and laboratory partners, including proper sample preservation and temperature requirements. Chain of Custody forms will be kept on file with the laboratories, available on request. According to FDEP 2017 SOPs (Effective 4/16/2018) (FS 1000 General Sampling Procedures and FD 1000 Documentation Procedures).

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Appendix A: Example CCHMN Field Equipment Check List

CCHMN Field Equipment Check List

Date:_____ Strata: _____

Agency:_____ Samplers:_____

	Equipment & Supplies
	CCHMN SOPs
	Sampling Site Locations
	Sampling Site Maps
	Data Sheets
	Pens, Pencils, Sharpies
	Chain of Custody Forms
	GPS
	Depth Finder
	DI Water
	Secchi
	Sonde & Extra Weight (Sonde #_____)
	Alpha Bottle
	Licor
	Pump or Syringes
	Filter Holders, Filters, Forceps
	Sample Bottle Kits
	Coolers
	Ice
	If Preserving Sample in Field, Acid Vials (SO_4 & NO_3) & Waste Container
	Equipment Spare Parts & Toolbox
	Truck Notebook
	Boat Notebook
	PFDs
	Sunscreen & Bug Repellant
	Cellphone & Handheld Radio
	Paddle
	Throwable PFD
	Horn or Whistle
	First Aid Kit
	Flares
	Other:
	Other:
	Other:

Appendix B: Example CCHMN Data Sheet

CHARLOTTE HARBOR - LEMON BAY RANDOM SAMPLING DATA SHEET

Site Storet Code:

Date:	**Grid#**	**Region: 1 2**	Blank Time:	Project ID#:
Time:	**Sonde:**	**3 4 5 LB**	_____ DUP Time:	Collection Type:
Collecting Agency:	**FWC**		_____ Bottom Time:	Sample Equipment:
GPS Selected:	**GPS Actual:**		**Weather Conditions:** Rain in the last 24 Hours: Yes No (circle)	
Lat:	Lat:		Wind dir/spd: mph or knots (circle)	
Long:	Long:		Wave ht: ft m (Circle)	

Samplers: SR EC TH CS DY RM EM AW AB NI MB GP KC DB EW LH SM NL NM MY JD Volunteer

Sampler Signature:

Cld cover (%): Hazy Clear Fog Rain

Tide Level: LS LR LF MR MF HR HS HF

L=Low; M=Mid, H=High

S=Slack, R=Rising, F=Falling

Water Depth / Secchi:

Is sample representative of typical physical conditions for this region/season? Yes No (circle)

Total Depth/m	Secchi Average/m

BOTTOM TYPE: seagrass mud sand hard bottom UNK

Water Data: (0.01)	Sample Depth/m	Water Temp. (°C)	Sp. Conductance (uS/cm)	Salinity ‰	Dissolved O2 (mg/L)	Dissolved O2 (% sat)	pH
Time:							
	0.5						
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	bottom						
	Blank						

Additional Comments & Observations:

Type	**SID**
FLO	

Page_____ of _____

Appendix C: Example CCHMN Chain of Custody Form

Benchmark EnviroAnalytical, Inc. E84167
1711 Twelfth Street East
Palmetto, FL. 34221
(941) 723-9986
(941) 723-6061 fax

Sample Temperature checked upon receipt with Temperature Gun ID #_____
Sample Temperature checked upon receipt at BEAS with Temperature Gun ID #_____

Client: **Charlotte County Public Works- Stormwater** Contact:
Joanne Vernon, P.E.
410 Taylor St, Unit 104
Punta Gorda, FL 33950
Joanne.Vernon@charlottecountyfl.gov
Matthew.Logan@charlottecountyfl.gov

Project Name: Charlotte Harbor/Lemon Bay FWC Profile # 700

Laboratory Submission #:

Station ID Naming Format: ###### "Surf" or "Bott"	Sample Matrix[2] / Sample Type[1]	Parameters, Preservative[4], Container Type[3] / Total Number of containers =						Field Parameters		Laboratory Sample #
		TSS (SM2540D)	NTU (180.1) Color/pH (SM2120)	Chlorophyll a Corrected (445.0)	Ortho-Phosphate (365.3) (Field Filtered must be on cap)	TKN (351.2) TP (365.3) NO2-NO3 (Systea Easy) NH3 (350.1) TN	TOC SM5310B	Temperature (°C)	pH (s.u.)	
		1 X 1 Quart Plastic	1 x 1/2 pint plastic	1 x 500 ml Opaque Plastic	1x1/2 Pint Plastic	1x1/2 Pint Plastic	1x40mL Glass Vial			
		Plain	Plain	Plain	Plain	1.1 mL 1:4 H2SO4 Acid Lot #	0.2 mL 1:1 H3PO4			
670045-01292025 Surf	SW /Grab	Date & Time	1/29/2025 8:49					20	7	
670045-01292025 Bott	SW /Grab	Date & Time	1/29/2025 8:53					23	7	
	SW /Grab	Date & Time								
	SW /Grab	Date & Time								
	SW /Grab	Date & Time								
	SW /Grab	Date & Time								
	SW /Grab	Date & Time								
	SW /Grab	Date & Time								
	SW /Grab	Date & Time								
	SW /Grab	Date & Time								

