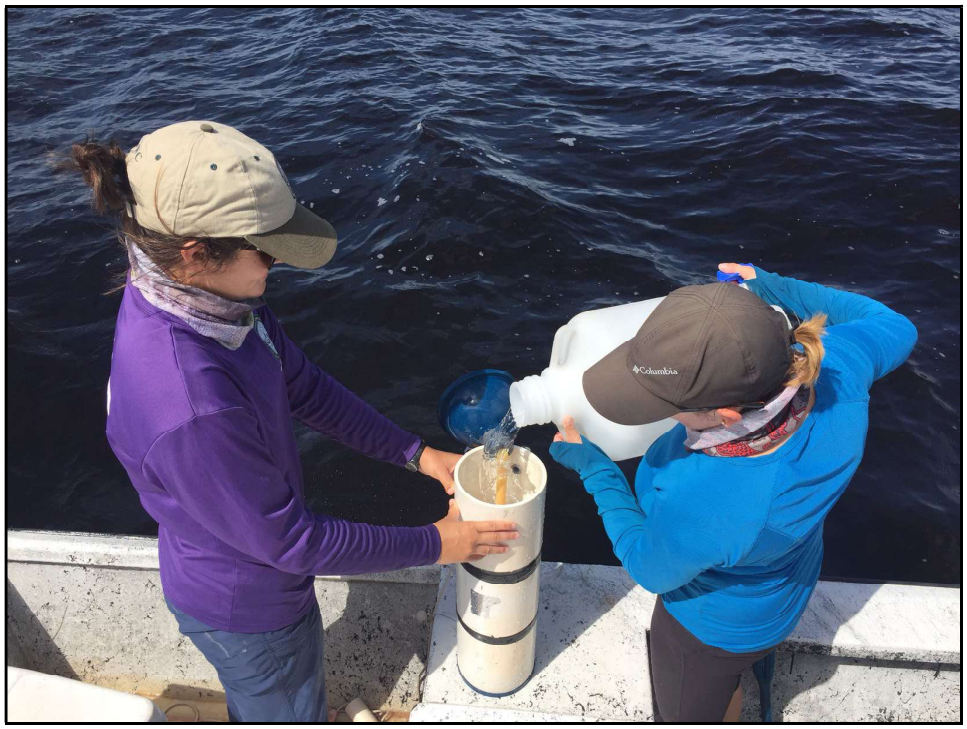
Coastal Charlotte Harbor Monitoring Network
Field Sampling
Quality Assurance Project Plan



Coastal & Heartland National Estuary Partnership
Updated 2025

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Section A – Project Management

A1. Title Page

Coastal Charlotte Harbor Monitoring Network Field Sampling Quality Assurance Project Plan

Prepared on
December 4, 2025

Submitted to EPA
January 13, 2026

Version 2

Prepared by
Coastal & Heartland National Estuary Partnership
1050 Loveland Blvd., Suite D, Port Charlotte, FL 33980

Prepared for
US Environmental Protection Agency
Sam Nunn Atlanta Federal Center
61 Forsyth St., SW
Atlanta, GA 30303

Cooperative Agreement
FY2026 USEPA Work Plan

This QAPP is effective for a period of five years from the EPA approval date.

This Quality Assurance Project Plan (QAPP) has been prepared according to guidance provided in the USEPA Quality Assurance Project Plan Standard (Directive No: CIO 2105-S-02.1, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC, April 2024) to ensure that environmental and related data collected, compiled and/or generated for the project are complete, accurate, and of the type, quantity and quality required for their intended use. The Coastal & Heartland National Estuary Partnership (CHNEP), with Charlotte County, Florida, as its fiscal host, will conduct work in conformance with the quality assurance program.

A2. Approval Page

U.S. Environmental Protection Agency

FELICIA BURKS Digitally signed by FELICIA BURKS
Date: 2026.03.26 12:19:26 -04'00'

Technical Reviewer
Region 4, United States Environmental Protection Agency

Date

MATTHEW REVEL Digitally signed by MATTHEW REVEL
Date: 2026.03.26 12:22:17 -04'00'

Designated QAPP Approval Official
Region 4, United States Environmental Protection Agency

Date

Coastal & Heartland National Estuary Partnership

Jennifer Hecker
Jennifer Hecker (Mar 24, 2026 15:24:24 EDT)

Project Coordinator and Quality Assurance Manager
Executive Director, Coastal & Heartland National Estuary Partnership

03/24/2026
Date

A3. Table of Contents, Document Format, and Document Control

List of Figures

List of Tables

Document Format

This QAPP follows the format and section headings outlined in the EPA IT/IM Directive Standard for QAPPs (Directive No: CIO 2105-S-02.1) to expedite review and approval.

Document Control

Document Control is used to identify the most current version of the QAPP and is included in the footer on every page (title, version, date, page, total number of pages).

Table 1: List of Commonly Used Acronyms

Acronym	Definition
BMAP	Basin Management Action Plan
CCHMN	Coastal Charlotte Harbor Monitoring Network
CCMP	Comprehensive Conservation and Management Plan
CHNEP	Coastal & Heartland National Estuary Partnership
CWA	Clean Water Act
DO	Dissolved Oxygen
DQO	Data Quality Objective
EDP	SWFWMD Environmental Data Portal
FDEP	Florida Department of Environmental Protection
FIM	FWC-FWRI Fisheries Independent Monitoring Program
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	FWC Fish and Wildlife Research Institute
LCEL	Lee County Environmental Laboratory
MFLs	Minimum Flows and Levels
NELAC	National Environmental Laboratory Accreditation Certification
NELAP	National Environmental Laboratory Accreditation Program
PAR	Photosynthetically Active Radiation
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SOPs	Standard Operating Procedures
SWF RAMP	(Southwest Florida) Regional Ambient Monitoring Program
SWFWMD	Southwest Florida Water Management District
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TNI	The NELAC Institute
TOC	Total Organic Carbon
TP	Total Phosphorus
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WIN	FDEP Watershed Information Network
WMIS	SWFWMD Water Management Information System
YSI	Yellow Springs Instrument multi-parameter water sampling meter

Revision History

Revision History	
Version #	**Brief Description of Changes**
Version 2	No changes, first Version according to New QAPP Standard submitted Jan 2026

The Coastal Charlotte Harbor Monitoring Network (CCHMN) Field Sampling QAPP was updated in 2025 to coincide with updates made to the CCHMN Standard Operating Procedures (SOP) to capture changes to the Network structure and strategy, new techniques or quality assurance measures, and data formats. Updates were also made to the CCHMN Field Sampling QAPP to follow the guidance outlined in the EPA IT/IM Directive Standard for QAPPs (Directive No: CIO 2105-S-02.1). A summary of these updates is provided below:

- Per the EPA IT/IM Directive Standard for QAPPs (Directive No: CIO 2105-S-02.1), "data" was changed to "environmental information" throughout the document.
- Section A4 Project Purpose, Problem Definition, and Background was updated to include the new 2025 CHNEP Comprehensive Conservation Management Plan (CCMP) Water Quality Improvement Activity 1.3: Assess and report water quality status and trends to identify water quality.
- The map of CCHMN Strata and Partners (Figure 3) was updated to reflect the current partner organizations responsible for field sampling, laboratory coordination, and project management in each of the strata.
- The CCHMN Field Sampling Distribution List (Table 4) and Project Organization Chart (Figure 5) were updated to include the current organizations and personnel responsible for field sampling and laboratory coordination and data management.
- Section A9 Project Quality Assurance Manager Independence was updated to change "CHNEP Project Manager" to "CHNEP Project Coordinator" to more accurately reflect CHNEP's role in coordinating the CCHMN project.
- The Data Ownership section was updated to reflect the current organizations responsible for data handling and uploading data into state and federal water quality databases for each stratum.
- References to the Medina et al., 2025 Water Quality Trends paper were added throughout the document.
- Field Sampling Procedures were updated to indicate that light attenuation (PAR; k) measurements were suspended in 2023 to allow for more areas with varying depths available for sample collection.
- The Field Sampling Procedures were also updated to reference current Florida Department of Environmental Protection (FDEP) SOPs.

A4. Project Purpose, Problem Definition, and Background

Project Purpose

This purpose of this document is to incorporate updated staff, dates, field, laboratory, and data management information into the CCHMN Standard Operating Procedures (SOPs). The original CCHMN Description and SOPs (CHNEP Technical Report 02-03) were approved by the CHNEP Management Conference on March 19, 2004 (CHNEP, 2004; available at www.chnep.org).

This QAPP provides general descriptions of the following: 1) the organizational hierarchy of the project with roles and responsibilities; 2) project goals, objectives, and tasks to be completed for this project; 3) data quality objectives and quality control quality assurance steps used in the collection of additional data; and 4) assessment and oversight protocols including validation and verification procedures for ensuring data usability.

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 2). Fifteen water quality parameters are measured and analyzed using consistent field and laboratory methods (CHNEP, 2025).

Data are uploaded biannually by partners to WIN (Watershed Information Network), previously called 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 SOPs 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 SWF 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* (2020) (CHNEP, 2019; 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 CCHMN, 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.

The CCHMN data is used for scientific assessment of water quality trends and is an essential component of water quality assessments and resource management decisions throughout the CHNEP watersheds and waterbodies. FDEP uses the data uploaded to the WIN database for the evaluation of waterbodies to determine if they are meeting regulatory requirements and the development of water quality criteria.

Problem Definition

Continued technically sound, consistent water quality monitoring in the CCHMN stratum is critical for the spatial and temporal integrity of the data collected by the Project. Southwest Florida estuaries are tidal mixing zones. Within the stratum, water quality conditions vary greatly daily, monthly, seasonally, annually, and inter-annually. The CCHMN stratum have been monitored continuously using the CCHMN SOPs since 2002. Continuity in the availability of the data is essential to evaluate status and trends of water quality conditions throughout the CHNEP estuaries for scientific and regulatory assessments as well as evaluation of the effects of resource management activities.

Background

The CHNEP estuaries are divided into 13 strata based on those used by Florida state agencies, including the FDEP, Southwest Florida Water Management District (SWFWMD), and FWC-FWRI and extensive review by the CHNEP Technical Advisory Committee (TAC). Each stratum has relatively homogeneous water quality conditions and is divided into square mile grids, as used by FWC-FWRI. 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. grids are randomly selected and then sampling sites within each of the selected grids are randomly selected each month. This allows theThe CCHMN to collects five samples at five sites per month within each stratum at five sites per month, adding up to 60 samples per stratum per year, or. Throughout the CHNEP estuaries, CCHMN partners provide consistent water quality data at 60 sites per month and 720 sites per yeartotal throughout the CHNEP estuaries. Sarasota County contracts Mote research laboratory (contract laboratory) to conducts 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.

The 12 strata sampled monthly in accordance with the CCHMN SOPs are shown in Figure 2 and include:

- 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

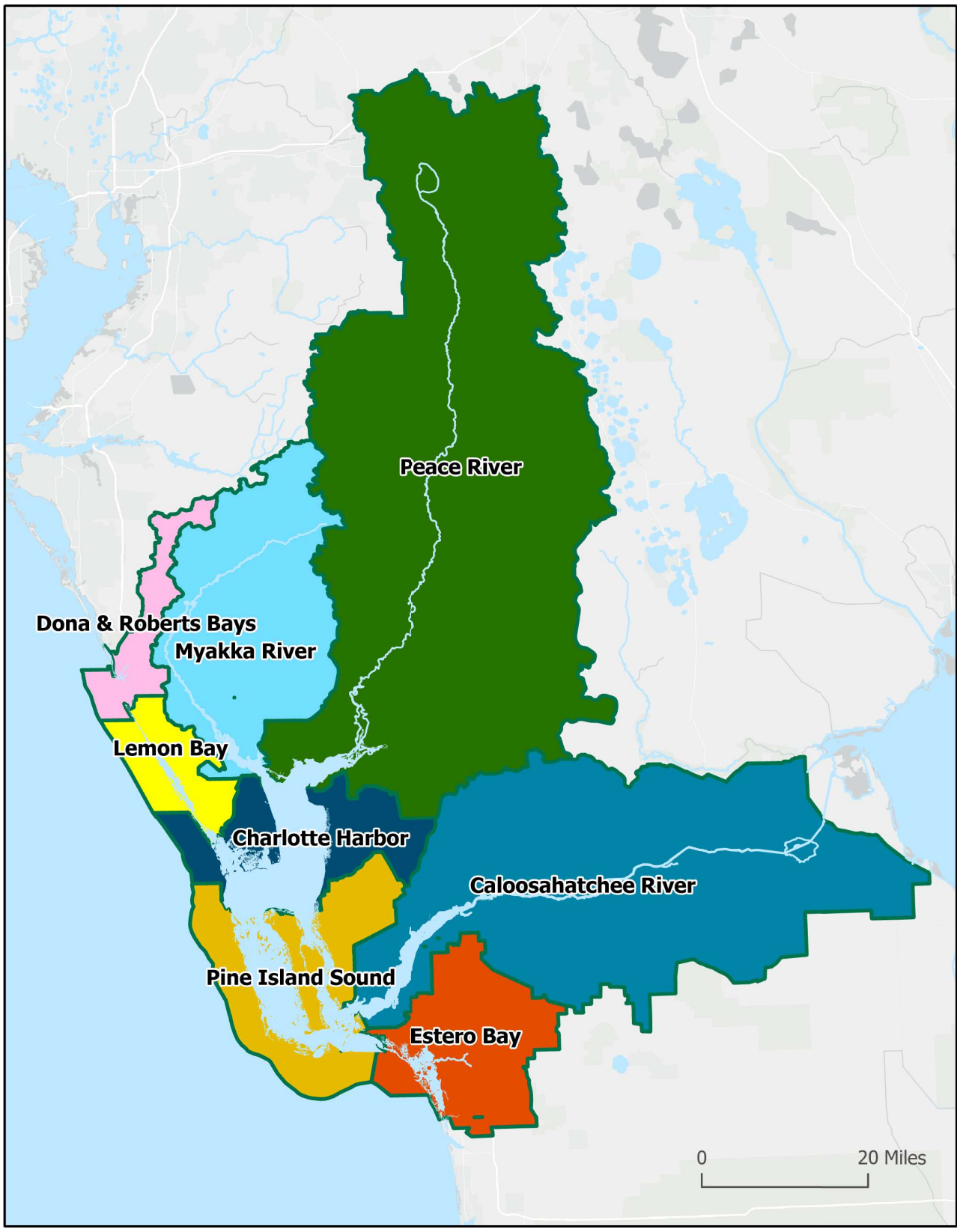

Figure 1: The basins within the CHNEP area.

