

North Carolina (NOC) National Estuarine Research Reserve
Research Creek Meteorological Metadata Report
January - December 2004
Latest Update: **October 12, 2023**

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons:

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or
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Contact Persons:

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2. Entry verification

Meteorological information is sampled every 5 seconds from each instrument on the weather station and stored on a Campbell Scientific CR10X data logger. Data are output to a file in three arrays: array 15 stores 15 minute average, max and min data; array 60 stores hourly average, max and min data; and array 144 stores daily average, max and min data. The CDMO Data Logger Program (NERR_4.CSI) was loaded into the CR10X and controls the sensors. The CR10X then interfaces with the PC208W software supplied by Campbell Scientific.

Data are uploaded from the CR10X data logger or storage module to a Personal Computer (IBM compatible). Files are exported from PC208W 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.

Any anomalous data were investigated and noted below in the Anomalous/Suspect Data Section. Any data corrections that were performed are noted in the Deleted Data Section below. The most common reported errors/anomalies in 2004 were precipitation differences greater than 5mm in 15 minutes. All errors were double checked with other data that could support such "anomalous" weather changes and were noted in the sections that follow.

Raw data files and EQWin databases were saved on multiple computers, archived on compact discs, and backed-up on the CDMO server. Paula May was responsible for error checking and compiling 2004 weather data.

3. Research Objectives

The principal objectives are to establish long-term monitoring of the weather in the vicinity of Masonboro Island, to obtain better data on storms and to be able to correlate the weather, water quality, chlorophyll and nutrient data. In addition, the weather data collected will be used in support of other ongoing projects within the Reserve and nearby area.

4. Research methods

The Campbell Scientific weather station samples every 5 seconds continuously throughout the year. These data are used by the CR10X to produce 15 minute averages, maximum and minimums (array 15), hourly averages, maximums and minimums (array 60) and daily averages, maximums and minimums (array 144) of air temperature, relative humidity, barometric pressure, rainfall, wind speed, and wind direction. Data are stored in a storage module connected to the CR10X and also downloaded hourly to a PC located in the NOCNERR lab via telemetry using the PC208W software package. Data are periodically compared to values recorded by other local weather stations to verify accuracy. Data are also quality checked using EQWin. The reports, graphs and queries of meteorological data are printed and reviewed. Anomalous data and errors are further investigated and data are corrected, deleted (if necessary) or left unchanged and noted in the metadata report.

The weather station and sensors are inspected monthly for cleaning and/or repair. Sensors are replaced and/or calibrated according to the manufacturer's guidelines (annually or biannually).

5. Site Location and Character:

The components of North Carolina's National Estuarine Research Reserve (from north to south) are: Currituck Banks, Rachel Carson, Masonboro Island, and Zeke's Island. They are located along the southeast Atlantic coast of the United States. Currently, only data from Masonboro Island and Zeke's Island components are transferred to the CDMO.

The meteorological site is located on Masonboro Island, 2.09 km from the NOC NERR lab, and approximately 76.2 m from the Research Creek water quality deployment site. The weather station is located on an inactive dredge spoil island adjacent to Research Creek east of the Intracoastal Waterway. It is directly across the Intracoastal Waterway from Whiskey Creek, at 34° 9.328'N, 77° 51.054'W. The station sits at an elevation of approximately 4.88 m above sea level, slightly offset from the highest point of the spoil, which has a maximum elevation of approximately 5.8 m. The site has scrub surrounding the periphery, and grassy cover in the central areas. The weather station consists of a 3-meter aluminum tower that holds the wind sensor (wind speed and direction) at a height of 3.68 m and the Li-COR sensor at a height of 3.66 m. The temperature and relative humidity sensor is mounted on the tower at 2.39 m and the barometric pressure sensor, which is inside of the CR10X housing, is mounted at a height of 1.75 m. The rain gauge is located on a separate platform 7.62 m east south east of the tower and is mounted at a height of 1.79 m. The sensors were wired to the CR10X (Campbell datalogger) according to the protocol in the Meteorological Monitoring SOP. There are no surrounding objects that obstruct or shade the weather station.

6. Data collection period

Collection of meteorological data began on 15 March 1997 and continues through the present. Instruments were deployed prior to this date; however, data were for initial testing and verification of functions, and have since been discarded. The data collection period for 2004 began on January 1, 2004 at 00:15 and ended December 31, 2004 at 24:00.