** 12-29-10 Send Extra TOC vial per every 10 Samples

1. "Sample Type" is used to indicate whether the sample was a grab (G) or whether it was a composite (C).
2. "Sample Matrix" is used to indicate whether the sample is being discharged to drinking water (DW), groundwater (GW), surface water (SW), fresh surface water (FSW), saline surface water (SSW), soil, sediment (SDMNT), or sludge (SLDG).
3. "Container Type" is used to indicate whether the container is plastic (P) or glass (G).
4. Sample must be refrigerated or stored in wet ice after collection. The temperature during storage should be less than or equal to 6°C (42.8°F).
5. Under "Preservative," list any preservatives that were added to the sample container. Lot Number of preservative used is specific to the bottles included in the kit. NaThio, H_2SO_4 and HNO_3 do not have expiration dates per the manufacturer. Micro bottles are pre-preserved at manufacturing stage. 40mL vials are pre-preserved at manufacturing stage.

Instructions:
1. Each bottle has a label identifying sample ID, premeasured preservative contained in the bottle, sample type, client ID, and parameters for analysis.
2. The following information should be added to each bottle label after collection with permanent black ink: date and time of collection, sampler's name or initials, and any field number or ID.
3. All bottles not containing preservative may be rinsed with appropriate sample prior to collection.
4. The client is responsible for documentation of the sampling event. Please note special sampling events on the sample custody form.
5. Sample Kit has been created by BEA, using new, certified bottles.

Laboratory Sample Acceptability:
pH <2 : □ BEA Temperature:
BEAS Temperature:

1	Collector & Affiliation (Print and Sign): **Alexa_Baldino**	Date:	Time:	Received By & Affiliation (Print and Sign):	Date:	Time:
2	Relinquished By & Affiliation (Print and Sign):	Date:	Time:	Received By & Affiliation (Print and Sign):	Date:	Time:

Appendix D: Example CCHMN Annual Audit Form

CCHMN FY2025 FIELD AUDIT FORM

Sampling Strata: _____

Organization: _____ Date: _____

Sampling Staff: _____ Time: _____

CHNEP Auditor: _____ Weather: _____

Boat: _____ Tide: _____

	Site #				
	1	2	3	4	5
SUMMARY DATA					
Data Recorder					
Secchi Disk Operator					
Alpha or Van Dorn Bottle Operator					
Pump Operator (if applicable)					
YSI Operator					
LiCor Operator (if applicable)					
Total Depth (m)					
Water Sample & YSI Depths (m)					
Surface					
Intermediate(s) (in 1 m increments - optional)					
(If ≥ 3m deep) Bottom					
LiCor Depths (m) (if applicable)					
Surface					
Intermediate(s) (in 1 m increments if applicable)					
(If ≥ 3m deep) Bottom					

Prepared by N. Iadevaia

CCHMN FY2025 Field Audit
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CCHMN FY2025 FIELD AUDIT FORM

GENERAL OBSERVATIONS					
Samples collected from randomly selected sites which are selected prior to field sampling; alternate sites chosen when: a) water depth too shallow b) unable to get to sample site. Representative sampling locations and depths were selected to account for homogeneous and heterogeneous conditions in the water body.					
Proper documentation of all required information occurs at every site as outlines in SOPs. Ambient field conditions were recorded for all samples. Equipment, field samplers, and lab information is all properly documented.					
Optional: 1 Duplicate field sample taken every 10 sites or 1 every sampling trip.					
1 blank taken every sampling trip.					
Water samples collected using a horizontal sampling device, such as a Van Dorn or Niskin alpha bottle.					
Optional: Use of new protective gloves for each sample.					
All sampling done away from motor; when sampling in a boat, samples taken from bow, away & upwind from engine.					
Care was exercised to not disturb bottom sediments during sample collection.					
DECONTAMINATION					
All equipment cleaned in a controlled environment & transported to the field pre-cleaned ready to use.					
All containers and container caps were free of cracks, chips, discoloration and other features that might affect the integrity of collected samples					
Every effort was made to prevent cross-contamination of samples and contamination of environment.					
Optional: Equipment washed in field with detergents (Liquinox, Luminox or Alconox).					
Field cleaned equipment for filtered sample (pump tubing, syringes, filters)with DI water after completion at each site. Optional: Equipment washed in field with detergents (Liquinox, Luminox or Alconox).					