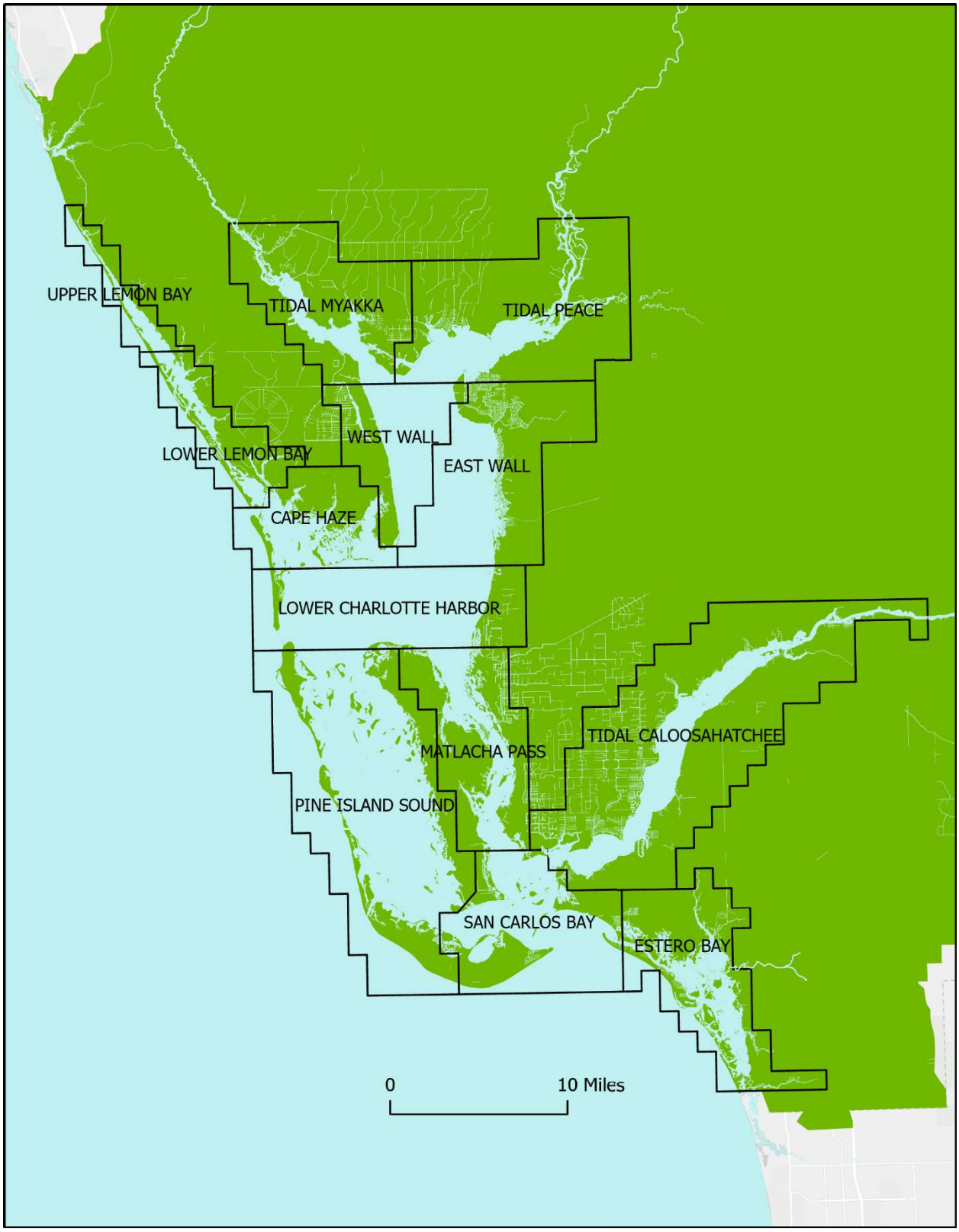

Figure 2: CCHMN Water Quality Sampling Strata

CCHMN field and laboratory partners collect and analyze water samples from 60 randomly selected field sites throughout 12 of the 13 stratum each month. Sarasota County conducts water quality monitoring in the final stratum (Upper Lemon Bay) monthly through an ambient monitoring program, however site selection is not in conformance with the CCHMN SOPs.

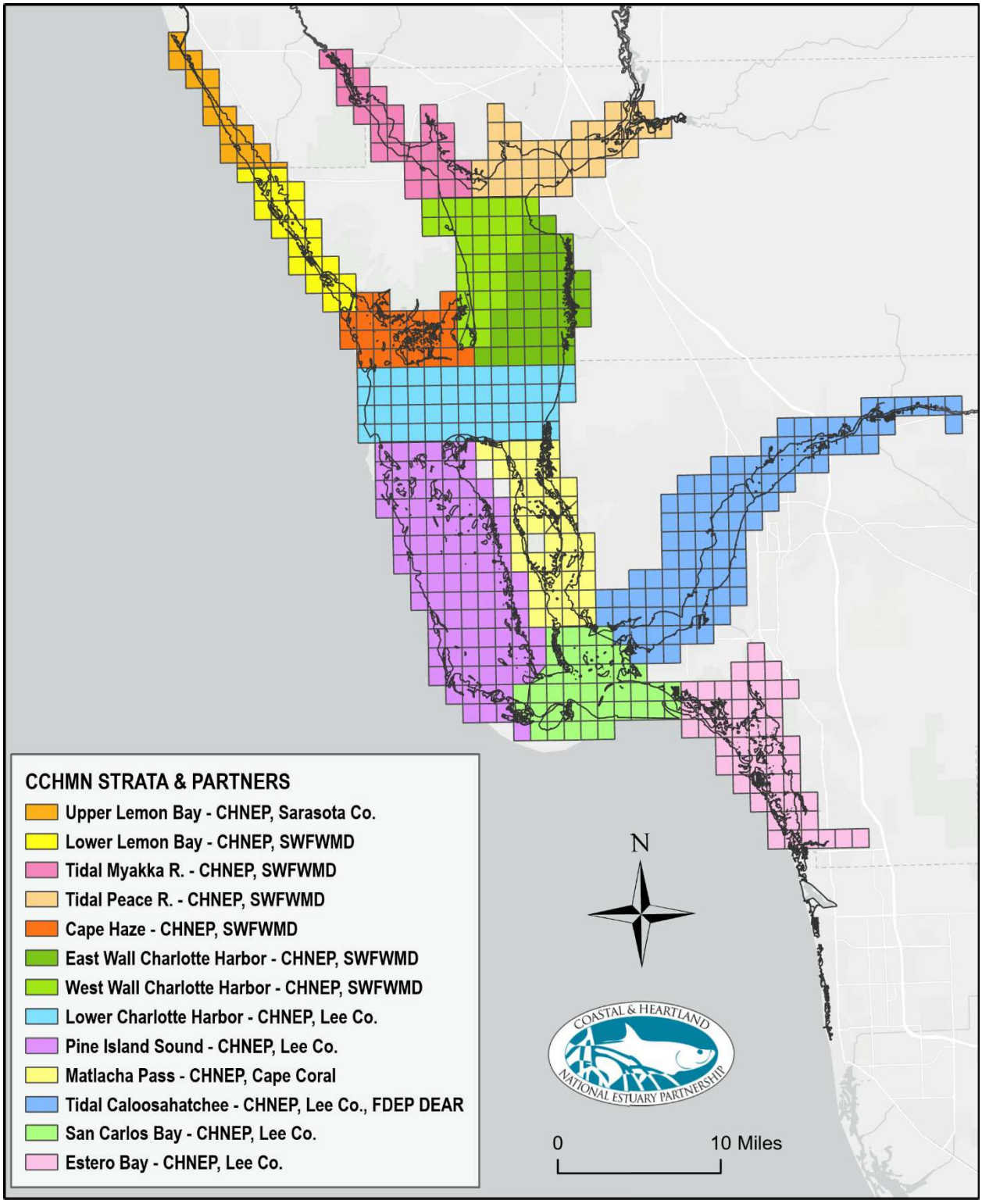

Figure 3: CCHMN Strata and Partners

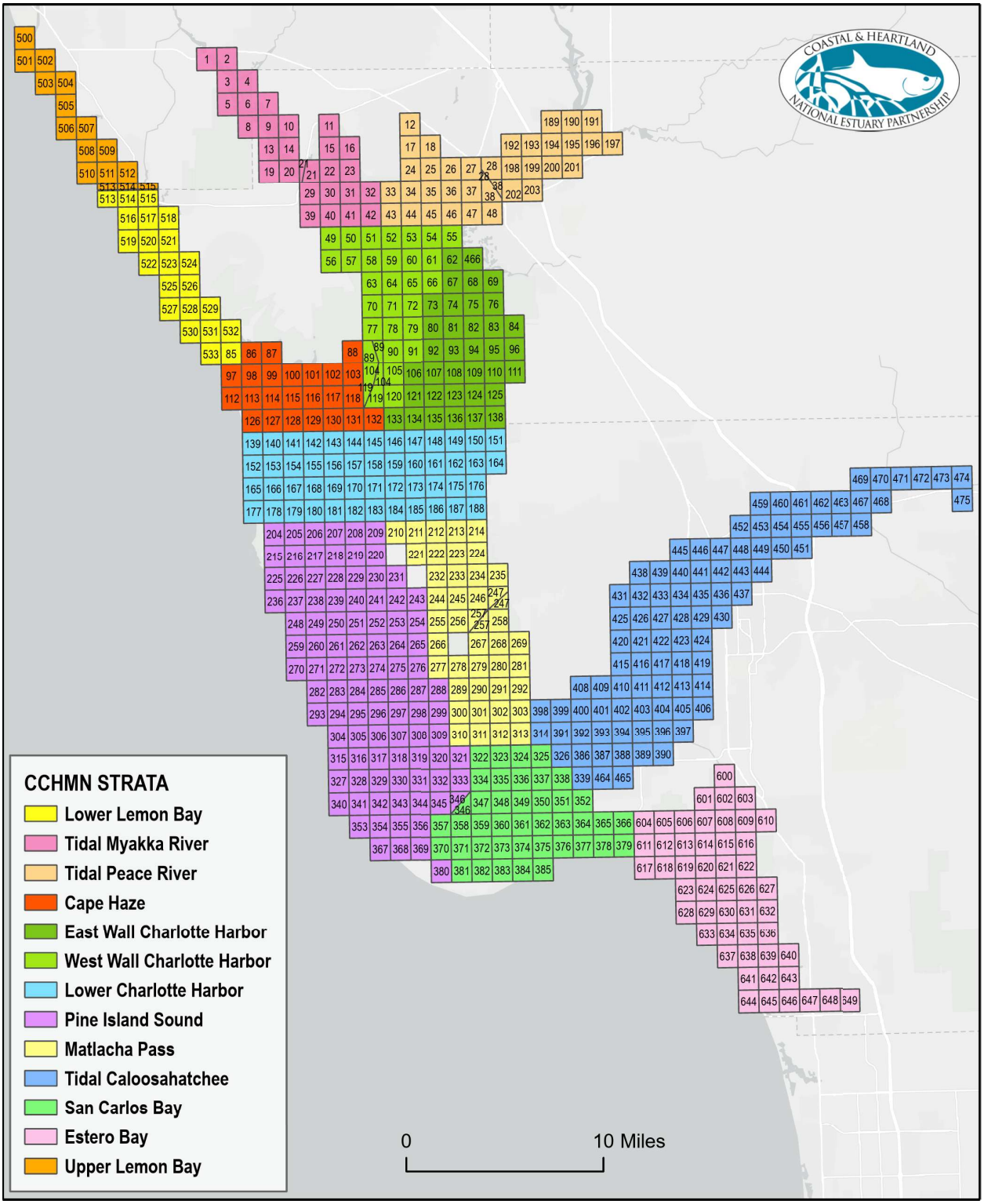

Figure 4: CCHMN Strata and Grid Numbers

Specific uses of the CCHMN water quality data include:

- 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 Update (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. 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 study design and field methods are described briefly in the following sections. For additional detail, please refer to the *Coastal Charlotte Harbor Monitoring Network Standard Operating Procedures* (CHNEP, 2025).