7. Distribution

National Oceanic and Atmospheric Administration (NOAA)/Estuarine Reserves Division (ERD) retains the right to analyze, synthesize and publish summaries of the NERRS SWMP 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 publication 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 ERD, OCRM, National Ocean Service (NOS), NOAA. The data enclosed within the package/transmission are 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 (see section I. 1. Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (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 tab-delimited format.

8. Associated researchers and projects

Meteorological data will be used to augment other research components of the System Wide Monitoring Program (SWMP) that currently include water quality, chlorophyll and nutrient monitoring. The principal objective of the water quality monitoring is to record long-term water quality data in order to observe and document any physical and chemical changes or trends in water quality over time. The objective of the chlorophyll and nutrient monitoring study is to ascertain the annual and tidal fluctuations in nutrient and chlorophyll a levels surrounding the four water quality sites.

Additional projects are ongoing and continually changing. Check with the Research Coordinator or other contact person for an updated list of research (see section I.1.).

II. Physical Structure Descriptors

9. Sensor specifications

Parameter: Precipitation

Units: millimeters (mm)

Sensor Type: Ecoharmony tipping bucket rain gauge

Model # TB4

Range: 0 to 600 mm/hr

Accuracy: 0.01 inches per bucket tip; +/- 3% for intensities from 25-600 mm/hr

Date of last calibration: 03/24/04

Parameter: Temperature

Units: Celsius

Sensor Type: Platinum resistance temperature detector (PRT)

Model #: HMP45ASP

Range: -40°C to 60°C

Accuracy: +/- 0.2°C @ 20°C

Date of last calibration: 03/06/03 (installed new on 11/03/03)

Parameter: Relative Humidity

Units: Percent

Sensor Type: Vaisala HUMICAP© 180 capacitive relative humidity sensor

Model # HMP45ASP

Range: 0 to 100% non-condensing

Accuracy: 20°C +/- 2% RH (0 - 90% RH), +/- 3% RH (90 - 100% RH)

Temperature dependence of RH measurement: +/- 0.05% RH/°C

Date of last calibration: 03/06/03 (installed new on 11/03/03)

Parameter: LI-COR Quantum Sensor

Units: mmol m⁻² (total flux)

Sensor type: High stability silicon photovoltaic detector (blue enhanced)

Model #: LI190SZ

Light spectrum waveband: 400 to 700 nm

Temperature dependence: 0.15% per °C maximum

Operating Temperature: -40°C to 65°C; Humidity: 0 to 100%

Range: 1% up to 10,000 µmol s⁻¹m⁻², 400-700 nm

Accuracy: 5 µA per 1000 µmol s⁻¹m⁻², with a stability of <± 2% change per year

Date of last calibration: 11/08/01 (installed on 11/03/03)

Parameter: Wind Speed and Wind direction

Units: meters per second (m/s); degrees

Sensor type: Vaisala Ultrasonic Wind Sensor

Model #: 425

Range: 0 to 65 m/s (0 to 144 mph, 0 to 125 knots); 0 to 360°

Accuracy: ±0.135 m/s (±0.3 mph, ±0.26 knots) or 3% of reading, whichever is greater; ±2°

Date of last calibration: N/A (no calibration needed) installed new on 07/15/02

Parameter: Barometric Pressure

Units: millibars (mb)

Sensor type: Vaisala Barometric Pressure

Model #: PTB101B

Range: 600 to 1060 mb

Accuracy: +/- 0.45 mb

Date of last calibration: 10/25/01 (installed on 11/03/03)

Storage Module

Model#: SM192

Storage capacity: 192,896 bytes

Operating range: Temperature: -35°C to +65°C

Processor: Hitachi 6303

Baud rates: 300, 1200, 9600, 76800

Memory type: user selectable for either ring style (default) or fill and drop.

Power requirements: 5 +/-0.4 VDC @ 100mA

Storage Module

Model#: SM4M

Storage capacity: 2 million low-resolution data values

Program storage: stores up to 8 programs with a total capacity of 128 KB

Processor: Hitachi H8S

Operating System: 64 KB, flash memory based, user downloadable

Operating range: Temperature: -35°C to +65°C

Baud rates: 9600, 76800

Memory type: user selectable for either ring style (default) or fill and drop.

Power requirements: 5 +/-0.3 VDC @ 100mA

Campbell Scientific CR10X Wiring Panel has 128K of flash memory (EEPROM), in which it stores the operating system and it's program (that it uses to run the weather station). Additionally, there are 128K of SRAM, which it uses to run the program and store its measurements and for final data storage.

