

ACE Basin National Estuarine Research Reserve
Meteorological Metadata Report
January - December 2004

Latest Update: **January 30, 2023**

I. Data Set & Research Descriptors

1. Principal investigator & contact persons:

SCDNR/Marine Resources Division	ACE Basin NERR field station
217 Fort Johnson Road	15717 Bennett's Point Road
Charleston, SC 29422	Green Pond, SC 29441
(843) 953-9300	(843) 844-8822

Contact Persons:

Dr. Elizabeth Wenner, Research Coordinator
E-mail: wennere@mrd.dnr.state.sc.us; (843) 953-9226
Saundra Upchurch, Reserve Biologist
E-mail: upchurchs@mrd.dnr.state.sc.us; (843) 953-9223
Amy Whitaker Dukes, Reserve Technician
E-mail: whitakera@mrd.dnr.state.sc.us; (843) 953-9225
Julie L. Dingle, Reserve Water Quality Technician
E-mail: diglej@mrd.dnr.state.sc.us; (843) 953-9225

2. Entry Verification

a) Data Input Procedures:

The 15-minute, 1-hour average and 24-hour meteorological data recorded by each sensor are stored in a Campbell Scientific CR10X datalogger. The CDMO Data Logger Program (`nerr4_2.csi`) that is loaded into the datalogger controls the sensors and data collections schedule (see 2b of the Entry Verification section for the data collection schedule). The CR10X then interfaced with the PC208W software supplied by Campbell Scientific.

The PC208W software is installed on a desktop and a laptop computer. The weather station is hard wired to the ACE Basin NERR field station located adjacent to the weather station. The weather data is downloaded from the datalogger weekly via the desktop computer located in the field station. The laptop computer is primarily used for a back-up, and the weather data is downloaded from the datalogger via a SC32A interface. These data are saved in a text file (*.DAT).

Data are uploaded from the CR10X data logger or storage module to a Personal Computer (IBM compatible). Files are exported from PC208W or LoggerNet in a comma-delimited format (.DAT) and opened in Microsoft Excel for pre-processing with the EQWin format macro that was developed by the CDMO to reformat the header columns, insert station codes, insert a date column (mm/dd/yyyy), correct the time column format and reformat the data to the appropriate number of decimal places. The pre-processed file is then ready to be copied into the EQWin `weather.eqi` file where the data are QA/QC checked and archived in a database. EQWin queries, reports and graphs are used to discover data set outliers (values which fall outside the range that the instrument is designed to measure) and large changes in the data. EQWin is also used to generate statistics, view

graphs, create customized queries and reports of the data, cross query the water, weather and nutrient data and finally export the data to the CDMO.

Common error noted in the monthly error reports was missing data, which was caused by a faulty solar panel regulator and lead acid battery. Amy Whitaker Dukes and Julie L. Dingle are responsible for these tasks.

Under Entry Verification:

Gemteck's EQwin version 5 and the CDMO developed Microsoft Excel EQWinFormat.xls macro now replaces the WDMP as the NERR MET database management program and primary QA/QC program.

The Centralized Data Management Office converted all SWMP weather data collected with CR10X program versions prior to version 4.0 which was distributed in October 2003. This was necessary in order to merge the old data format (12 array output) with the new data format found in version 4.0 (3 array output). The new format produces averages, maximums and minimums every fifteen minutes (array 15), every hour (array 60) and every day (array 144) for any sensors hooked up to the CR10X. Specifically, the 150 and 151 fifteen-minute data were converted to the new 15 array; the hourly 101, 102, 105 and 106 data were converted to the new 60 array; and the daily 241, 242, 243, 244, 245 and 246 data were converted to the new 144 array. With the new format, the use of 55555's to code for deleted data and 11111's to code for missing data has been abandoned. Hence, all 55555's or 11111's contained in the SWMP weather data collected prior to Version 4.0 of the CR10X program were removed and left blank.