A5. Project Task Description

Project Goals

The goals of the CCHMN Field Sampling Project are to collect monthly water quality data and samples throughout the CCHMN strata consistent with the CCHMN stratified random sampling design and SOPs and transport the samples to partner laboratories according to approved chain-of-custody procedures. Select partners also upload the data to the FDEP WIN, the SWFWMD EDP database, and the CHNEP Water Atlas (http://www.chnep.wateratlas.usf.edu/).

Project Tasks, Responsibilities, Deliverables and Schedule

CCHMN Core Water Quality Analytes for Estuaries and Tidal Rivers:

The CCHMN core water quality analytes measured and collected in estuaries and tidal rivers 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 (°C) (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). If collected, light attenuation data will be taken for sites greater than 1.3 meters deep.

Field Sampling and Laboratory Analysis Responsibilities:

The CCHMN field and laboratory partners are shown in Figure 3.

- 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 is 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 (FDEP QA Rule).

One of the ways that TNI fosters the generation of data of known and documented quality is through the National Environmental Laboratory Accreditation Program, or NELAP. The purpose of this program is to establish and implement a program for the accreditation of environmental laboratories. NELAP relies on consensus standards representing the best professional practices in the industry to establish the requirements for this program, which is then implemented by state agencies recognized by TNI as Accreditation Bodies. The TNI Standard for laboratories, Volume 1, is modeled after ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration Laboratories." TNI Standard Volume 2 is the Accreditation Body (AB) requirements to accredit laboratories. The AB Standard is based on ISO/IEC 17011:2004 "Conformity Assessment – General Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies." Volumes 3 and 4 relate to the proficiency testing components of NELAP (https://nelac-institute.org/content/NELAP/index.php).

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 CCHMN. CHNEP houses and updates SOPs and QAPP documents and works with CHNEP Technical Advisory Committee (TAC) and CCHMN partner agencies to make agreed upon changes to SOPs and QAPP Items to keep documents and practices current. CHNEP also directly funds sampling efforts to fill data gaps, hosts the annual CCHMN partners meeting, conducts field sampling audits, attends SWF 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 SWF 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 contracting or 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 to resolve outstanding issues.

Data Ownership:

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

- Upper Lemon Bay – Sarasota County
- Lower Lemon Bay – SWFWMD and Charlotte County
- 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 with one another to the best of their ability to standardize data formatting.

Links to the CCHMN data on agency 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; and 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.

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 Water Quality Trends page (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, http://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 Southwest Florida Regional Ambient Monitoring Program (SWF RAMP):

All participating CCHMN laboratories and field monitoring agencies will participate in SWF 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

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 in regard to 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.
- The initial grab is taken at 0.5 m below the surface for those locations where the bottom depth is less than 3.0 m. Measure the water column to determine maximum depth and sampling depth prior to lowering the sampling device. At the desired depth, send the messenger weight down to trip the closure mechanism. Rinse the sampling device with ample amounts of site water prior to collecting the first sample. Discard rinse away from and downstream of the sampling location.
- If the sample site depth is greater than or equal to 3.0 m, then an additional sample is taken at 0.5 m above the bottom.

- Sonde values shall be taken at 0.5 m below the surface at all sites, and 0.5 m above the bottom for sites deeper than 1 m. Optional: intermediate depths of 0.5 m.
- 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, and 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). Non-preserved bottles will be rinsed with sample water prior to filling.
- 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, multi-parameter sonde readings, Secchi disks values and any other pertinent information needed. 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, 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 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 1.0 m depths.
- Values may also optionally (preferred) be measured and recorded at 1 m depth profiles throughout the water column at sites greater than 1.5 m.
- Depths shall be recorded from the sonde probes, not the bottom of the instrument.
- Bottom composition information (mucky, sandy, submerged aquatic vegetation, hard bottom or unknown) 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.
- Additional information is recorded as per the datasheet (see Appendix F.1).
- An example CCHMN field datasheet is shown in Appendix F.1.

L. Light Measurements: (Suspended 2023)

Light attenuation readings will be taken and recorded using a Li-cor according to the below procedure. This information will be used to update/calibrate the Optical Model for CHNEP and Charlotte Harbor region.

- 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 2. 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).

A6. Information/Data Quality Objectives and Performance/Acceptance Criteria

Data Quality Objectives

This QAPP for the CCHMN Field Sampling was developed to meet the data quality objective requirements of the USEPA *Quality Assurance Project Plan Standard* (Directive No: CIO 2105-S-02.1). The field sampling is to be conducted in accordance with the CCHMN SOPs (CHNEP, 2025). In conjunction with the field sampling, the associated laboratory analyses are to be conducted in accordance with the requirements of The NELAC Institute (TNI).

The overall goal of the CCHMN Field Sampling Project is to collect technically sound, consistent water quality data in the 13 CCHMN stratum to continue the critical spatial and temporal integrity of the region.

The specific data quality objectives of the Project are to:

1. Collect monthly water quality field measurements and samples at randomly selected sites throughout the CCHMN strata consistent with the CCHMN stratified random sampling design, SOPs, and quality assurance requirements as well as the FDEP QA Rules (62-160, F.A.C.) and FDEP 2017 SOPs (Effective 4/16/2018) Field testing overall – FT 1000,
2. Transport the samples according to approved Chain-of-Custody procedures,
3. Collaborate with partners that conduct laboratory analyses in accordance with the requirements of their TNI, and
4. Upload the data to federal, state, and water management district water quality databases using acceptable data management protocols.

The CCHMN stratified random sampling design reduces sampling bias and enhances the precision of results. Sixty randomized samples are collected each month to capture representative water quality conditions across 12 strata throughout the CHNEP area over multiple years. Long-term random sampling of water quality conditions throughout the CHNEP area allows scientific assessment of water quality trends and comparability across strata.

Performance/Acceptance Criteria

The water quality parameters for the field measurements and sample collection for the CCHMN Project are shown in Table 3. The methods associated with each parameter are described in Section B.

Table 3: CCHMN Field Sampling Parameters and Water Quality Standards

Parameter	FL Water Quality Standard
Measured In-Situ:	
Depth	n/a
Secchi Disc	62-302.530 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.530&Section=0
Light Attenuation	62-302.530 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.530&Section=0
Temperature	n/a
Salinity	n/a
Specific Conductance	62-302.530 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.530&Section=0
Dissolved Oxygen	62-302.533 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.533
pH	62-302.530 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.530&Section=0
Water Samples Collected for Laboratory Analyses:	
Color	n/a
Specific Conductance	62-302.530 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.530&Section=0
Turbidity	62-302.530 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.530&Section=0
Total Suspended Solids	62-302.530 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.530&Section=0
Total Organic Carbon	n/a
Chlorophyll *a* (corrected)	62-302.532 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.532
Total Nitrogen	62-302.532 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.532
Total Kjeldahl Nitrogen	n/a
Total Ammonia Nitrogen	n/a
Nitrite plus Nitrate Nitrogen	n/a
Dissolved Orthophosphate	n/a
Total Phosphorus	62-302.532 F.A.C. https://flrules.org/gateway/ruleno.asp?id=62-302.532

A7. Distribution List

Distribution List

This original quality assurance project plan, and any subsequent revisions or modifications, shall be distributed to the below listed individuals who are identified by organizational affiliations and project specific roles. If additional individuals become involved with this project, the quality assurance project plan shall be distributed to those individuals as well.

Table 4: CCHMN Field Sampling Distribution List

QAPP Recipient	Organization	Email Address
NEP Program Officer US EPA Region 4	U.S. Environmental Protection Agency (USEPA) – Region 4 61 Forsyth Street SW Atlanta, GA 30303	Region4@epa.gov
EPA QA Officer US EPA Region 4	U.S. Environmental Protection Agency (USEPA) – Region 4 61 Forsyth Street SW Atlanta, GA 30303	Region4@epa.gov
Project Coordinator Coastal & Heartland National Estuary Partnership	Coastal & Heartland National Estuary Partnership (CHNEP) 1050 Loveland Blvd., Suite D Port Charlotte, FL 33980	chnep@chnep.org
QA Manager Coastal & Heartland National Estuary Partnership	Coastal & Heartland National Estuary Partnership (CHNEP) 1050 Loveland Blvd., Suite D Port Charlotte, FL 33980	chnep@chnep.org
Field and Laboratory Support Coordinator Lee County Environmental Laboratory	Lee County Environmental Laboratory (LCEL) 60 S. Danley Drive, Unit 2 Fort Myers, FL 33907	lcel@leegov.com
Field and Laboratory Support Coordinator City of Cape Coral	City of Cape Coral 815 Nicholas Parkway East Cape Coral, FL 33990	ccerd@capecoral.gov
Field Sampling Coordinator Florida Dept. of Environmental Protection	Florida Dept. of Environmental Protection Division of Environmental Assessment and Restoration (DEAR) 3900 Commonwealth Blvd., M.S. 49 Tallahassee, FL 32399	SROCDEAR@floridadep.gov
Field and Laboratory Support Coordinator Southwest Florida Water Management District	Southwest Florida Water Management District (SWFWMD) 2379 Broad Street Brooksville, FL 34604	swfwmd@swfwmd.state.fl.us

A8. Project Organization

Project Organization

Individual	Responsibilities
NEP Program Officer US EPA Region 4	Responsible for QAPP review
EPA QA Officer US EPA Region 4	Responsible for QAPP review/approval
Project Coordinator Coastal & Heartland National Estuary Partnership	Project Contact responsible for project supervision and ensuring compliance with QAPP reporting protocols, review/approval
QA Manager Coastal & Heartland National Estuary Partnership	Responsible for data management, ensuring compliance with QAPP data and analysis protocols.
Field and Laboratory Support Coordinator Lee County Environmental Laboratory	Responsible for field and laboratory coordination and data management
Field and Laboratory Support Coordinator City of Cape Coral	Responsible for field and laboratory coordination and data management
Field Sampling Coordinator Florida Dept. of Environmental Protection	Responsible for field sampling coordination
Field and Laboratory Support Coordinator Southwest Florida Water Management District	Responsible for field and laboratory coordination and data management

The purpose of this document is to present the Quality Assurance Project Plan (QAPP) for the Coastal Charlotte Harbor Surface Water Quality Monitoring Network (CCHMN). The CCHMN is a monthly, stratified random water quality monitoring program conducted throughout the Coastal & Heartland National Estuary Partnership (CHNEP) (Figure 1.) estuaries by multiple field and laboratory partners. CHNEP coordinates with the CCHMN, and partners conduct the water quality monitoring throughout the thirteen CHNEP estuary regions (stratum) (Figure 2.) using consistent Standard Operating Procedures (CHNEP, 2025). The Southwest Florida Water Management District (SWFWMD) is responsible for conducting CCHMN field sampling in the six upper Charlotte Harbor strata (Figure 3.). CHNEP provides funding support for Lee County Environmental Laboratory (LCEL) to conduct CCHMN field sampling in the Lower Charlotte Harbor strata (Figure 3.). CHNEP serves as coordinator for the CCHMN. CHNEP houses and updates Standard Operating Procedures and QAPP Documents and works with CHNEP TAC and CCHMN partner agencies to make agreed upon changes to SOPs and QAPP items to keep documents and practices current. CHNEP also directly funds sampling efforts to fill data gaps, hosts the Annual CCHMN partners meeting, conducts field sampling audits, attends SWF RAMP meetings, uploads data into the CHNEP Water Atlas and funds maintenance and trend analysis features on CHNEP Water Atlas pages on behalf of the partners. Additional support for CCHMN field and laboratory activities is provided by funding and in-kind match from the partners.

The CCHMN Partner Roles are outlined in the CCHMN Standard Operating Procedures (Attachment 1). This project structure provides the framework for accomplishing the project

tasks, facilitating project performance, and adhering to quality control (QC) procedures and quality assurance (QA) requirements.