10. Coded variable definitions

Sampling station:	Sampling site code:	Station code:
Research Creek	RC	nocrcmet

11. Anomalous/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.

15 minute sample rainfall amount differences of over 5 mm in 15 minutes can occur during storms and indicate intense precipitation bursts during thunderstorms or frontal passages.

The following precipitation data appear to be correct:

Date	Time	Julian	Array ID	TotPrcp
03/31/2004	07:15	91	15	6.1
05/01/2004	10:45	122	15	6.4
05/02/2004	09:00	123	15	5.3
05/20/2004	15:15	141	15	6.6
05/28/2004	21:30	149	15	6.9
06/12/2004	03:15	164	15	9.1

06/28/2004	02:30	180	15	8.1
07/04/2004	15:00	186	15	6.6
07/17/2004	13:30	199	15	6.9
07/17/2004	13:45	199	15	9.4
07/29/2004	05:45	211	15	8.9
07/29/2004	06:00	211	15	13.2
07/29/2004	06:30	211	15	8.4
08/01/2004	04:30	214	15	7.9
08/01/2004	04:45	214	15	5.3
08/02/2004	12:45	215	15	6.9
08/05/2004	19:45	218	15	10.2
08/12/2004	18:00	225	15	5.3
08/12/2004	18:30	225	15	5.6
08/12/2004	19:00	225	15	8.1
08/12/2004	19:15	225	15	6.9
08/13/2004	03:15	226	15	5.6
08/13/2004	03:30	226	15	10.9
08/14/2004	10:30	227	15	7.1
08/14/2004	10:45	227	15	22.1
08/15/2004	06:45	228	15	7.1
08/15/2004	07:00	228	15	17.8
08/15/2004	07:15	228	15	10.9
08/15/2004	07:30	228	15	5.6
08/15/2004	07:45	228	15	7.4
08/15/2004	09:45	228	15	7.6
08/29/2004	15:30	242	15	5.1
09/01/2004	14:30	245	15	5.8
09/01/2004	14:45	245	15	8.6
09/06/2004	09:30	250	15	7.9
09/06/2004	09:45	250	15	9.7
09/09/2004	03:15	253	15	5.8
09/09/2004	03:30	253	15	10.9
09/14/2004	15:15	258	15	6.6
09/14/2004	15:30	258	15	6.9
09/14/2004	19:45	258	15	12.7
09/14/2004	20:00	258	15	16.8
09/14/2004	20:15	258	15	13.5
09/14/2004	20:30	258	15	8.4
09/14/2004	20:45	258	15	12.2
09/14/2004	21:00	258	15	15.2
09/14/2004	21:15	258	15	10.9
09/17/2004	18:45	261	15	9.4
09/28/2004	04:45	272	15	9.7
10/01/2004	01:15	275	15	5.6
10/01/2004	01:30	275	15	6.4
10/15/2004	08:00	289	15	10.4

Higher than normal wind speed values were recorded for the dates and times listed below due to unknown reasons. These values are most likely erroneous data that may be reported during conditions of extreme cold, freezing rain, or periods of no wind. The data were retained but are suspect.

Date	Time	Julian	Array ID	WSpd
01/25/2004	14:00	25	60	43.1
05/07/2004	14:30	128	15	31.4
06/03/2004	05:30	155	15	38.8
06/04/2004	06:00	156	15	41.7
06/04/2004	06:15	156	15	39.1
06/08/2004	07:45	160	15	59.6
06/10/2004	07:15	162	15	30.1
06/11/2004	07:15	163	15	63.8
06/12/2004	08:15	164	15	41.7
06/19/2004	06:15	171	15	40.2
07/21/2004	19:45	203	15	60.9
07/21/2004	20:00	203	15	33.7
07/25/2004	19:00	207	60	58.6
07/25/2004	19:30	207	15	36.7
07/28/2004	20:00	210	60	51.4
08/26/2004	19:00	239	60	58.8
09/16/2004	18:30	260	15	39.5
09/26/2004	21:00	270	60	34.7
10/11/2004	16:30	285	15	31.5
11/12/2004	11:45	317	15	60.1

Total Precipitation data for March should be considered suspect. At some point during the month the rain gauge had fallen off its platform, possibly due to strong winds, and was found face down on the ground on March 24, 2004. On this date, the rain gauge was reinstalled on the platform and calibrated.