For data collection, the CR10X datalogger was programmed to collect data in the following formats:

- i) 15-minute data are collected instantaneously for Air Temperature (C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). 15-minute Precipitation (mm) and PAR (mmol/m²) data are totaled from 5-second readings, prior to NERR_4.CSI
- ii) 15-minute average, maximum and minimum data are averages of 5-second readings for Air Temperature (degree C), Relative Humidity (%), Barometric Pressure (mb) and Wind Speed (m/s) with NERR_4.CSI.
- iii) Hourly average, maximum, and minimum data are averages of 5-second readings for Air Temperature (degree C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Hourly totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.
- iv) Daily average, maximum and minimum data are averages of 5-second readings for Air Temperature (degree C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Daily totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.

Data were stored on a Campbell Scientific storage module (SM192 or SM4M), which was retrieved monthly. The data were downloaded and pre-processed as described in Section 2. QA/QC of the data was conducted using either the WDMP or EQWin. WDMP error reports and EQWin queries were based on the following anomalous data criteria:

Air Temp:

- 15 min sample not greater than max for the day
- 15 min sample not less than the min for the day
- 15 min sample not greater than 3.0 C from the previous 15 minutes (WDMP only)
- Max and min temp recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 50 C or less than -30 C (EQWin only)

Relative Humidity:

- Not changed by more than 25% from the previous 15 minutes (WDMP only)
- Max and min humidity recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 100% or less than 0% (EQWin only)

Pressure:

- Pressure not greater than 1040 mb or less than 980 mb (WDMP only)
- Pressure changes greater than 5 mb per hour (WDMP only)
- Maximum and minimum values recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 1060 mb or less than 900 mb (EQWin only)

Wind Speed:

- Wind speed not greater than 65 m/s or less than 0.5 m/s (WDMP only)
- Wind speed not greater than 30 m/s (EQWin only)
- Wind speed not less than 0.5 m/s for 12 consecutive hours (EQWin only)

Wind Direction:

- Wind direction not greater than 360 degrees or less than 0 degrees

Rainfall:

- Precipitation not greater than 5 mm in 15 min
- No precipitation for the month (WDMP only)

Photo synthetically Active Radiation (PAR):

- Sample not greater than 5000 mmol/m² or less than -0.5 mmol/m²

Time:

- 15-minute interval recorded

For all data:

-No duplicate data

3. Research objectives (Campbell Weather Station):

The principal objective of the Weather Monitoring Program is to record long-term meteorological data for the ACE Basin in order to observe any environmental changes or trends over time.

4. Research Methods

The Campbell Scientific weather station measures the parameters every 5 seconds to produce both hourly and daily averages of those measurements of air temperature, relative humidity, barometric pressure, rainfall, and wind speed and wind direction. An instantaneous sample is taken every 15 minutes and that data is stored in array 150. The PC208W software is installed on a desktop and a laptop computer. The weather station is hard wired to the ACE Basin NERR field station located adjacent to the weather station. The weather data is downloaded from the datalogger weekly via the desktop computer located in the field station. The laptop computer is primarily used for a back-up, and the weather data is downloaded from the datalogger via a SC32A interface. These data are saved in a text file (*.DAT).

On-site weather conditions are measured to verify the accuracy of the readings by the sensors. After downloading data, sensors on the weather station are inspected for damage or debris. If any problems are found, it is repaired and/or cleaned. Tree limbs and other shrubs are cut back to prevent obstruction of the sensors. Sensors will be removed and sent back to Campbell Scientific for calibration at a minimum of every two years.

5. Site Location and Character

The ACE Basin National Estuarine Research Reserve (NERR) is located on the Southeastern Atlantic coast of the United States, including portions of Charleston, Colleton and Beaufort Counties in South Carolina. The study area encompasses the Ashepoo, Combahee, and South Edisto River basins, which empty into St. Helena Sound. Diverse estuarine wetlands provide extensive and complex habitat types for fish and wildlife. The NERR consist of approximately 92,000 acres of tidal marshes. Of this, 65,600 acres are salt marshes, 13,600 acres are brackish marshes and 12,100 acres are freshwater marshes. Interspersed within these three tidal marsh zones are approximately 26,000 acres of managed wetlands, marsh impoundments. St. Helena Sound comprises approximately 23,870 acres of open coastal marine and estuarine waters.

The weather station is located at the Bennett's Point field station on Mosquito Creek, a navigable tributary off of the Ashepoo River. The weather stations latitudinal and longitudinal coordinates are: (32° 33.5623'N, 80° 27.2715'W) The station is approximately 90 m from the creek (800 m from the Ashepoo River) in a grassy field, 80 m to the southwest of the field station. The closest wind obstructions are oak trees, 25 m to the south and southwest of the weather station and 70 m from a public paved road.

