Sapelo Island National Estuarine Research Reserve
Meteorological Metadata Report
July - December 2002

Latest Update: February 22, 2023

I. Data Set & Research Descriptors

1. Principal investigator & contact persons

Sapelo Island National Estuarine Research Reserve
Sapelo Island, GA 31327
912-485-2251 phone
912-485-2141 fax

Contact Persons
Dorset Hurley, Research Coordinator
E-mail: dhurley@darientel.net; (912) 485-2251
Jane Garbisch, Reserve Water & Weather Quality Technician
E-mail: duplin@mac.com; (912) 485-2265
Christina Richards, SINERR GRF
E-mail: richards@plantbio.uga.edu; (706) 542-1417

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 (nerr30.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 laptop computer. This computer is used to download the weather data from the datalogger via a SC32A interface. These data are saved in a text file (*.DAT).

Once an entire month of data is collected, the CDMO Weather Data Management Program (WDMP) is used to convert the files to an Access database. This program was developed in Visual Basic to interface with the NERR Meteorological Data Collection Schedule (see 2b of the Entry Verification section for the data collection schedule). The WDMP inputs and converts the monthly raw data file into the database, as described below.

First, it converts the comma delimited monthly raw data file into an Access database. Next, it checks the data against a predetermined set of error criteria (see Appendix G for the CDMO Meteorological Data Collection Error/Anomalous Data Criteria). Finally, it produces error and summary reports. Any anomalous data are investigated and noted in the

Anomalous Data/Data Corrections Section. Any data corrections that are performed are noted in the Anomalous Data/Data Correction Section below. Common errors noted in the monthly error reports were missing data, which was caused by either technical failures or unknown factors. Jane Garbisch and Christina Richards are responsible for these tasks.

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.

b) Data Collection Schedule

i) Data are collected in the following formats.

(1) Sample data points are collected every 15 minutes.

(2) Hourly averages are produced every 60 minutes.

(3) Daily average, maximum with time, and minimum with time every 24 hours.

ii) 15 minute sample point parameters:
Date, Time, Air Temperature (c), Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction, Rainfall (mm)

iii) Hourly average parameters:
Date, Time, Air Temperature (c), Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction, Wind Direction Standard Deviation (using Yamartino's Algorithm)

iv) Daily Averages parameters:
Date, Time, Air Temperature (c), Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction

v) Daily Maximum parameters:
Date, Time, Air Temperature (c), Time, Relative Humidity (%), Time, LiCor (par), Time, Barometric Pressure (mb), Time, Wind Speed (m/s), Time, Battery Voltage, Time

vi) Daily Minimum parameters:
Date, Time, Air Temperature (c), Time, Relative Humidity (%), Time, LiCor (par), Time, Barometric Pressure (mb), Time, Wind Speed (m/s), Time, Battery Voltage, Time

c) Error/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
- Max and min temp recorded for the day
- 1 hour average not greater than 10% above the greatest 15 min sample recorded in the hour

Relative Humidity:

- Not changed by more than 25% from the previous 15 minutes
- Max and min humidity recorded for the day
- 1 hour average not greater than 10% above the greatest 15 min sample recorded in the hour

Rainfall:

- Precipitation not greater than 5 mm in 15 min
- No precipitation for the month

Wind Speed:

- Wind speed greater than 30 m/s
- Wind speed less than .5 m/s

Wind Direction:

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

Pressure:

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

Time:

- 15 minute interval recorded

For all data:

- Duplicate interval data

3. Research objectives

The principal objective of the Weather Monitoring Program is to establish a continuous meteorological record for the Sapelo Island NERR in order to observe both long-term trends and short- term variability in weather parameters over time. Additionally, this data provides a baseline of information for the large quantity of biological research and physical oceanography conducted within the Reserve by staff, graduate students and fellows, University of Georgia Marine Programs, and the recently established Georgia Coastal Ecosystems Long Term Ecological Research (GCE-LTER) initiative.