CCHMN FY2025 FIELD AUDIT FORM

AQUEOUS SAMPLING PROCEDURES					
Equipment construction was appropriate for the analytes of interest.					
Sample collection equipment & non-preserved sample containers rinsed 3x with sample water before sample is taken. Rinse water from intermediate devices was discarded away from and downstream of the sampling location					
Sample containers containing premeasured preservatives were not rinsed with sample prior to collection. Care was taken to avoid contact with samples and sample container interiors. Sample container tags or labels were attached so as to prevent contact between the sample and the label or tag when pouring or dispensing from the container.					
Proper order for filling sample bottles is used: non-preserved, preserved, then filtered. Headspace was left in each sample container after sample collection.					
Orthophosphate samples filtered using peristaltic pump or syringe-filter combination with .45 micron filters; tubing for peristaltic pump rinsed with sample water through spigot.					
Total Organic Carbon (TOC) bottle filled to reverse meniscus not to include any head space.					
Optional: Bacteria sample take. Bacteriological samples were collected as the last analyte group in the collection sequence in order to maximize available holding time.					
Use of certified clean containers or properly sterilized containers. All sterilized containers remained sealed until just prior to filling with sample and remained sealed after filling with sample.					
All sample preservation conformed to DEP SOP requirements. pH paper was not inserted into sample containers. All grab samples were preserved within 15 minutes of collection					
Once filled, sample bottles put on wet ice. Optional: Chlorophyll bottles are laid on top of other bottles in ice chests until cooled, then completely iced.					

CCHMN FY2025 FIELD AUDIT FORM

LIGHT DATA (if applicable)					
Secchi disk depth taken on shady side of boat without sunglasses.					
Light meter readings taken on sunny side of boat.					
Licor measurements recorded simultaneously with 2 uw sensors mounted with PVC pole frame held vertically & sensors not shaded by each other, the boat, SAV or other objects.					
Data qualifier used to record bottom composition information (mucky, sandy, submerged aquatic vegetation, hard bottom or unknown), especially when using a 4 pi light meter over white, sandy sediments.					
MISCELLANEOUS					
Multi-parameter sampling meter values (pH, DO, salinity, temperature) recorded to nearest 0.01 values; conductivity readings recorded to nearest unit.					
Multi-parameter sampling meters calibrated before & after each trip; post-sampling calibration done within 24 hours; data managers notified of failures ASAP & no later than before WIN upload. Manufacturers' suggested maintenance activities and any repairs are performed and documented for all applicable equipment and instruments					
Each CCHMN partner will participate in a minimum of 2 RAMP meetings annually.					
NOTES					
General					
Misc. How do lab and filed communicate? Examples: questions, changes in SOPs, anomalies in data that cause it to need a qualifying code.					
Things to Watch					
Discussion for Annual Meeting Based on Field Audit Results					

Prepared by N. Iadevaia

CCHMN FY2025 Field Audit
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Appendix E: Example CCHMN Sonde Calibration Record and Work Sheets

FIELD INSTRUMENT CALIBRATION RECORDS - EXAMPLE CALIBRATION LOG - PRP

Project Site/FacID: _____

Calibrated by (Print)/Affiliation: _____

Boldly "X" this box if there is qualified data on this page.

Temperature (Quarterly) Date of Last Temp Verification: See log book:

DISSOLVED OXYGEN (DO) (REFERENCE: DEP SOP FT 1500) **Acceptance Criteria +/-0.3 mg DO/L**

Meter/Instrument Name and Unique ID: _____

	Initials	Date	Time	Standard (DO %)	Temp °C	Saturation mg/L (100%)	Response DO (%)	Deviation mg DO/L	Deviation mg DO/L	Pass or Fail
CAL ICV CCV				100%						P F
CAL ICV CCV				100%						P F
CAL ICV CCV				100%						P F
CAL ICV CCV				100%						P F
CAL ICV CCV				100%						P F
CAL ICV CCV				100%						P F

See Table FT 1500-1 and/or Table FS 2200-2 for Dissolved Oxygen Saturation corresponding to Temperature.

SPECIFIC CONDUCTANCE (REFERENCE: DEP SOP FT 1200) **Acceptance Criteria +/-5% the standard**

Meter/Instrument Name and Unique ID: _____

	Initials	Date	Time	Standard (µmho/cm)	Exp. Date	Lot #	Response	Deviation (%)	Pass or Fail
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F

OXIDATION-REDUCTION POTENTIAL (ORP) **Acceptance Criteria +/-10 mV**

REFERENCE: ***EPA Region 4, Operating Procedure, Field Measurement of Oxidation-Reduction Potential (ORP)***

Meter/Instrument Name and Unique ID: _____

	Initials	Date	Time	Standard (mV)	Exp. Date	Lot #	Response (mV)	Response (mV)	Pass or Fail
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F
CAL ICV CCV									P F

Perform ICVs and CCVs only in "READ/RUN" mode.