The CR10X datalogger and the barometric sensor are enclosed in a 1.8 m elevated aluminum box. Two long poles are attached to the aluminum box, which elevate sensors above potential barriers and enhance the performance of each sensor. The LiCor sensor is attached to the outside top of the box. The Wind Sentry sensor and Temperature/Relative Humidity sensor are

attached to a cross bar mounted on top of a 3 m pole. During the summer of 2003, ACE Basin staff installed a 15 foot galvanized steal tower. The Wind Sentry, Temperature/Relative Humidity, and the LiCor sensors are now suspended off the tower, elevating the sensors approximately 15 feet above the ground. The Solar Panel is attached to 2.5 m long pole, and is oriented to the east at approximately a 47-degree angle. The Tipping Bucket Rain gauge (1.3 m height) is located 2.5 m to the southeast of the box on a concrete level platform. The sensors are wired to the CR10X following protocol in the CDMO Manual, with minor changes due to upgraded sensors.

6. Data Collection Period

Bennett's Point Weather Station

BEGIN

END

12/26/03 (360), 10:30	01/06/04 (006), 11:30
01/06/04 (006), 11:45	01/13/04 (013), 14:15
01/13/04 (013), 14:30	01/20/04 (020), 12:30
01/20/04 (020), 12:45	02/03/04 (034), 11:15
02/03/04 (034), 11:30	02/10/04 (041), 11:15
02/10/04 (041), 11:30	02/17/04 (048), 14:00
02/17/04 (048), 14:15	02/24/04 (055), 11:30
02/24/04 (055), 11:45	03/04/04 (064), 10:15
03/04/04 (064), 10:30	03/11/04 (071), 10:00
03/11/04 (071), 10:15	03/16/04 (076), 14:30
03/16/04 (076), 14:45	03/25/04 (085), 10:45
03/25/04 (085), 11:00	03/30/04 (090), 10:30
03/30/04 (090), 10:45	04/06/04 (097), 11:15
04/06/04 (097), 11:30	04/13/04 (104), 12:30
04/13/04 (104), 12:45	04/20/04 (111), 10:00
04/20/04 (111), 10:15	04/27/04 (118), 10:15
04/27/04 (118), 10:30	05/04/04 (125), 12:45
05/04/04 (125), 13:00	05/11/04 (132), 10:30
05/11/04 (132), 10:45	05/18/04 (139), 11:15
05/18/04 (139), 11:30	05/25/04 (146), 10:00
05/25/04 (146), 10:15	06/02/04 (154), 11:30
06/02/04 (154), 11:45	06/08/04 (160), 10:30
06/08/04 (160), 10:45	06/15/04 (167), 11:15
06/15/04 (167), 11:30	06/22/04 (174), 10:00
06/22/04 (174), 10:15	06/29/04 (181), 10:00
06/29/04 (181), 10:15	07/06/04 (188), 09:30
07/06/04 (181), 09:45	07/14/04 (196), 12:00
07/14/04 (196), 12:15	07/20/04 (202), 09:45
07/20/04 (202), 10:00	07/27/04 (209), 10:15
07/27/04 (209), 10:30	08/03/04 (216), 09:30
08/03/04 (216), 09:45	08/10/04 (223), 09:30
08/10/04 (223), 09:45	08/17/04 (230), 09:00
08/17/04 (230), 09:15	08/24/04 (237), 09:45
08/24/04 (237), 10:00	08/31/04 (244), 10:30
08/31/04 (244), 10:45	09/07/04 (251), 09:30