Slightly negative values for PAR were recorded for numerous periods of time when no light was present. Because these data are within range of the sensor, values were retained.

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.

Inaccurate precipitation data were collected due to testing, calibration and/or cleaning of the rain gauge. Precipitation data for the following dates and times were removed or corrected:

Array	Date	Time
15	02/24/04	17:00
60	02/24/04	17:00
144	02/24/04	24:00
15	03/24/04	15:30
15	03/24/04	15:45
15	03/24/04	16:00
60	03/24/04	16:00
144	03/24/04	24:00

Extremely high wind speed values were recorded for the dates and times listed below due to unknown reasons. These values are most likely erroneous data that may be reported during conditions of extreme cold, freezing rain, or periods of no wind. The data were deleted due to the values being out of sensor range.

Date	Time	Julian	Array ID	WSpd
01/25/2004	14:00	25	15	147.4
01/25/2004	14:15	25	15	363.3
01/25/2004	15:00	25	60	426.0
01/25/2004	18:30	25	15	318.6
01/25/2004	19:00	25	60	195.6
01/25/2004	24:00	25	144	89.4
02/29/2004	18:30	60	15	90.8
06/25/2004	07:00	177	15	78.1
07/25/2004	19:00	207	15	229.2
07/25/2004	20:00	207	60	121.7
07/28/2004	19:30	210	15	191.3
08/02/2004	19:15	215	15	302.2
08/02/2004	20:00	215	60	80.2
08/26/2004	18:45	239	15	224.8
09/26/2004	21:00	270	15	110.7

When the CR10X is powered down for maintenance or other causes or the program reloaded, all temporary 5 second data for that calendar date are lost at the moment of power down. When the CR10X is powered again the 5 second data from that point on for that date are again stored in the daily temporary file for that calendar date. Consequently, the daily averages, maximums and minimums for all parameters, which are calculated for the calendar date using the 5 second data file, will be incorrect for the calendar date because only a portion of the day's data will be used for calculation. The same applies to

the hourly and 15 minute averages, maximums and minimums for the time period immediately following a power down event. Current protocol is to delete the daily data for these dates as well as any hourly and 15 minute averages so affected.

All data for the following dates and times were deleted due to a program reload:

Array	Date	Time
15	02/02/04	15:15
60	02/02/04	16:00
144	02/02/04	24:00

The value of -99999 was recorded by the CR10X for wind speed and minimum wind speed periodically throughout the data set for unknown reasons. The values for the following dates and times were removed from the data set:

Date	Julian	Time	ArrayId
06/20/2004	172	20:15	15
06/20/2004	172	21:00	60
06/20/2004	172	24:00	144
07/05/2004	187	18:45	15
07/05/2004	187	19:00	60
07/05/2004	187	24:00	144
07/10/2004	192	01:15	15
07/10/2004	192	02:00	60
07/10/2004	192	24:00	144
09/03/2004	247	12:45	15
09/03/2004	247	13:00	60
09/03/2004	247	24:00	144
09/10/2004	254	14:15	15
09/10/2004	254	15:00	60
09/10/2004	254	24:00	144
09/12/2004	256	18:00	15
09/12/2004	256	18:00	60
09/12/2004	256	24:00	144
12/02/2004	337	07:00	15
12/02/2004	337	07:00	60
12/02/2004	337	24:00	144
12/07/2004	342	04:45	15
12/07/2004	342	05:00	60
12/07/2004	342	24:00	144

The erroneous value 447 was recorded periodically throughout the data set from April through December for wind speeds, wind speed minimums, and wind speed maximums for unknown reasons. These values were deleted from the data set.

Wind speed and minimum wind speed:

ArrayId	Date	Julian	Time
15	01/25/2004	25	14:30
15	01/25/2004	25	14:45
15	01/25/2004	25	15:00
15	01/25/2004	25	15:15
15	01/25/2004	25	15:30
15	01/25/2004	25	15:45

15	01/25/2004	25	16:00
60	01/25/2004	25	16:00
15	01/25/2004	25	16:15
15	01/25/2004	25	16:30
15	01/25/2004	25	16:45
15	01/25/2004	25	17:00
60	01/25/2004	25	17:00
15	01/25/2004	25	17:15
15	01/25/2004	25	17:30
15	01/25/2004	25	17:45
15	01/25/2004	25	18:00
60	01/25/2004	25	18:00
15	01/25/2004	25	18:15
15	07/25/2004	207	19:15