CAL - Calibration; ICV - Initial Calibration Verification; and, CCV - Continuing Calibration Verification.

FIELD INSTRUMENT CALIBRATION RECORDS - EXAMPLE CALIBRATION LOG - PRP

Project Site/FacID: _____

Calibrated by (Print)/Affiliation: _____

Boldly "X" this box if there is qualified data on this page.

TURBIDITY (REFERENCE: DEP SOP FT 1600) Meter/Instrument Name and Unique ID: _____

Std=0.1-10 NTU +/-10% **Std=11-40 NTU +/-8%** **Std=41-100 NTU +/-6.5%** **Std>100 NTU +/-5%**

	Initials	Date	Time	Standard (NTU)	Exp. Date	Lot #	Response (NTU)	Deviation (%)	Pass or Fail	
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F

pH (REFERENCE: DEP SOP FT 1100) **Acceptance Criteria +/-0.2 SU**

Meter/Instrument Name and Unique ID: _____

	Initials	Date	Time	Standard (SU)	Exp. Date	Lot #	Response (SU)	Deviation (SU)	Pass or Fail	
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F
CAL ICV CCV									P	F

Perform ICVs and CCVs only in "READ/RUN" mode.

CAL - Calibration; ICV - Initial Calibration Verification; and, CCV - Continuing Calibration Verification.

ProDSS Calibration Worksheet

a xylem brand

When the Environment Demands It

This calibration worksheet can help document your calibration and track the performance of your sensors. Please follow the detailed calibration procedures in the ProDSS manual or your facility's standard operating procedure (SOP) to ensure all calibrations are as accurate and as consistent as possible.

Refer to the *YSI Solution Expiration Dates* document to ensure your calibration solutions are fresh. In addition to using fresh standards, never accept an out-of-range or questionable calibration results.

Calibration Date_____ ***Technician:***_____

Handheld Serial Number:_____ ***Handheld Software Version:***_____

Cable Serial Number:_____

Temperature

*Reading when sensor is dry and in room temp air:*_____ *Accurate? Y N*

Conductivity

*Reading when sensor is dry and in room temp air:*_____ *Acceptable value is less than 1 µS/cm*

*Actual Reading in solution before calibration is accepted:*_____

*Reading in calibration solution after calibration is completed:*_____

Conductivity Cell Constant in GLP record after calibration:*_____

Acceptable range for ProDSS conductivity/temperature sensors (626902) is 4.5 to 6.5

Acceptable range for integral (i.e. built-in) sensors on ODO/CT assemblies is 4.4 to 6.4

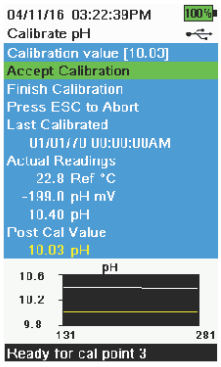
Optical Dissolved Oxygen

*Barometric pressure:*_____

*Actual Reading before DO% calibration is accepted:*_____

*Reading in DO% calibration environment after calibration is completed:*_____

*ODO gain in GLP record after calibration:*_____ *Acceptable range is 0.75 to 1.50*



pH

		Actual Readings during calibration		
Buffer	*Calibration Value*	*pH*	*pH mV***	*Acceptable pH mV in buffer*
7				-50 mV to 50 mV
4				+165 to +180 from pH 7 buffer mV value
10				-165 to -180 from pH 7 buffer mV value

*pH slope in GLP record after calibration:*_____ *Acceptable range is ~ 55 to 60 pH/mV (Ideal is 59.16 mV/pH)*

**GLP stands for Good Laboratory Practice file. This calibration record contains important information about the calibration result.*

***The pH mV at the time of calibration (Sensor Value) can also be seen in the final pH GLP record.*

ProDSS Calibration Worksheet

a xylem brand

When the Environment Demands It

ORP

*Actual Reading in solution before calibration is accepted:*_____

*Reading in calibration solution after calibration is completed:*_____

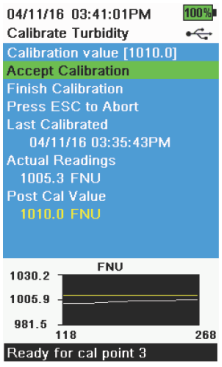
*ORP Cal Offset in GLP record after calibration:*_____ *Acceptable range is* ***-100 to 50***

Turbidity

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

Acceptable range for ***Actual Reading*** *during calibration of the first point is* ***-10*** *to* ***10*** *FNU*

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.*



Depth (Completed in Air)

*Actual Reading before calibration is accepted:*_____

*Reading in air after calibration is completed:*_____

Ammonium

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

***Other standard concentrations can be used. A 2 point calibration without chilling a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.*

****The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.*

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