09/07/04 (251), 09:45	09/14/04 (258), 10:30
09/14/04 (258), 10:45	09/21/04 (265), 10:45
09/21/04 (256), 11:00	09/28/04 (272), 10:00
09/28/04 (272), 10:00	10/05/04 (279), 09:30
10/05/04 (279), 09:45	10/12/04 (286), 10:15
10/12/04 (286), 10:30	10/19/04 (293), 10:30
10/19/04 (293), 10:45	10/26/04 (300), 10:00
10/26/04 (300), 10:15	11/02/04 (307), 12:30
11/02/04 (307), 12:45	11/08/04 (313), 13:15
11/08/04 (313), 13:30	11/16/04 (321), 10:30
11/16/04 (321), 10:45	11/23/04 (328), 12:00
11/23/04 (328), 12:15	11/30/04 (335), 11:30
11/30/04 (335), 11:45	12/07/04 (342), 12:00
12/07/04 (342), 12:15	12/14/04 (349), 10:30
12/14/04 (349), 10:45	12/21/07 (356), 12:15
12/21/07 (356), 12:30	12/28/04 (363), 10:45
12/28/04 (363), 11:00	01/04/05 (004), 11:00

7. Distribution

According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program, is as follows.

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from the NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance/quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data. NERR weather data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Section 1 Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page <http://inlet.geol.sc.edu/cdmohome.html>. Data are available in text format and Access data tables.

8. Associated Researchers and Projects

The NERR Water Quality Monitoring Project is a study, which records long-term water quality data for the ACE Basin in order to observe any physical changes or trends in water quality over time. The two sampling sites are in separate tributaries of the South Edisto River. One site

represents an urban or "treatment" site is in a tidal marsh creek off Big Bay Creek (approximately 14 kilometers from the weather station, GPS coordinates: 32°29'38.72125N and 80°19'21.69864W). It is surrounded by residential and commercial development and subject to nonpoint source pollution. The other site is our pristine site and is located in a tidal creek off St. Pierre Creek (approximately 9 kilometers from the weather station, GPS coordinates: 32°31'40.59518N and 80°21'41.25481W). The tidal creek and St. Pierre Creek are surrounded by a wide expanse of *Spartina alterniflora* marsh. Extensive mud flats and oyster reefs fringe the banks. Development in the immediate area is sparse, and this creek is subject to relatively light boat traffic. Measurements for both sites are taken every thirty minutes over roughly a two-week collection period.

In July 1997, the Reserve staff initiated nutrient monitoring study. The objective of the study is to ascertain the annual and tidal fluctuations in nutrient levels near our two data logger sites. Nutrient levels are measured during a complete tidal cycle each month, and the samples are analyzed for ammonia, nitrite-nitrate, ortho-phosphate, and chlorophyll a concentrations. In January of 2002, the nutrient monitoring protocol was added to the NERR System Wide Monitoring Program (SWMP).

Dr. Charles Wenner of SCDNR/Marine Resources Research Institute received funding through the National Marine Fisheries Service in January of 2001 to continue an ongoing survey of red drum (*Sciaenops ocellatus*) in the South Edisto and Combahee River basins, by electro-fishing in tidal freshwater and low salinity brackish water. Although red drum are the target species, all catches are separated, measured and weighted to provide a distribution and population size for each species.

The ACE Basin NERR received initial funding from the U.S. Environmental Protection Agency to establish a National Atmospheric Deposition Program site in the Reserve. Sampling efforts began on January 1, 2002 and will continue for five years. Weekly precipitation samples are collected and analyzed for atmospheric pollutants. The precipitation collector is located on Bear Island, a Wildlife Management Area inside the NERR.

The results of addition studies conducted in the ACE Basin can be obtained by contacting the Reserve.

II. Physical Structure Descriptors

9. Sensor Specifications, Operating Range, Accuracy, Date of Last Calibration

LiCor Quantum Sensor

Model #: LI-190SZ

Stability: < +/- 2% change over a 1 year period

Operating Temperature: -20 to +65 degree C

Sensitivity: Typically 30 nA per 100 klux

Light Spectrum Wavelength: 400 to 700 nanometers

Date of last calibration: 09/18/2003

Wind Sentry

Model #: 03001

Range: 0-50 m/s; 360o Mechanical

Date of last calibration: Exact date is unknown; Purchase date 04/24/2003

Temperature and Relative Humidity

Model #: HMP45AC

Operating Temperature: -40 to +60 degree C

Temperature Measurement Range: -40 to +60 degree C

Temperature Accuracy: +/- 2% degree C @ 20 degree C

Relative Humidity Measurement Range: 0 - 100% non-condensing

RH Accuracy: +/- @% RH (0 - 90%) and +/- 3% (90 - 100%)