A9. Project Quality Assurance Manager Independence

Each organization involved in collecting, analyzing and uploading data for analysis for this Project follow internal protocols for Quality Assurance and Standard Operating Procedures for each of the above mentioned activities approved and in accordance with FDEP QA Rule, Chapter 62-160, F.A.C. (https://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-160) including the 2017 Field Sampling Standards, DEP WIN Standards (publicfiles.dep.state.fl.us -/DEAR/WIN/), and DEP Data Usability (DEP-EA-001/07; https://publicfiles.dep.state.fl.us/dear/sas/sopdoc/2008sops/usability_doc.pdf).

The Project Quality Assurance Manager (QAM) shall be independent of environmental information operations. The Project Coordinator and Quality Assurance Manager have the responsibility, authority, skills, and independence to contract and manage CCHMN annual field audits in a technically sound, unbiased manner to assure the validity of the monitoring results and data. The Project QA Officer has completed the following Trainings: FDEP SOPs for Water and Groundwater Sampling & Meter Testing Training Course, DEP Requirements for Field Testing and Surface Water Sampling, Introduction to DEP Quality Plans, Field Testing SOPs (including calibration, verification and acceptance criteria), and Basic Data Review.

A10. Project Organization Chart and Communications

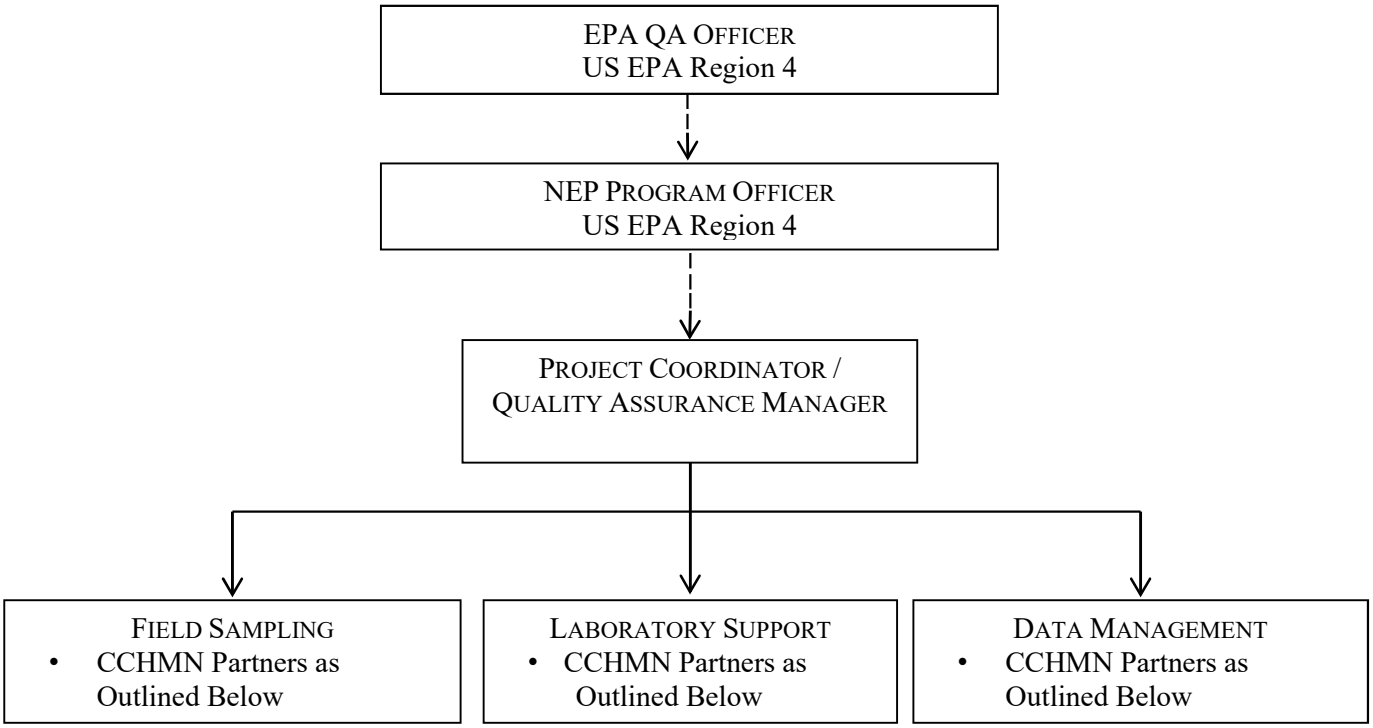

Figure 5: CCHMN Field Sampling Organizational Chart

Figure 5 outlines the different roles that are carried out by the various entities involved in the project, as described below.

CHNEP will serve as the Project Coordinator for all project coordination functions including coordination amongst CCHMN partners, questions regarding project SOPs, as well as finance and grant management related to the Lower CCHMN Field Sampling Project.

CHNEP will serve as the Quality Assurance Manager for quality assurance regarding all aspects of field sampling protocols and data management for the CCHMN Field Sampling Project.

In some years, the CHNEP Project Coordinator and CHNEP Quality Assurance Manager are the same person, and in some years, the CHNEP Project Coordinator and CHNEP Quality Assurance Manager may be different staff members.

The Field and Laboratory Support Coordinators outlined below represent organizations independent of the CHNEP. The CHNEP Project Coordinator and CHNEP Quality Assurance Manager will request and review data deliverables and quarterly reports from the Field and Laboratory Support Coordinator organizations outlined below to ensure consistency and adherence to the approved QAPP. Should any discrepancies or deviations from the approved QAPP be identified, the CHNEP Project Coordinator, CHNEP Quality Assurance Manager, and

EPA NEP Program Officer, if necessary, will coordinate directly with the Field and Laboratory Support Coordinator to resolve issues and ensure alignment with agreed-upon methods and quality standards. For procedures related to communicating and addressing QAPP non-conformance or discrepancies within the project team, the CHNEP QA Manager will inform the CHNEP Executive Director to carry out dispute resolution practices, if needed.

The Lee County Environmental Laboratory serves as a Field and Laboratory Support Coordinator for the CCHMN Field Sampling Project. Staff are responsible for ensuring clean, properly labeled sample bottles and sample transport coolers are provided each month and for receiving and logging the samples according to chain-of-custody procedures. Staff also coordinates data management between field and laboratory results.

The City of Cape Coral serves as a Field and Laboratory Support Coordinator for the CCHMN Field Sampling Project. Staff are responsible for ensuring clean, properly labeled sample bottles and sample transport coolers are provided each month and for receiving and logging the samples according to chain-of-custody procedures. Staff also coordinates data management between field and laboratory results.

The Southwest Florida Water Management District serves as a Field and Laboratory Support Coordinator for the CCHMN Field Sampling Project. Staff are responsible for ensuring clean, properly labeled sample bottles and sample transport coolers are provided each month and for receiving and logging the samples according to chain-of-custody procedures. Staff also coordinates data management between field and laboratory results.

The Florida Dept. of Environmental Protection Division of Environmental Assessment and Restoration (DEAR) serves as the Field Support Coordinator for the CCHMN Field Sampling Project. Staff are responsible for collecting samples and ensuring clean, properly labeled sample bottles and sample transport coolers are provided each month and for receiving and logging the samples according to chain-of-custody procedures and coordinating with Lee County Environmental Laboratory who processes samples and uploads the data.

A11. Personnel Training/Certification

Training Requirements

CCHMN Field Sampling Project staff must have a good understanding of water quality monitoring procedures and parameters, the importance of each parameter and expected ranges of values to be found throughout the Southwest Florida estuaries. Project field staff must be proficient at water quality equipment calibration, field sampling techniques, data recording, sample transport methods, Chain-of-Custody protocols and quality assurance practices, as defined in the CCHMN SOPs as well as the FDEP QA Rules (62-160, F.A.C.) and FDEP 2017 SOPs (Effective 4/16/2018) Field testing overall – FT 1000. In addition, project field staff must be capable of safe boat operation. The CHNEP Quality Assurance Manager will be responsible for contracting or performing annual field audits for sample collection for each sampling agency to ensure field staff proficiency. Field and Laboratory partners will also participate in the SWF RAMP quarterly meetings and split-sample analyses. The CHNEP Project Coordinator will be responsible for documenting personnel training and coordinating with Field and Laboratory Support Coordinators to obtain documentation of personnel training records and skill evaluation for staff within their respective organizations.

A12. Documents and Records

CHNEP houses and updates the CCHMN Standard Operating Procedures and QAPP Documents and works with CHNEP TAC and CCHMN partner agencies to make agreed upon changes to SOPs and QAPP items to keep documents and practices current. This QAPP is effective for a period of five years from the EPA approval date, after which CHNEP staff will review and make updates, if necessary, to the QAPP to capture changes to the Network structure and strategy, new techniques or quality assurance measures, and data formats. If changes are made to the EPA IT/IM Directive Standard for QAPPs, CHNEP staff will make updates to the QAPP to be in conformance with current EPA Directive Standards. These updates will then be reviewed and discussed by CCHMN partner agencies at the CCHMN Annual Meeting. Based on discussion and partner input at the CCHMN Annual Meeting, further updates may be made to the SOPs and QAPP. The updated QAPP will then be brought to the CHNEP TAC for their review and approval. If further edits are suggested by CHNEP TAC Members, these edits will be incorporated and the updated QAPP will be brought back to the CHNEP TAC for final review and approval.

The Final Approved CCHMN SOPs and QAPP Documents will be made available on the CHNEP Water Atlas website (https://www.chnep.wateratlas.usf.edu/).

Information Included in Reports

Annual reports of CCHMN Field Sampling Project data and field audit results will be provided by the data owners to the applicable federal, state, and water management district water quality databases. The University of South Florida Water Institute staff will upload CCHMN data to the CHNEP Water Atlas website (https://www.chnep.wateratlas.usf.edu/) through a contract maintained with the CHNEP to facilitate public access to the data.

Schedule for Laboratory Analyses

The CCHMN Field Sampling Project laboratory analyses will be conducted within the holding times for each parameter in accordance with the requirements of their TNI and FDEP QA Rules (62-160, F.A.C.).

Records Retention

The CCHMN Field Sampling data results will be retained by the federal, state, and water management district water quality databases. The University of South Florida Water Institute staff will upload CCHMN data to the CHNEP Water Atlas website (https://www.chnep.wateratlas.usf.edu/) through a contract maintained with the CHNEP to facilitate public access to the data. All project records, including field sampling data, field audit results, laboratory results, certification and training documentation, quarterly reports and invoices, contract agreements, and SOPs and QAPPs, will be retained electronically in CHNEP's project repository network drive for a minimum of five years, ensuring long-term accessibility and auditability.

Section B – Implementing Environmental Information Operations

B1. Identification of Project Environmental Information Operations

Sampling Design Rationale

The CHNEP estuaries are divided into 13 strata based on those used by the FWC Fisheries Independent Monitoring program (FIM) and extensive review by the CHNEP technical community. Each stratum has relatively homogeneous water quality conditions and is divided into square mile grids, as used by FWC FIM. Within 12 of the strata, five grids are randomly selected and then sampling sites within each of the selected grids are randomly selected each month. This allows the CCHMN to collect data within each stratum at five sites per month, adding up to 60 samples per stratum per year. Throughout the CHNEP estuaries, CCHMN partners provide consistent water quality data at 60 sites per month and 720 sites per year. Sarasota County conducts water quality monitoring in the final stratum (Upper Lemon Bay) monthly through an ambient monitoring program, however site selection is not in conformance with the CCHMN SOPs.

Sampling Locations and Frequency

The 12 strata sampled monthly in accordance with the CCHMN SOPs are shown in Figure 2 and include:

- 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

B2. Methods for Environmental Information Acquisition

Water Quality Sampling Methods

CCHMN Core Water Quality Analytes for Estuaries and Tidal Rivers
The CCHMN core water quality analytes measured and collected in estuaries and tidal rivers 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).

Equipment Needs

The CCHMN Field Sampling equipment and supply needs are shown in Table 5. The example checklist is used when preparing for field sampling to assure all equipment and supplies are available on the boat during sampling events.

Table 5: Example CCHMN Field Sampling Equipment and Supply Needs

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
Multi-parameter sonde& Extra Weight (Sonde #)
Alpha or Niskin Bottle
Li-cor
Pump or Syringes
Filter Holders, Filters, Forceps
Sample Bottle Kits
Coolers
Ice
If Acidify 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:

Support Facilities

The CCHMN Field Sampling is conducted by trained staff at the identified sampling agencies. Each facility has dedicated laboratory space for preparing water quality field sampling equipment and calibrating instruments in a clean environment, free from potential contaminants. CCHMN Field Sampling project personnel maintain the boats, trucks, and sampling equipment in working order. In addition, the facilities house computers used for downloading, entering, and managing the CCHMN data. Following completion of sampling each month, the coolers containing the iced samples are transported to the laboratory partners following approved Chain-of-Custody procedures (Section B.3), within sample holding times (Table 2.). All laboratories are NELAC (TNI) certified.