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, wind speed and wind direction. An instantaneous sample is taken every 15 minutes and that data is stored in array 150. A laptop computer is

used to download the data from the datalogger via the SC32A interface. 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 Sapelo Island National Estuarine Research Reserve is located on the Southeastern Atlantic coast of the United States in McIntosh County, Georgia. The study area encompasses the Duplin River estuary, a tidally flushed drainage system flowing into Doboy Sound from the north. The Duplin River watershed occupies most of the Reserve, which also contains various forest types, sand dunes, a section of ocean beach and minor developed areas. The Duplin River estuary covers 3,300 acres between Sapelo Island and the mainland in McIntosh County. It drains a tidal bay and an extensive network of salt marshes about 6 miles long, into which there is little upland run-off. Diverse estuarine wetlands provide extensive and complex habitat types for fish and wildlife. Brackish and freshwater marshes located within the uplands of the island are supplied with freshwater exclusively by runoff and surficial aquifer expression associated with this perched, freshwater lense. Interspersed within the three tidal marsh zones (Upper, middle and lower Duplin; Imburger et. al. 1983) are approximately 500 acres of managed brackish wetlands. The Reynolds duck impoundment (Reynolds Pond) located within Sapelo's northernmost upland component, which was historically a manipulated freshwater impoundment has reverted back into a brackish marsh with diurnal tidal exchange due to the collapse of the dated tidal gate. The Duplin River which is supplied by Doboy Sound with its tidal oceanic/estuarine influences is currently under intensive study (Summer 2003) to characterize and model the hydrological exchange of the river by a team of researchers from the Skidaway Institute of Oceanography (SKIO) and University of Georgia: School of Marine Programs. The primary objective of this research is to add to the body of information supplied by Imburger et. al. 1983, in addition to creating an interactive model for a better understanding of tidal exchange, hydrological residence time and chemogradients associated with the three distinct hydrological boundaries suggested by Imburger's work.

Weather station site description and deployment

The weather station is located at Marsh Landing on the Duplin River, a navigable river at 31 ° 25.068' N, 81° 17.721' W. The station is approximately 50 m from the River mounted on a metal tower at the edge of the parking lot for the ferry dock. There are no nearby wind obstructions. The CR10X datalogger and the barometric sensor are enclosed in fiberglass housing at an elevation of approximately 1m. The 10 m tall weatherstation tower elevates the sensors above potential confounding physical barriers in addition to enhancing the performance of each sensor probe. The Wind Sentry sensor and Temperature/Relative Humidity sensor are attached to the tower at 10 m and 3 m elevations; respectively. The Solar Panel is attached 4 m above the ground, and is oriented to the South at approximately

a 45 degree angle from the ground. The LiCor sensor is attached at an elevation of 3 m. The Tipping Bucket Rain gauge is attached to the tower at an elevation of 7m and fixed to the southwest side of the tower. The sensors are wired to the CR10X following protocol in accordance with the Campbell Scientific CR10X Based Meteorological Monitoring Station SOP, with minor changes due to upgraded sensors.

6. Data Collection Period
Marsh Landing Weather Station

The weather station was not online until September 4, 1445 because probes had to be calibrated and there were no personnel to set up the station to collect the data.

BEGIN	END
09/04/2002 (247), 14:45	09/30/2002 (273), 09:15
09/30/2002 (273), 09:30	11/02/2002 (306), 09:00
11/02/2002 (306), 09:15	11/26/2002 (330), 09:15
11/27/2002 (331), 20:00	12/29/2002 (363), 15:45

7. Distribution
According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program:

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://cdmo.baruch.sc.edu/. Data are available in text format and Access data tables. The Sapelo Island National Estuarine Research Reserve has also partnered with the GCE-LTER in data acquisition in order to obtain “real-time” output of all monitored weather and atmospheric parameters. These data are collected and archived using a different

QA/QC protocol and are available by contacting the GCE-LTER data manager, Wade Sheldon at the following address: "GCE-LTER Information Manager" gcelter@UGA.EDU.