Uncertainty of calibration: +/- 1.2% RH

Date of last calibration: 03/12/2003

Barometric Sensor

Model #: PTB101B

Calibrated Range: 26" - 32" (Standard)

Supply Voltage: 12 VDC at 12 mA

Accuracy: +/- 0.7 of span

Operating Temperature Range: -22 to +55 degree C

Date of last calibration: 02/27/2003

Tipping Bucket Rain Gauge

Texas Electronics

Model #: TR-525I

Calibration: 0.01 inch per tip

Accuracy: +/- 3% (Rates of 1 to 6 inches per hour)

Date of last calibration: 5/11/04 Purchase date June of 2001

10. Coded Variable Indicator and Variable Code Definition

Sampling station:	Sampling site code:	Station code:
Bennett's Point	BP	acebpmet

11. Data Anomalies / Suspect Data

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The

updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

January to December 2004
No Anomalies Data

12. Deleted Data

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

January 2004
No deleted data.

February 2004
No deleted data.

March 2004

A - At 10:20 on March 4 (J 64), ACE NERR staff powered down the CR10X data logger in order to install/upload the new CDMO approved DLD program file. The program was modified to correct a time sequence problem for data output. Array 60 at 11:00 on March 4 (J64) and array 144 at 24:00 on March 4 (J64) records were deleted, because these records were based off of five second records which were lost when the data logger was powered down.

B - At 10:15 on March 11 (J71), ACE NERR staff could not communicate with the CR10X data logger. The data logger was powered down for approximately fifteen seconds to reset the functions of the data logger. Array 60 at 11:00 on March 11 (J71) and array 144 at 24:00 on March 11 (J71) records were deleted, because these records were based off of five second records which were lost when the data logger was powered down.

C - At 11:45 on March 23 (J83), ACE NERR staff could not communicate with the CR10X data logger. The data logger was powered down for approximately fifteen seconds to reset the functions of the data logger. Array 60 at 12:00 on March 23 (J83) and array 144 at 24:00 on March 23 (J83) records were deleted, because these records were based off of five second records which were lost when the data logger was powered down.

April 2004
No deleted data.

May 2004

No deleted data.

June 2004

No deleted data.

July 2004

A - At 13:45 on July 14 (J196), ACE NERR staff could not communicate with the CR10X data logger, due to a potential lightning strike. The data logger was powered down for approximately fifteen seconds to reset the functions of the data logger. Array 60 at 14:00 on July 14 (J196) and array 144 at 24:00 on July 14 (J196) records were deleted, because these records were based off of five second records which were lost when the data logger was powered down.

August 2004

No deleted data.

September 2004

No deleted data.

October 2004

No deleted data.

November 2004

A - At 13:30 on November 8 (J313), ACE NERR staff could not communicate with the CR10X data logger. The field station experienced frequent power surges which could have caused the communication from the hard wired computer in side the field station to the Campbell weather station to fail. The data logger was powered down for approximately fifteen seconds to reset the functions of the data logger. Array 60 at 14:00 on November 8 (J313) and array 144 at 24:00 on November 8 (J313) records were deleted, because these records were based off of five second records which were lost when the data logger was powered down.

B - At 11:30 on November 23 (J328), ACE NERR staff could not communicate with the CR10X data logger. The field station experienced frequent power surges which could have caused the communication from the hard wired computer in side the field station to the Campbell weather station to fail. The data logger was powered down for approximately fifteen seconds to reset the functions of the data logger. Array 60 at 12:00 on November 23 (J328) and array 144 at 24:00 on November 23 (J328) records were deleted, because these records were based off of five second records which were lost when the data logger was powered down.

December 2004

No deleted data.

13. Missing Data

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of calibration of equipment, or repair/replacement of the sampling station platform. For more details on deleted data, see the Deleted Data Section (12.). If additional information on missing data is needed, contact the Research Coordinator at the Reserve submitting the weather data.

A – Known missing data: From 12:45 on January 20 (J20) to 10:00 on January 23 (J23), data were lost. The data storage capacity of the CR10X data logger reached its maximum capacity and began to record new data overwriting old data.