Corrective Action Responsibilities for Data Collection

CCHMN Field Sampling problem prevention and resolution are the responsibility of field and maintenance staff. Field sampling equipment and boats receive routine maintenance. In addition, spare parts and tool kits for the equipment and boat are taken into the field during sampling days.

Equipment Preparation and Decontamination

Immediately following each sampling event, field sampling staff clean the equipment, including the Alpha or Niskin bottle, pump tubing, and filter holders, with an acceptable decontamination solution, followed by a tap water rinse (3 times) and finished with a deionized water rinse (3 times), before air drying and storage in clean, closed containers. Filter holders are loaded prior to field sampling and stored in clean, closed containers. The clean field equipment is transported during sampling events in the clean containers. Prior to sampling each site, the equipment is rinsed with ambient site water 3 times before samples are collected. The multi-parameter water quality sonde is calibrated in the laboratory facility within 24 hours before and after each sampling event, according to the manufacturer's guidelines, and the calibration results are recorded on the Sonde Calibration Record Sheet (Figure 6). The light attenuation equipment (Li-cor light meter sensors – 1 air and 2 underwater sensors) are calibrated immediately before and after each sampling event according to the CCHMN SOPs (CHNEP, 2025), and the calibration results are recorded on the CCHMN Field Sampling Data Sheet (Appendix F.2).

FIELD INSTRUMENT CALIBRATION RECORDS - 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: _____

CAL	ICV	CCV	Initials	Date	Time	Standard (DO %)	Temp °C	DO Saturation mg/L (100%)**	Response DO (%)	Response 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 FS 2200-2 and/or Table FT 1500-1 for Dissolved Oxygen 100% Saturation (mg/L) corresponding to Temperature.

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

Meter/Instrument Name and Unique ID: _____

CAL	ICV	CCV	Initials	Date	Time	Standard (µmho/cm)	Exp. Date	Lot #	Response (µmho/cm)	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: _____

CAL	ICV	CCV	Initials	Date	Time	Standard (mV)	Exp. Date	Lot #	Response (mV)	Deviation (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.

Deviation (%) = 100-{(Response/Standard)*100}

Version Date: November 2021

Figure 6: Sonde Calibration Record Sheet

Sample Container Selection and Preparation

The CCHMN Field Sampling containers are prepared by the laboratories and provided to sampling staff prior to each sampling event. Laboratories purchase and clean the sample containers (Table 6.) for the selected sites.

Sample Container Volume, Preservation and Holding Times

The CCHMN Field Sampling containers, preservative, and holding time requirements are shown in Table 6. The laboratory analytical methods are shown in Table 6.

Table 6: CCHMN Field Sampling Containers, Preservation Methods, and Holding Times

Parameter	Units	Sample Container	Preservation Method	Holding Times
Measured In-Situ:				
Depth	m	n/a	n/a	n/a
Secchi Disc	m	n/a	n/a	n/a
Light Attenuation	µmol	n/a	n/a	n/a
Temperature	°C	n/a	n/a	n/a
Salinity	ppt	n/a	n/a	n/a
Specific Conductance	µS	n/a	n/a	n/a
Dissolved Oxygen	mg/L	n/a	n/a	n/a
pH	pH units	n/a	n/a	n/a
Water Samples Collected for Laboratory Analyses:				
Color	PCU	1 L Polyethylene	Put on ice	24 hours
Specific Conductance	µS	1 L Polyethylene	Put on ice	28 days
Turbidity	NTU	1 L Polyethylene	Put on ice	48 hours
Total Suspended Solids	mg/L	1 L Polyethylene	Put on ice	7 days
Total Organic Carbon	mg/L	40 ml glass	Sulfuric Acid	28 days
Chlorophyll *a* (corrected)	mg/L	1 L Amber Nalgene	Put on ice	Filter within 24 hours; analyze within 3 weeks
Total Nitrogen	mg/L	Calculation	Sulfuric Acid	calculated
Total Kjeldahl Nitrogen	mg/L	250-ml polyethylene	Sulfuric Acid	28 days
Total Ammonia Nitrogen	mg/L	250 ml polyethylene	Sulfuric Acid	28 days
Nitrite plus Nitrate Nitrogen	mg/L	250 ml polyethylene	Sulfuric Acid	28 days
Dissolved Orthophosphate	mg/L	250 ml polyethylene	Put on ice	48 hours
Total Phosphorus	mg/L	250 ml polyethylene	Sulfuric Acid	28 days

Analytical Methods

Analyses of water samples collected by the CCHMN Project are conducted according to their TNI requirements and FDEP QA Rules (62-160, F.A.C.). The analytical methods and minimum detection limits for each parameter utilized for this project are shown in Table 7.

Table 7: CCHMN Analytical Methods

Parameter	Units	Laboratory Analysis Method	Minimum Detection Level
Measured In-Situ:			
Depth	m	n/a	0.1 m
Secchi Disc	m	n/a	0.1 m
Light Attenuation	µmol	n/a	5 µmol
Temperature	ºC	n/a	0.01 ºC
Salinity	ppt	n/a	0.01 ppt
Specific Conductance	µS	n/a	1 µS
Dissolved Oxygen	mg/L	n/a	0.01 mg/L
pH	pH units	n/a	0.01 units
Water Samples Collected for Laboratory Analyses:			
Color	PCU	SM20 2120 C	1.0 CU
Specific Conductance	µS	SM21 2510B	2 µS
Turbidity	NTU	EPA 180.1	0.2 NTU
Total Suspended Solids	mg/L	SM21 2540D	0.6 mg/L
Total Organic Carbon	mg/L	SM21 5310 B	1.0 mg/L
Chlorophyll *a* (corrected)	mg/L	SM21 10200 H	0.5 mg/M3
Total Nitrogen	mg/L	Calculation	0.06 mg/L
Total Kjeldahl Nitrogen	mg/L	EPA 351.2	0.05 mg/L
Total Ammonia Nitrogen	mg/L	EPA 350.1	0.014 mg/L
Nitrite plus Nitrate Nitrogen	mg/L	EPA 353.2	0.01 mg/L
Dissolved Orthophosphate	mg/L	EPA 365.1	0.004 mg/L
Total Phosphorus	mg/L	EPA 365.1	0.006 mg/L

Validation of Non-Standard Analytical Methods

No non-standard analytical methods are used for the CCHMN Field Sampling Project.

Corrective Action Responsibilities for Data Entry

Potential deviations from the field sampling methods for the CCHMN Field Sampling Project are identified during the annual field audits. Options for corrective actions are immediately investigated and the most effective actions are implemented within 1 month of being identified. Corrective actions for laboratory analyses are identified and addressed by the laboratory according to their TNI requirements and FDEP QA Rules (62-160, F.A.C.) quality control/quality assurance procedures.

Time Period for Analyses and Data

CCHMN Field Sampling Project laboratory analyses are completed within the holding times for each parameter shown in Table 6.

B3. Integrity of Environmental Information

Sample Handling

Water samples are collected according to the CCHMN SOPs (CHNEP, 2025), using a Kemmerer, Van Dorn, Alpha and Beta Sampler, Niskin (or equivalent) used for Specific depth grab sampling bottle that is rinsed 3 times with ambient water before being lowered to the proper depth. Sample containers that do not contain preservatives are rinsed 3 times with ambient water before filling. Containers are filled in order of non-filtered and non-preserved, preserved, and then filtered. Sample containers are put in ice in ice chests immediately after filling. Following completion of the sampling event, the samples are transported on ice in the ice chests directly to the appropriate laboratory within 2 hours.

Example Chain-of-Custody Form

The CCHMN Field Sampling Project follows the CCHMN SOPs (CHNEP, 2025) Chain-of-Custody procedures. An example Chain-of-Custody Record Form is shown in Figure 7. The form is signed by the field sampler and each relinquishing party until the samples are delivered to the laboratory staff. The record form includes the date and time of sampling, site number and depth, number of sample containers for each analysis to be performed, and the corresponding Lab ID number. Once received by the laboratory, the holding time and temperature of the samples are verified to ensure the laboratory quality assurance requirements.

LCEL

Lee County Environmental Laboratory
60-2 Danley Dr Ft Myers, FL 33907
Phone: (239) 533-8600

Lab Certification: E45049
LCEL_F_COC_20150828R1

Analysis Request & Chain of Custody Record

LCEL does not accept any samples used for evidentiary purposes

Page 1 of 2

Report/Result Information	Billing/Invoice Information
Name: FWC/CHNEP Re: Charlotte Harbor Random	Name: DNRM RE: CHNEP/CCHMN
Address: 1926 Victoria Ave	Address: 1500 Monroe St
Fort Myers, FL 33901	Ft Myers FL
Phone/Fax: (239) 338-2556 / (239) 339-2560	Phone/Fax: (239) 533-8109 / (239) 533-8108
Sample Collector(s) (please print): Judy Ott	Sample Collector Signature:

Matrix Codes:
DW-Drinking water
GW- Ground water
WW-Waste water
SW-Surface water
WWS-Wastewater Sludge
S-Sediment
O-Other

Preservative Codes:
NP-No Preservative
N-Nitric Acid
S-Sulfuric Acid
H-Hydrochloric Acid
SH-Sodium Hydroxide
ST-Sodium Thiosulfate
O-Other

Relinquished By: (signature)	Date	Time	Received By: (signature)
Relinquished By: (signature)	Date	Time	Received By: (signature)
Relinquished By. (signature)	Date	Time	Received By. (signature)

Sample(s) on ice ☒ Yes or ☐ No? Temperature °C:

Analyses Required

Collection Date	Time			Sample Description & Location	Matrix (see codes)	TOC	CHLOROA	O-PO4, COLOR	NH3,TKN,TN T-PO4, NO3, NOX,ONIT	TSS,TURB, NO2, SILICA BOD,BODI	TOTAL DEPTH _BC	Secchi_BC	pHF_BC,TempC_BC ,SalF_BC, Cond_BC, DoField_BC, CHLORO PREP	Lab ID #
						Preservatives (see codes)								
						S	NP	NPF	S	NP				
						# of Sample Containers Submitted								
		AM	PM	Site # Surface	SW	1	1	1	1	2				AD
		AM	PM	Site # Bottom	SW	1	1	1	1	2				AD
		AM	PM	Site # Surface	SW	1	1	1	1	2				AD
		AM	PM	Site # Bottom	SW	1	1	1	1	2				AD
		AM	PM	Site # Surface	SW	1	1	1	1	2				AD
		AM	PM	Site # Bottom	SW	1	1	1	1	2				AD

S:\Client Chain of Custody\CHNEP_RS.Doc

Figure 7: Example Chain of Custody Record Form

B4. Quality Control

Quality Control Procedures and Frequency

The CCHMN Field Sampling Project is conducted in accordance with the CCHMN SOPs (CHNEP, 2025). The CCHMN SOPs define how, when, and where field sampling is conducted each month, as well as how samples are transported to the laboratory for analysis.

Immediately before and after each sampling event, field sampling equipment, including the multi-parameter water quality sonde and light attenuation (Li-cor) instrument, are calibrated according to CCHMN SOPs, laboratory protocols, and equipment manufacturer guidelines (Section B.7).

During each monthly sampling event, one set of sample containers is filled with deionized water to serve as a field equipment blank for laboratory analyses.

Each year, a field audit of the CCHMN Field Sampling Project is conducted by CHNEP, and corrective actions are identified and implemented immediately following the field audit report. Following the annual field audits, a CCHMN quality assurance meeting is held for all project partners, to review field audit results and discuss and implement corrective actions throughout the sampling program.

Quarterly, staff participate in the SWF RAMP split sample analyses and meetings. SWF RAMP is a region-wide collaboration of water quality field sampling and laboratory organizations from six counties in southwest Florida. The SWF RAMP mission is to "foster cooperative participation to improve comparability of surface water sample collection, in situ measurements and laboratory methods used by surface water quality monitoring programs in southwest Florida marine and freshwater systems". At each quarterly meeting, Project sampling partners collect samples from the same ambient water source, which are then analyzed by partnership laboratories. The analytical results are compared at the following SWF RAMP meeting and corrective actions are discussed and implemented.

Quality Control Assessment Calculations

The results of the quarterly SWF RAMP split sample field collection and sample analyses are that mean, standard deviation, median, maximum and minimum values for each parameter are compared. Results that exceed ± 1 and ± 2 standard deviations are noted and corrective actions are discussed and implemented at the next SWF RAMP meeting. In addition, laboratory partners conduct quality control assessment calculations according to procedures consistent with their TNI requirements and FDEP QA Rules (62-160, F.A.C.) and implement corrective actions, as required by their laboratory certification.

B5. Instrument/Equipment Calibration, Testing, Inspection and Maintenance

Supplies and Consumables

CCHMN Field sampling staff purchase and utilize multi-parameter water quality sonde calibration solutions recommended by the manufacturer and replaces them prior to the expiration dates.