8. Associated Researchers and Projects

The NERR Water Quality Monitoring Project is a study which records long-term water quality data for Sapelo Island in order to observe any physical changes or trends in water quality over time. Four continuous water quality stations are maintained and described as follows: Deployment on alternate weeks with weekly field check and cleaning in summer due to intensive bio-fouling community. Data collected on all parameters at 30 minute intervals and include biweekly data harvesting and weekly calibration and bio- fouling checks. YSI 6600 and 6000 series water quality electronics deployed at all sites.

Locations

Marsh Landing: near surface: Lat: 31 25' 04" N, Long: 081 17' 46" W
Marsh Landing: near benthic: Lat: 31 25' 04" N, Long: 081 17' 46" W
Flume Dock: near surface: Lat: 31 28' 58" N, Long: 081 17' 03" W
Hunt Camp near benthic: Lat: 31 28' 30" N, Long: 081 17' 30" W

Water Quality site descriptions

Near Surface water quality monitoring units are suspended by chains from floating docks associated with each station. Near benthic sites are fixed in a deployment depth of 0.5 m above bottom. Salinities at all sites vary according to localized rainfall and associated runoff. Upper Duplin River sites (Flume Dock and Hunt Camp) experience slightly lower salinities associated with rainfall events (2 –3 ppt) as compared to lower Duplin River sites (Marsh Landing). Average salinities range from 15 ppt. to 30 ppt. depending on seasonal or event rainfall.

Related Research

In January, 2002 the Reserve initiated nutrient monitoring of the Duplin River. The objective of the study is to characterize the annual and tidal fluctuations in nutrient levels near our four water quality data logger sites. Nutrient levels are measured during a complete tidal cycle each month via ISCO technology on three-hour intervals. Additionally, grab samples (three replicates at all four water quality sites) are also taken monthly. Nutrient samples are auto-analyzed for ammonia, nitrite-nitrate, ortho-phosphate, and chlorophyll a concentrations. Entrococcus fecalis is monitored as a measure of anthropogenic influences related to on-site septic system functionality with the Duplin River Basin via culturing and counting colonies as described in Standard Water and Wastewater Analysis.

In the summer of 2002, Dr. Chistopher Craft completed the construction of 10 sediment/erosion tables (SET) within the Sapelo Island NERR and greater Sapelo Island to determine the hydrologic effects of erosion and deposition on surface (0.0 m), near surface

(0.01 m) and deep (5 m) subsurface sediments of Sapelo Island marshes. Funding for this project is sponsored in association with the GCE- LTER.

Selected current projects, PI's and affiliate organizations:
Macropredator abundance in the Duplin River: Dr. Steve Vives, Georgia Southern University, Dept. of Biology
Benthic Decapod Monitoring: Dr. Dale Bishop, University of Georgia, School of Marine Programs
Maritime Forest Restoration: Dr. John Averett, Georgia Southern University, Dept of Biology
Nutrient Monitoring of the Duplin River: Dr. Randal Walker, University of Georgia, Marine Extension Service
Characterization and modeling of the hydrodynamics and tidal exchange in the Duplin River: Dr Jack Blanton, Skidaway Institute of Oceanogaphy/GCE-LTER and Dr. Wei Jun Ki, University of Georgia, School of Marine Programs/GCE-LTER.
Prokaryotic community assemblage and inventory in Georgia salt marshes: Dr. Mary Ann Moran, University of Georgia, School of Marine Programs/GCE-LTER
Hermatodinium prevalence in Callinectes sapidus in the Duplin River: Dr. Dick Lee, Skidaway Institute of Oceanography, Amanda Wrona, University of Georgia, School of Marine Programs, Michael Sheppard, Savannah State University
Ecological niche and invasion biology of the green porcelin crab in the intertidal habitats of Coastal Georgia: Amanda Hollebone, Dr. Mark Hay Skidaway Institute of Oceanography/ Georgia Institute of Technology

II. Physical Structure Descriptors

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

LiCor Quantum Sensor
Model #: LI-190SB
Stability: < +/- 2% change over a 1 year period
Operating Temperature: -20 to +65 ºC
Sensitivity: Typically 30 nA per 100 flux
Light Spectrum Wavelength: 400 to 700 nanometers
Date of last calibration: Febuary 7, 2001