14. Other Remarks – Daily Total Rainfall Amounts Measured in Millimeters

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

Precipitation:

During the initial years of NERRS SWMP weather data collection the CR10X programming was inconsistent in how precipitation values were recorded. For most reserves, zeros were not recorded when rainfall had not occurred between 2001-2003, instead no rainfall was represented by a blank cell. The CDMO verified which datasets were impacted by this issue for the 2001-2006 datasets and inserted zeros when the metadata indicated that no precipitation occurred and data were not missing for other reasons. In some cases, zero values for precipitation data were evaluated and removed where the metadata confirmed that no rainfall should have been in the dataset. The pre-2007 data did not go through a thorough QAQC process again at that time (in addition to previous QAQC); however, if discrepancies were noticed between what was documented in the metadata and what was in the dataset, additional updates may have been made. The updated datasets were

uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout early 2023.

LiCor/PAR: Negative LiCor/PAR data have been observed during the night. These small negative values are within the range of the sensor and are due to normal errors within the sensor and the CR10X datalogger. The Maximum signal noise error for the Licor sensor is +/- 2.214 mmoles/m² over a 15 minute interval. These data were corrected to zero.

South Carolina experienced several meteorological rain events throughout the year, including five tropical disturbances. These storms affected the entire eastern coast of the United States, and all occurred within forty-five days of each other.

Hurricane Charley	August 12-17	rain accumulation – 5.36 inches
Tropical Storm Gaston	August 29-30	rain accumulation – 1.95 inches
Hurricane Frances	September 6-8	rain accumulation – 4.21 inches
Hurricane Ivan	September 15-16	rain accumulation – 0.37 inches
Hurricane Jeanne	September 26-27	rain accumulation – 0.56 inches

Calendar Day Precipitation Total measured in Millimeters (mm)

January 2004

01/18/2004	0.5
------------	-----

February 2004

02/02/2004	3.3
02/03/2004	1.3
02/06/2004	9.4

March 2004

03/16/2004	5.8
03/30/2004	0.8

April 2004

04/08/2004	2.0
04/12/2004	24.9
04/13/2004	9.1
04/26/2004	4.8
04/27/2004	0.3
04/30/2004	0.5

May 2004

05/01/2004	51.3
05/02/2004	22.1
05/03/2004	4.6
05/16/2004	0.3
05/18/2004	7.9

June 2004

06/01/2004	0.5
06/04/2004	18.0
06/13/2004	18.0
06/14/2004	4.1
06/15/2004	21.8
06/16/2004	13.0
06/17/2004	1.5
06/20/2004	0.3
06/21/2004	10.4
06/22/2004	0.5
06/23/2004	3.3
06/24/2004	0.5
06/25/2004	0.3
06/27/2004	15.2
06/28/2004	0.8
06/30/2004	14.7

July 2004

07/01/2004	1.3
07/03/2004	1.5
07/10/2004	0.3
07/11/2004	3.8
07/12/2004	3.3
07/17/2004	0.3
07/18/2004	0.8
07/24/2004	2.0
07/25/2004	3.3
07/31/2004	19.6

August 2004

08/01/2004	3.0
08/02/2004	32.5
08/11/2004	0.8
08/12/2004	32.8
08/13/2004	11.9
08/14/2004	17.8
08/15/2004	26.7
08/16/2004	0.3
08/17/2004	30.7
08/22/2004	38.9
08/23/2004	27.7
08/25/2004	0.8
08/27/2004	2.8
08/28/2004	0.5

08/29/2004	20.8
08/30/2004	22.9
08/31/2004	0.5
September 2004	
09/01/2004	19.6
09/06/2004	70.4
09/07/2004	4.8
09/08/2004	19.1
09/10/2004	1.5
09/11/2004	0.5
09/13/2004	2.8
09/15/2004	0.5
09/16/2004	7.9
09/26/2004	4.3
09/27/2004	8.1
October 2004	
10/08/2004	2.5
10/09/2004	0.8
10/15/2004	15.5
10/19/2004	6.9
November 2004	
11/02/2004	0.3
11/04/2004	4.1
11/12/2004	13.2
11/21/2004	4.8
11/22/2004	3.0
11/24/2004	3.8
11/25/2004	0.5
11/27/2004	25.7
December 2004	
12/09/2004	1.3
12/10/2004	0.5
12/23/2004	0.8

2004 Annual Total = 802.6 millimeters, or 35.83 inches of Precipitation.