Field sampling agency staff and laboratories utilize and replace analytical calibration solutions recommended by the individual instrument manufacturers within guidelines identified in their NELAC certification procedures. They also purchase, replace, clean, and acidify sample bottles within their NELAC certification procedures. Sample bottles used for chlorophyll and total organic carbon (TOC) sample collection and analyses are cleaned after each use according to NELAC requirements. Sample bottles for other analytical parameters are purchased prior to each sampling event and discarded following use.

Performance and System Audits

Annual field audits of the CCHMN Field Sampling Project are conducted by CHNEP for consistency with the CCHMN SOPs (CHNEP, 2025). Results of the field audits are discussed at the CCHMN annual quality assurance meeting and corrective actions are implemented immediately following the meeting. Audits of laboratory procedures are conducted consistently with the frequency and methods required for their TNI requirements and FDEP QA Rules (62-160, F.A.C.). Corrective actions are also implemented according to their TNI requirements and FDEP QA Rules (62-160, F.A.C.).

Equipment Needing Calibration and Frequency

CCHMN Field Sampling Project staff calibrate the multi-meter water quality sonde immediately before and after each sampling event according to the manufacturer's guidelines. Project staff also calibrate the light attenuation (Li-cor) instrument immediately prior to and following field sampling according to the CCHMN SOPs (CHNEP, 2025).

Calibration Standards for Field Instruments

Calibration standards are purchased and replaced according to the field equipment manufacturer's recommendations. No calibration standards are required for dissolved oxygen (DO) or for the light attenuation (Li-cor) instrument. Calibration standards for the analytical instruments are purchased and replaced according to the instrument manufacturers' recommendations.

Calibration Records

Calibration records for the multi parameter water quality sonde and light attenuation (L-icor) instruments are maintained by agency field and laboratory staff respectively.

B6. Inspection/Acceptance of Supplies and Services

Supplies
The CCHMN Field Sampling equipment and supplies are shown in Table 5 and Appendix F.1. CCHMN Field Sampling Project calibration supplies for the multi-meter water quality sonde are inspected and accepted annually during the field audit conducted by CHNEP. Results of the inspection are documented on the Sonde Calibration Record Sheet (Figure 6). Laboratory analytical instrument calibration supply and sample bottle records are inspected and accepted in accordance with their TNI requirements and FDEP QA Rules (62-160, F.A.C.).

Criteria for Supplies
The criteria for the multi-meter water quality sonde and analytical instrument calibration solutions are provided by the manufacturers. The solutions are replaced prior to their expiration dates.

Supply Inspection Responsibilities
Supply inspection for the CCHMN Field Sampling Project is the responsibility of the Field Sampling Coordinator and the Laboratory Coordinator at each respective agency.

Non-Measurement Data Types and Acceptance Criteria
No non-measurement data are used for the CCHMN Field Sampling Project.

Limitations of Non-Measurement Data
No non-measurement data are used for the CCHMN Field Sampling Project.

Rational for Non-Measurement Data
No non-measurement data are used for the CCHMN Field Sampling Project.

B7. Environmental Information Management

Record Keeping, Storage and Retrieval

The data owner identified below 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 Stratum are:

- Upper Lemon Bay – Sarasota County
- Lower Lemon Bay – SWFWMD
- Cape Haze/Gasparilla Sound – SWFWMD
- Tidal Myakka River – SWFWMD
- Tidal Peace River – SWFWMD
- Charlotte Harbor East Wall – SWFWMD
- Charlotte Harbor West Wall – SWFWMD
- Lower Charlotte Harbor – Lee County Environmental Laboratory
- Pine Island Sound – Lee County Environmental Laboratory
- Matlacha Pass – City of Cape Coral Environmental Resources Division
- 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 websites include:

- Florida WIN (Watershed Information Network): http://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 Handling Procedures

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.

Attachments to the Quality Assurance Project Plan

F.1 CCHMN Field Sampling Equipment List.
F.2 CCHMN Field Sampling Data Sheet.
F.3 CCHMN Standard Operating Procedures (CHNEP, 2025).

Office of Information Resource Requirements Process

CCHMN Field Sampling data is made available to scientists, resource managers, and the public upon request. Data inquiries are also directed to the CHNEP Water Atlas (https://chnep.wateratlas.usf.edu/) for additional options for data retrieval, graphing, and mapping.

Section C – Assessment, Response Actions and Oversight

C1. Assessments and Response Actions

Audit Number and Frequency

CCHMN Field Sampling Project field audits are conducted each year by CHNEP for consistency with the CCHMN SOPs (CHNEP, 2025). Results of the field audits are discussed at the CCHMN annual quality assurance meeting and corrective actions are implemented immediately following the meeting. Audits of the laboratory procedures are conducted consistently with the frequency and methods required for them to their TNI requirements and FDEP QA Rules (62-160, F.A.C.). Corrective actions are also implemented according to their TNI requirements and FDEP QA Rules (62-160, F.A.C.).

Audit Responsibilities

CHNEP will conduct the annual CCHMN field audits and quality assurance meeting to ensure that all CCHMN field partners are conducting data collection according to the CCHMN SOPs (CHNEP, 2025) and to assure that identified corrective actions are implemented immediately following the meeting.

Auditor's Independence, Authority and Competence

The CHNEP has the responsibility, authority, skills, and independence to contract and conduct the CCHMN annual field audits in a technically sound, unbiased manner to assure the validity of the monitoring results and data. The Project QA Officer has completed the following FDEP Trainings: SOPs for Water and Groundwater Sampling & Meter Testing Training Course, DEP Requirements for Field Testing and Surface Water Sampling, Introduction to DEP Quality Plans, Field Testing SOPs (including calibration, verification and acceptance criteria), and Basic Data Review.

Audit Results Documentation, Verification and Communication

The results of the annual CCHMN field audits are provided to the field sampling and laboratory partners. The field audit results are discussed at the annual CCHMN quality assurance meeting within 2 months of completion of the audits. Corrective actions are discussed at the annual meeting. The CCHMN Annual Field Audit Reports are available on request from the CHNEP office (www.chnep.org).

Corrective Action Implementation Responsibilities

Corrective actions identified in the CCHMN annual field audits and quality assurance meeting are implemented immediately following the meeting by CCHMN Field Sampling staff.

C2. Oversight and Reports to Management

Frequency and Distribution of Reports

The annual CCHMN Field Audit Reports are prepared by CHNEP. The reports are provided to the CCHMN field sampling partners immediately following the annual quality assurance meeting. The CCHMN Annual Field Audit Reports are available on request from the CHNEP office (www.chnep.org).

Section D – Environmental Information Review and Usability Determination

D1. Environmental Information Review

Data Acceptance Criteria

The CCHMN Field Sampling Project data acceptance criteria are met if: a) the field sampling is conducted in accordance with the CCHMN SOPs (CHNEP, 2025); b) any corrective actions identified in the annual field audit are implemented; and c) the field sampling results fall within the maximum and minimum ranges of values ±15% for each parameter observed in the region during the CCHMN sampling period (2002 to present).

Data Qualifier Flags

Data values that fall outside of the maximum and minimum ranges of values ±15% for each parameter observed in CCHMN strata from 2002 to present are reviewed and corrected on a site by site, date by date basis and accepted or rejected/deleted based on review by the data owners. The data outliers flagged for review are documented on the CCHMN Field Sampling Data Sheets (Appendix F.2). Data outliers observed during status and trends analysis by CHNEP staff and contractors are resolved on a case-by-case basis.

Project-Specific Statistics, Calculations and Algorithms

No specific statistics, calculations or algorithms are utilized for the CCHMN Field Sampling Project.

D2. Usability Determination

Data Usability

The CHNEP will contract with the University of South Florida Water Institute to regularly analyze the CCHMN data and make the results publicly available through the CHNEP Water Atlas website (http://www.chnep.wateratlas.usf.edu/).

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://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

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Section F – Appendices

Appendix F.1: CCHMN Field Sampling Equipment 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 F.2: CCHMN Field Sampling 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			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	
Sampler Signature:					
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

Type	SID
FLO	

Water Data: (0.01)	Sample Depth/m	Water Temp (°C)	Sp. Conductance (µS/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:

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Appendix F.3: CCHMN Standard Operating Procedures 2025 Updates

COASTAL CHARLOTTE HARBOR MONITORING NETWORK

Standard Operating Procedures
2025 Updates

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

1050 Loveland Blvd.
Port Charlotte, FL 33980
941-833-6580
www.CHNEP.org

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.

COASTAL & HEARTLAND NATIONAL ESTUARY PARTNERSHIP

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CHNEP Executive Director	**Ms. Jennifer Hecker**

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Figures

Tables

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.

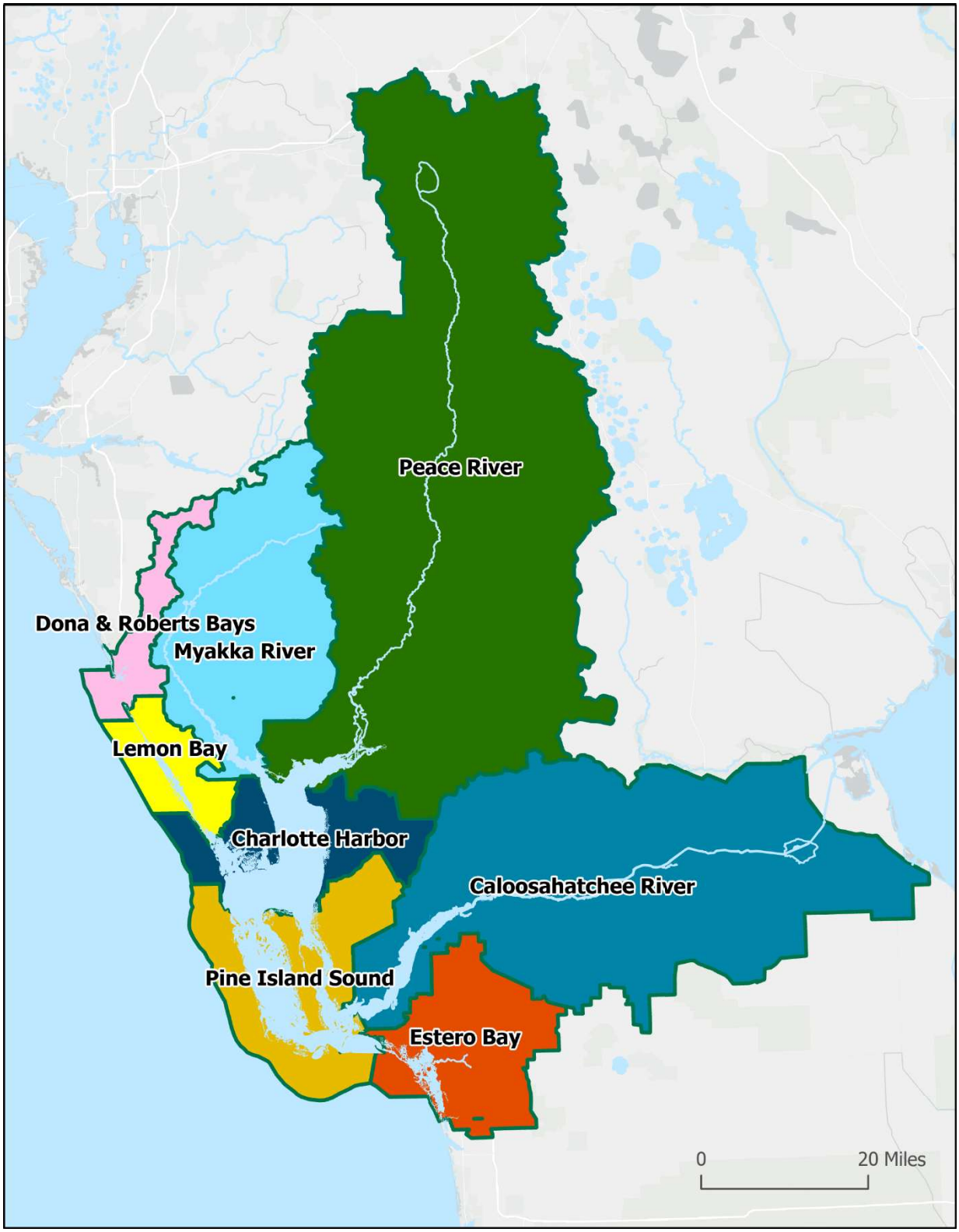
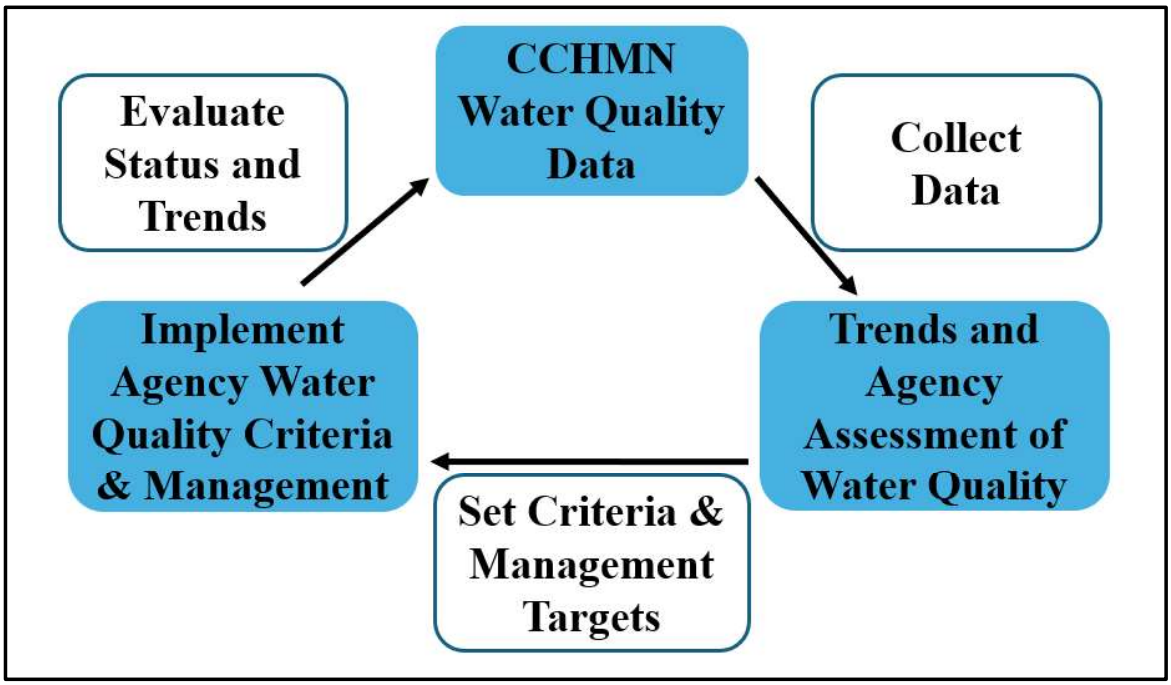