Wind Sentry
Model #: 03001
Range: 0-50 m/s; 360º Mechanical
Date of last calibration: May 22, 2002

Temperature and Relative Humidity
Model #: HMP45C
Operating Temperature: -40 to +60 ºC
Temperature Measurement Range: -40 to +60 ºC

Temperature Accuracy: +/- 2% ºC @ 20 ºC
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: 09/11/2000

Barometric Sensor

Model #: Vaisala Barometric Pressure Transmitter PT101B, CS105
Calibrated Range: 26" - 32" (Standard)
Supply Voltage: 12 VDC at 12 mA
Accuracy: +/- 0.7 of span
Operating Temperature Range: -22 to +55 ºC
Range: 60-1060 HPa
Date of last calibration: May 22, 2002

Tipping Bucket Rain Gauge

Texas Electronics
Model #: TE-525WS-L
Calibration: 0.01 inch per tip
Accuracy: +/- 3% (Rates of 1 to 6 inches per hour)
Date of last calibration: May 22, 2002

10. Coded Variable Indicator and Variable Code Definition

Site definition**:** ML = Marsh Landing
Station code: sapmlmet

11. Data Anomalies/Data Corrections

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.

Air temperature and relative humidity data were deleted for all of 2002 due to programming and wiring errors of the temperature sensor.

September 2002

a.) Data was not collected until September 4; therefore all data should be missing until September 4. The following data appear to be correct. September had several tropical storms offshore, though not passing directly over the island.

Precip difference on September 13 (256) from 930 to 945 (10.668 to 3.302) is greater than 5 mm.
Precip difference on September 14 (257) from 2145 to 2200 (5.334 to 10.414) is greater than 5 mm.
Precip difference on September 14 (257) from 2200 to 2215 (10.414 to.508) is greater than 5 mm.
Precip difference on September 25 (268) from 2300 to 2315 (5.588 to 13.208) is greater than 5 mm.
Precip difference on September 25 (268) from 2315 to 2330 (13.208 to 2.286) is greater than 5 mm.

Data Corrections:

b.) The following temperature and relative humidity data were deleted due to programming and wiring errors of the temperature probe.

101 4 247 1500 Technician changed 101 Array data from 4 (247) 1500 to 30 (273) 900
150 4 247 1445 Technician changed 150 Array data from 4 (247) 1445 to 30 (273) 915
241 4 247 2400 Technician changed 241 Array from 4 (247) 2400 to 29 (272) 2400
243 4 247 2400 Technician changed 243 Array data from 4 (247) 2400 to 29 (272) 2400
244 4 247 2400 Technician changed 244 Array data from 4 (247) 2400 to 29 (272) 2400

c.) Hourly barometric pressure data on September 4 (247) 1500 (942mb) was deleted as well as daily barometric pressure on September 4 (247) 2400 where the values were erroneously low (942mb). Barometric pressure jumps from 942mb at 1400 to 1015mb at 1500. Daily minimum barometric pressure was recorded as 600mb, indicating a sensor error.

October 2002

a.) The following data are suspect but rain was reported on these days at different weather stations.

Precip difference on September 9 (282) from 2130 to 2145 (.254 to 7.112) is greater than 5 mm
Precip difference on September 9 (282) from 2200 to 2215 (9.144 to 3.302) is greater than 5 mm
Precip difference on September 10 (283) from 1030 to 1045 (7.874 to .508) is greater than 5 mm
Precip difference on September 24 (297) from 1930 to 1945 (.254 to 5.334) is greater than 5 mm

Data Corrections:

b.) The following temperature and relative humidity data were deleted due to programming and wiring errors of the temperature probe.