Figure 1: The basins within the CHNEP area

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).



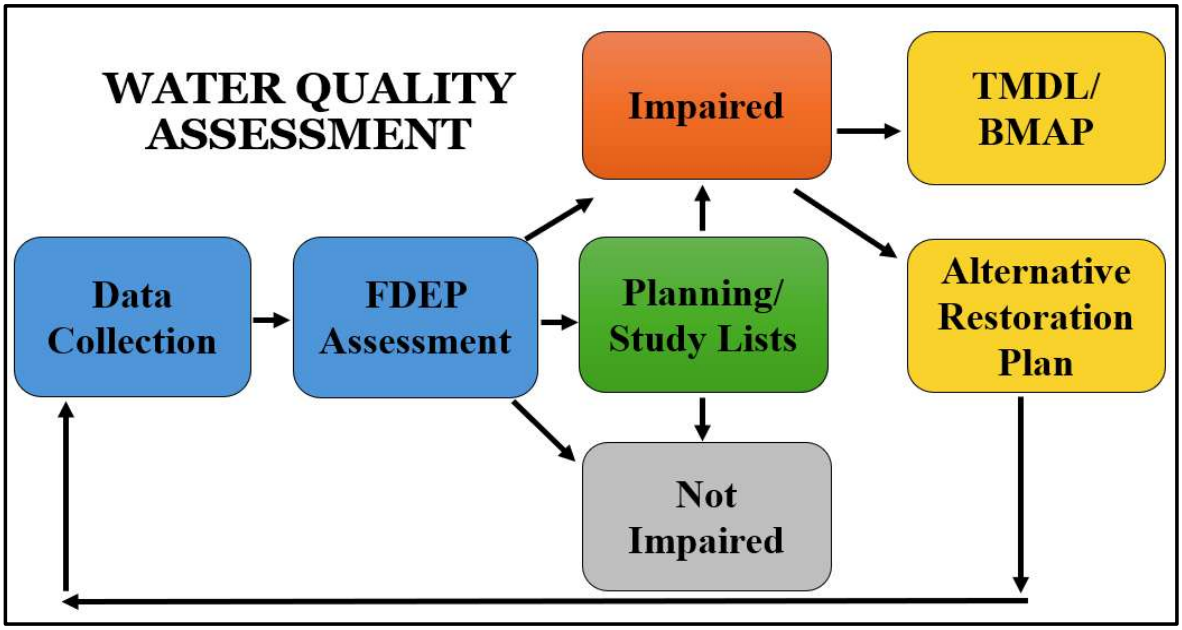


Figure 2: Uses of CCHMN Data

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).

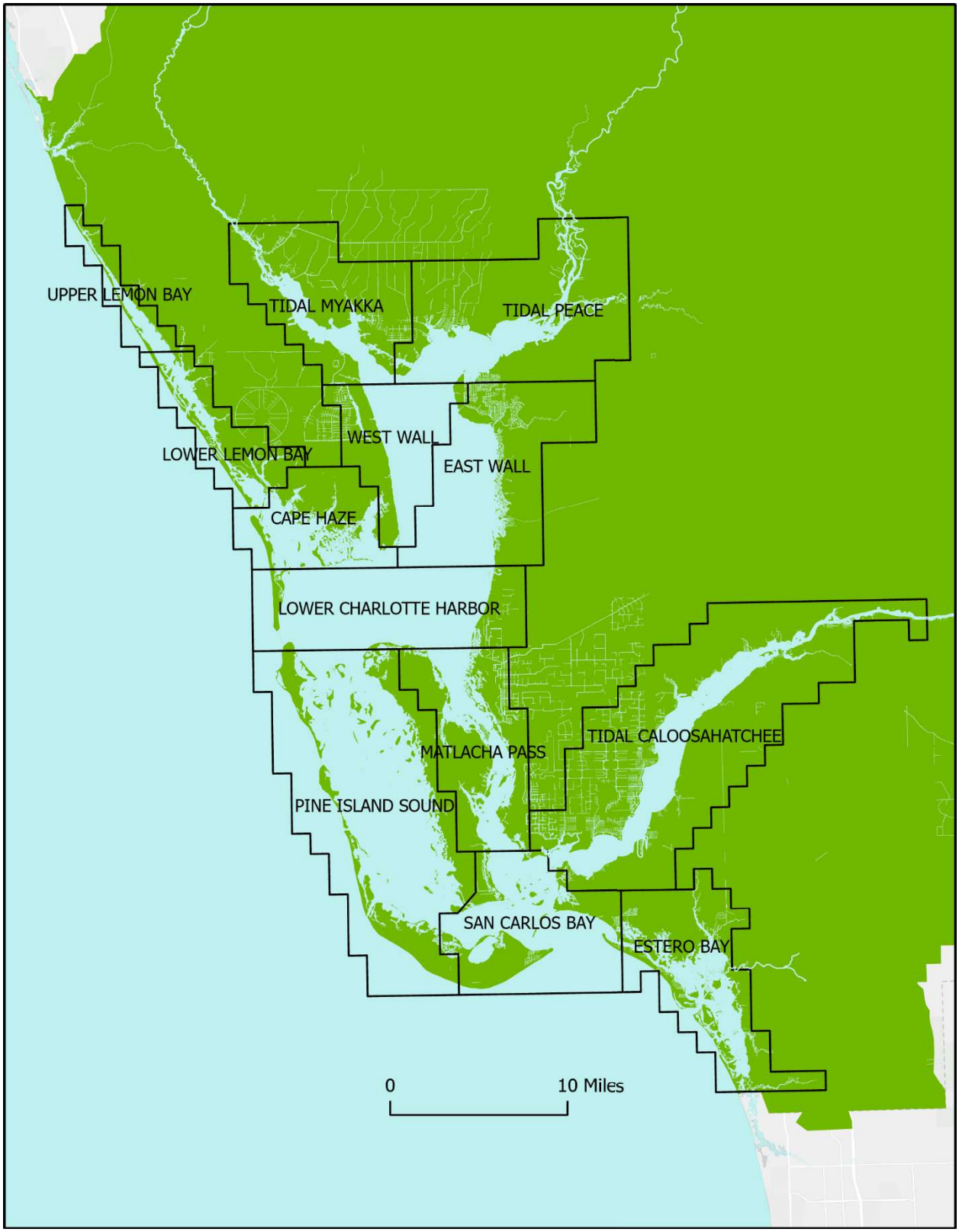


Figure 3: CCHMN Water Quality Sampling Strata

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.

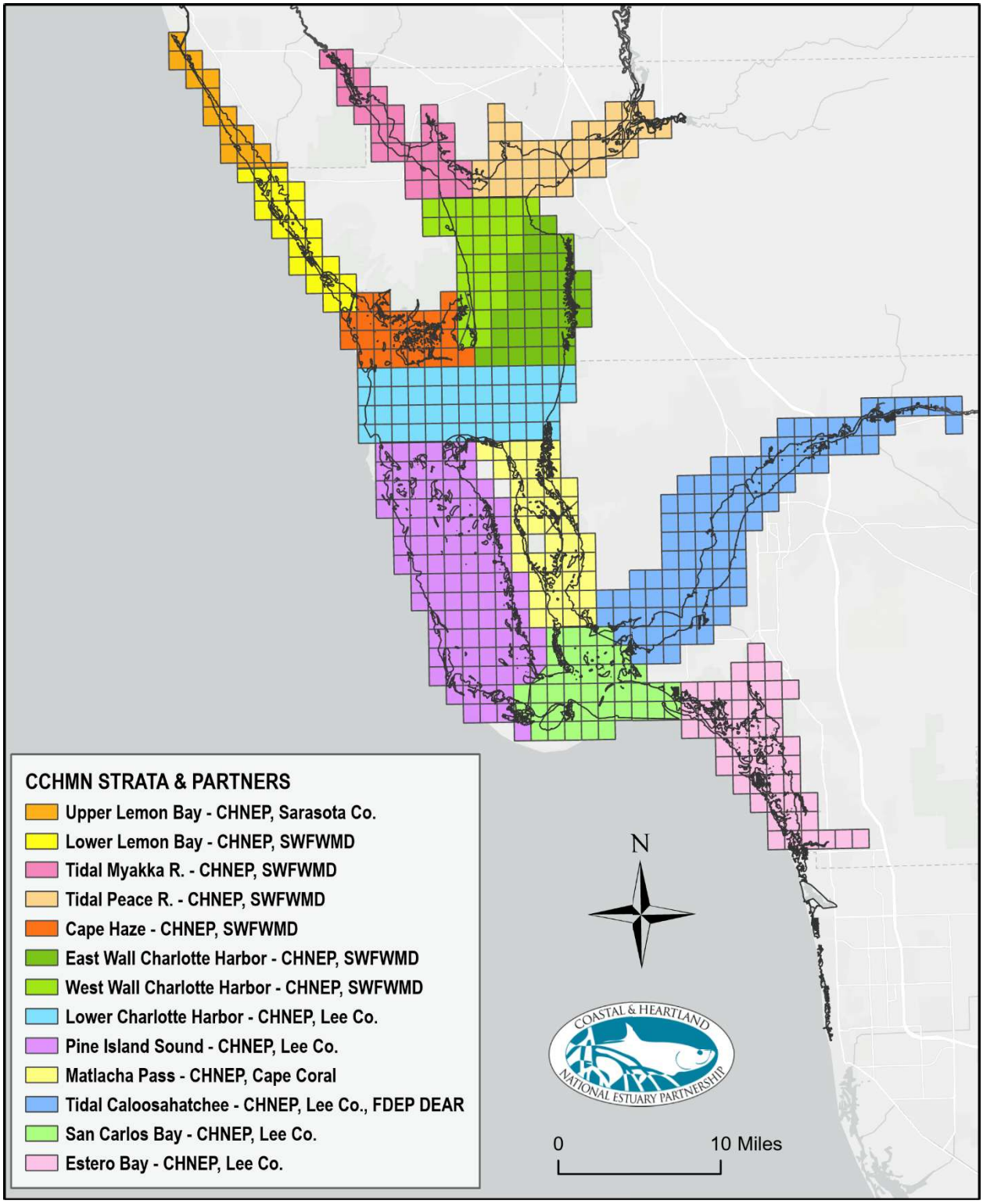


Figure 4: CCHMN Strata and Partners

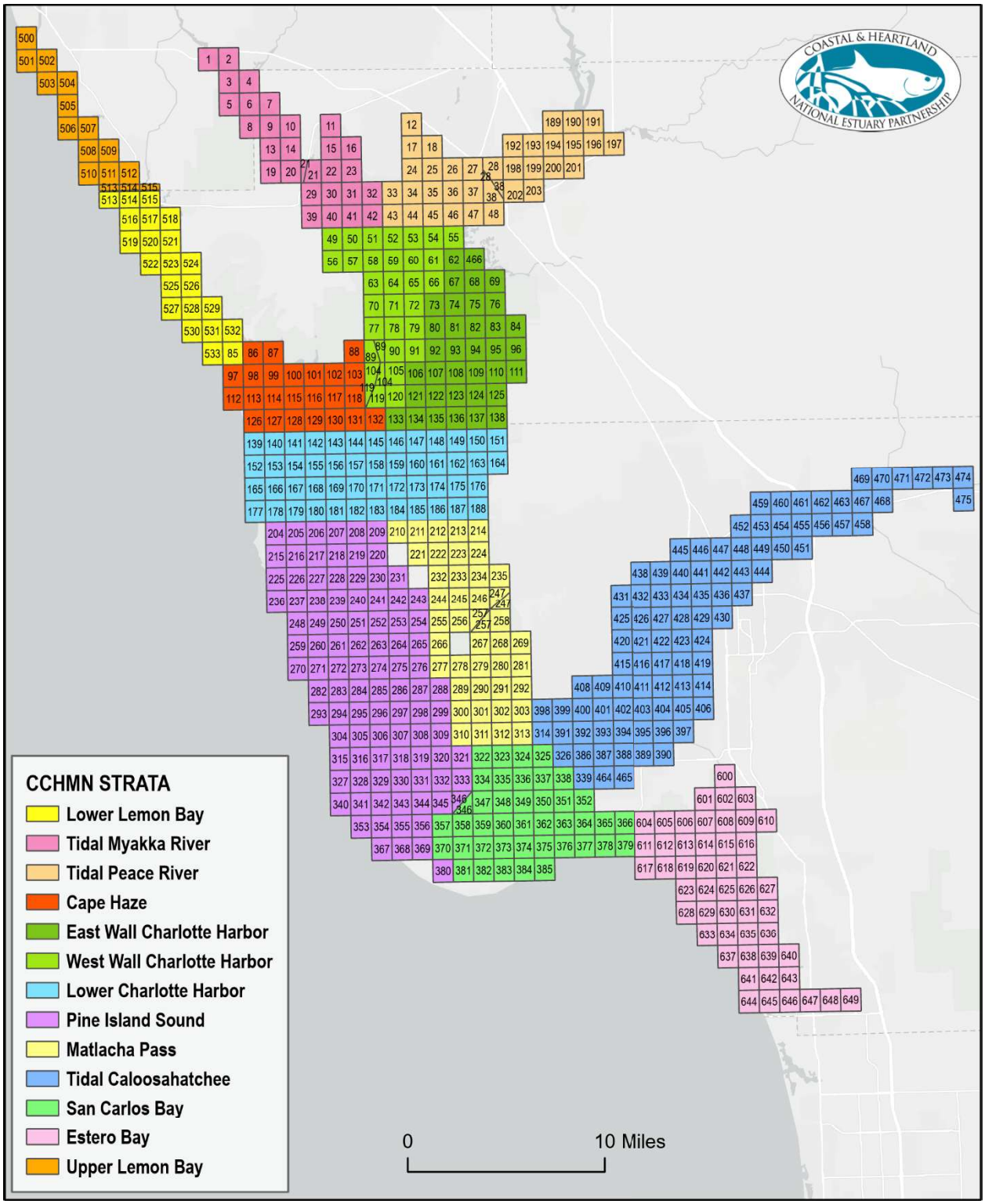


Figure 5: CCHMN Strata and Grid Numbers

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

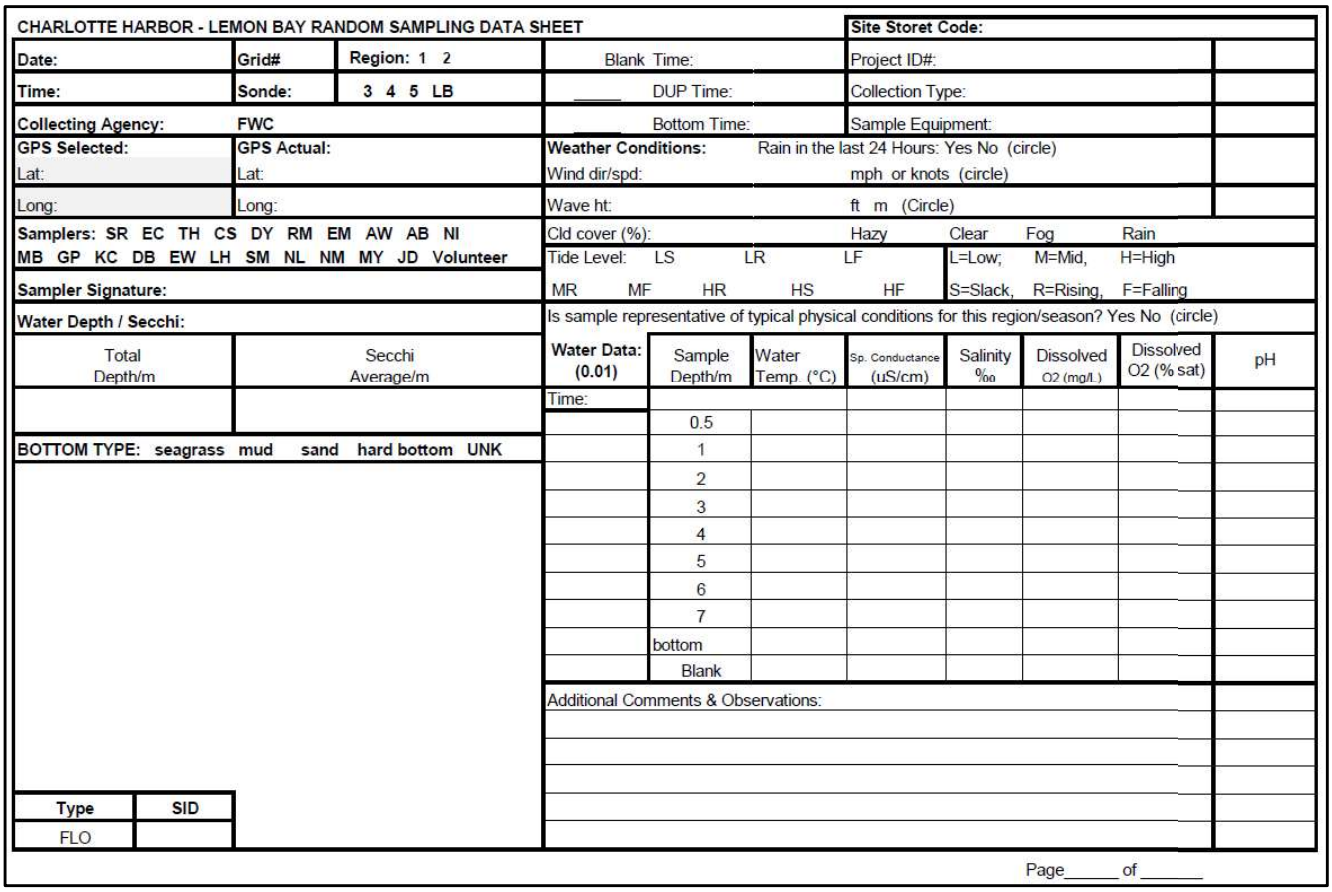
CCHMN Field Equipment Check List

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:

Water Depth / Secchi:

Total Depth/m	Secchi Average/m

BOTTOM TYPE: seagrass mud sand hard bottom UNK

Type	SID
FLO	

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

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

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:

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**
Joanne Vernon, P.E.
410 Taylor St, Unit 104
Punta Gorda, FL 33950
Joanne.Vernon@charlottecountyfl.gov
Matthew.Logan@charlottecountyfl.gov

Contact:

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 = 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	Field Parameters Temperature (°C)	Field Parameters pH (s.u.)	Laboratory Sample #
		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

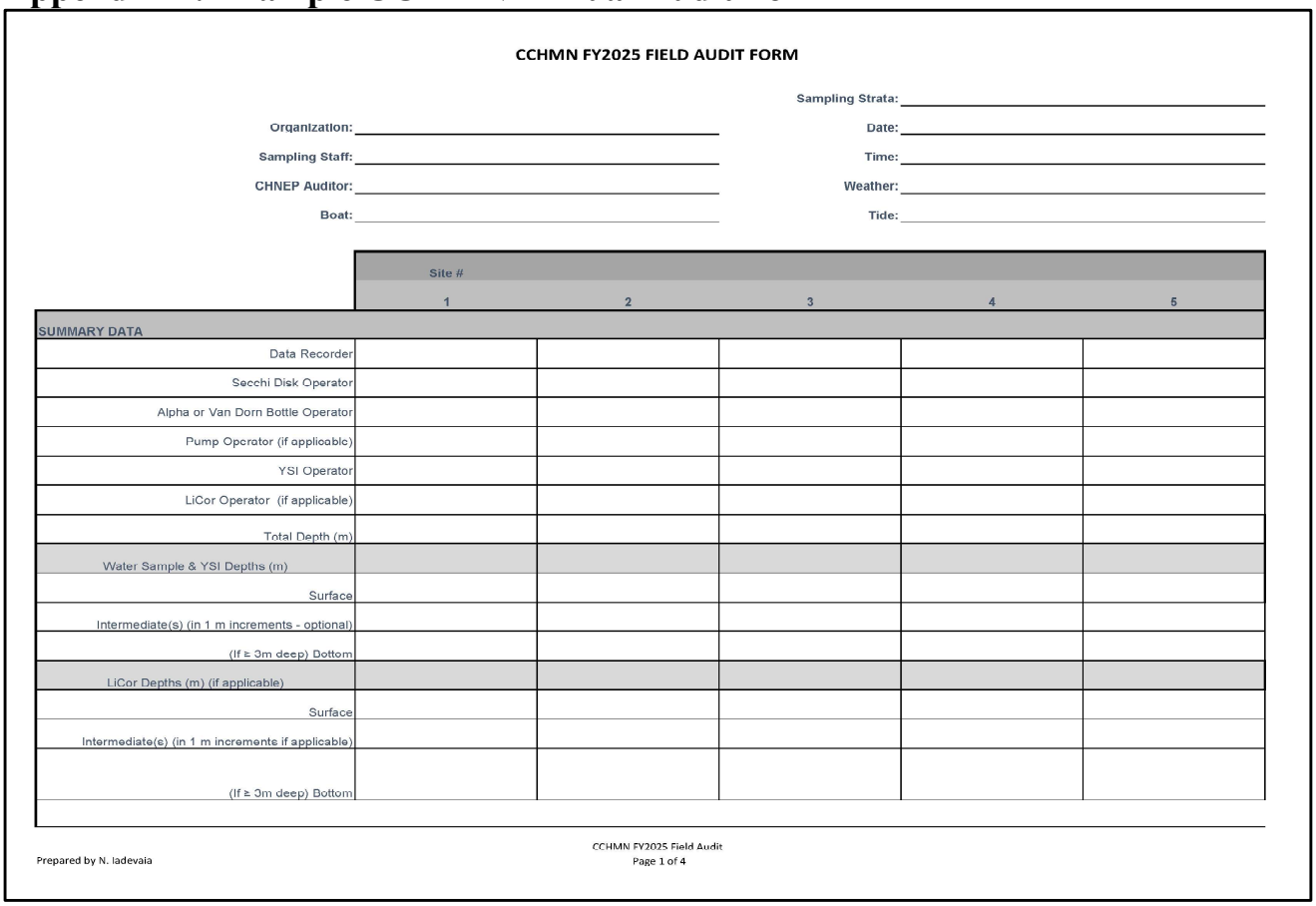
1. "Sample Type" is used to indicate whether the sample was a grab (G) or whether it was a composite (C).
2. "Sample Matrix" is used to indicate whether the sample is being discharged to drinking water (DW), groundwater (GW), surface water (SW), fresh surface water (FSW), saline surface water (SSW), 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, 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

Organization: _____ Sampling Strata: _____

Sampling Staff: _____ Date: _____

CHNEP Auditor: _____ Time: _____

Boat: _____ Weather: _____

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					

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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)					

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CCHMN FY2025 Field Audit
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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.					

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CCHMN FY2025 Field Audit
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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					

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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***

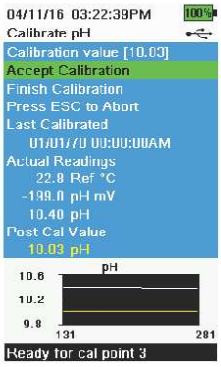
Optical Dissolved Oxygen

*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:*_____

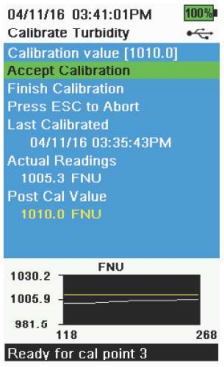
*ORP Cal Offset in GLP record after calibration:*_____ *Acceptable range is* ***-100 to 50***

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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