101 1 274 100 Technician changed 101 Array data at 1 (274) 100 to 31 (304) 2400
150 1 274 15 Technician changed 150 Array data at 1 (274) 15 to 31 (304) 2400
241 1 274 2400 Technician changed 241 Array data at 1 (274) 2400 to 31 (304) 2400
243 1 274 2400 Technician changed 243 Array data at 1 (274) 2400 to 31 (304) 2400
244 1 274 2400 Technician changed 244 Array data at 1 (274) 2400 to 31 (304) 2400

November 2002

a.) The following data are suspect. The rain gauge may have malfunctioned due to high volume of rainfall although thunderstorms often drop large amounts of rain in a short amount of time.

Precip difference on November 12 (316) from 445 to 500 (2.032 to 17.018) is greater than 5 mm
Precip difference on November 16 (320) from 1315 to 1330 (2.032 to 8.128) is greater than 5 mm
Precip difference on November 16 (320) from 1330 to 1345 (8.128 to 1.27) is greater than 5 mm

Data Corrections:

b.) The following temperature and relative humidity data were deleted due to programming and wiring errors of the temperature probe.

101 1 305 100 Technician changed 101 Array data from 1 (305) 100 to 26 (330) 900
150 1 305 15 Technician changed 150 Array data from 1 (305) 15 to 26 (330) 915
241 1 305 2400 Technician changed 241 Array from 1 (305) 2400 to 25 (329) 2400
243 1 305 2400 Technician changed 243 Array data from 1 (305) 2400 to 25 (329) 2400
244 1 305 2400 Technician changed 244 Array data from 1 (305) 2400 to 25 (329) 2400

December 2002

None

Data Corrections:

a.) The following temperature and relative humidity data were deleted due to programming and wiring errors of the temperature probe.

101 1 335 100 Technician changed 101 Array data from 1 (335) 100 to 29 (363) 1500
150 1 335 15 Technician changed 150 Array data from 1 (335) 15 to 29 (363) 1545
241 1 335 2400 Technician changed 241 Array from 1 (335) 2400 to 28 (362) 2400
243 1 335 2400 Technician changed 243 Array data from 1 (335) 2400 to 28 (362) 2400
244 1 335 2400 Technician changed 244 Array data from 1 (335) 2400 to 28 (362) 2400

12. 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.

September

a.) Data were not collected until September 4 @ 1445.

b.) The following data are missing due to battery failure.

Missing 150 Array data (15 minute data) from September 30 (273) 930 to 2400
Missing 101 Array data (Hourly Averages) from September 30 (273) 1000 to 2400
Missing 102 Array data (Hourly Average Wind Parameters) from September 30 (273) 1000 to 2400

October

None

November

a.) The following data are missing due to technical failure.

Missing 150 Array data (15 minute data) from November 26 (330) 930 to November 30 2400
Missing 101 Array data (Hourly Averages) from November 26 (330) 1000 to November 30 2400
Missing 102 Array data (Hourly Average Wind Parameters) from November 26 (330) 1000 to November 30 2300
Missing 241 data (Daily Averages) from November 26 (330) 2400 to November 30 2400
Missing 242 data (Daily Average Wind Parameters) from November 26 (330) 2400 to November 30 2400
Missing 243 data (Daily Max/Time Values) from November 26 (330) 2400 to November 30 2400
Missing 244 data (Daily Min/Time Values) from November 26 (330) 2400 to November 30 2400

December

a.) The following data are missing, possibly due to a battery failure.

Missing 150 Array data (15 minute data) from December 29 (363) 1600 to December 31 (365) 2400
Missing 101 Array data (Hourly Averages) from December 29 (363) 1600 to December 31 (365) 2400
Missing 102 Array data (Hourly Average Wind Parameters) from December 29 (363) 1600 to December 31 (365) 2300
Missing 241 data (Daily Averages) from December 29 (363) 2400 to December 30 (364) 2400
Missing 242 data (Daily Average Wind Parameters) from December 29 (363) 2400 to December 30 (364) 2400
Missing 243 data (Daily Max/Time Values) from December 29 (363) 2400 to December 30 (364) 2400
Missing 244 data (Daily Min/Time Values) from December 29 (363) 2400 to December 30 (364) 2400

13. Other Remarks

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.

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.