Maximum wind speed:

Date	Julian	Time	Arrayld
01/25/2004	25	13:45	15
01/25/2004	25	14:00	15
01/25/2004	25	14:00	60
01/25/2004	25	14:15	15
01/25/2004	25	14:30	15
01/25/2004	25	14:45	15
01/25/2004	25	15:00	15
01/25/2004	25	15:00	60
01/25/2004	25	15:15	15
01/25/2004	25	15:30	15
01/25/2004	25	15:45	15
01/25/2004	25	16:00	15
01/25/2004	25	16:00	60
01/25/2004	25	16:15	15
01/25/2004	25	16:30	15
01/25/2004	25	16:45	15
01/25/2004	25	17:00	15
01/25/2004	25	17:00	60
01/25/2004	25	17:15	15
01/25/2004	25	17:30	15
01/25/2004	25	17:45	15
01/25/2004	25	18:00	15
01/25/2004	25	18:00	60
01/25/2004	25	18:15	15
01/25/2004	25	18:30	15
01/25/2004	25	19:00	60
01/25/2004	25	24:00	144
02/29/2004	60	18:30	15
02/29/2004	60	19:00	60
02/29/2004	60	24:00	144
04/02/2004	93	08:45	15
04/02/2004	93	09:00	60
04/02/2004	93	24:00	144

04/20/2004	111	12:45	15
04/20/2004	111	13:00	15
04/20/2004	111	13:00	60
04/20/2004	111	24:00	144
05/01/2004	122	07:45	15
05/01/2004	122	08:00	60
05/01/2004	122	24:00	144
05/07/2004	128	06:45	15
05/07/2004	128	07:00	60
05/07/2004	128	14:30	15
05/07/2004	128	15:00	60
05/07/2004	128	24:00	144
05/18/2004	139	09:15	15
05/18/2004	139	10:00	60
05/18/2004	139	12:15	15
05/18/2004	139	13:00	60
05/18/2004	139	24:00	144
05/22/2004	143	10:15	15
05/22/2004	143	11:00	60
05/22/2004	143	24:00	144
05/24/2004	145	07:30	15
05/24/2004	145	08:00	60
05/24/2004	145	24:00	144
05/29/2004	150	14:15	15
05/29/2004	150	15:00	60
05/29/2004	150	24:00	144
05/30/2004	151	07:15	15
05/30/2004	151	08:00	60
05/30/2004	151	24:00	144
05/31/2004	152	10:45	15
05/31/2004	152	11:00	60
05/31/2004	152	24:00	144
06/02/2004	154	09:15	15
06/02/2004	154	10:00	60
06/02/2004	154	24:00	144
06/03/2004	155	05:30	15
06/03/2004	155	06:00	60
06/03/2004	155	24:00	144
06/04/2004	156	05:45	15
06/04/2004	156	06:00	15
06/04/2004	156	06:00	60
06/04/2004	156	06:15	15
06/04/2004	156	07:00	60
06/04/2004	156	24:00	144
06/08/2004	160	07:15	15
06/08/2004	160	07:45	15
06/08/2004	160	08:00	15
06/08/2004	160	08:00	60
06/08/2004	160	24:00	144
06/09/2004	161	05:30	15

06/09/2004	161	05:45	15
06/09/2004	161	06:00	60
06/09/2004	161	24:00	144
06/10/2004	162	07:00	15
06/10/2004	162	07:00	60
06/10/2004	162	07:15	15
06/10/2004	162	08:00	60
06/10/2004	162	24:00	144
06/11/2004	163	06:45	15
06/11/2004	163	07:00	60
06/11/2004	163	07:15	15
06/11/2004	163	07:30	15
06/11/2004	163	08:00	60
06/11/2004	163	24:00	144
06/12/2004	164	06:30	15
06/12/2004	164	06:45	15
06/12/2004	164	07:00	60
06/12/2004	164	08:15	15
06/12/2004	164	09:00	60
06/12/2004	164	24:00	144
06/13/2004	165	11:30	15
06/13/2004	165	12:00	60
06/13/2004	165	24:00	144
06/17/2004	169	05:45	15
06/17/2004	169	06:00	60
06/17/2004	169	18:15	15
06/17/2004	169	19:00	60
06/17/2004	169	24:00	144
06/19/2004	171	06:00	15
06/19/2004	171	06:00	60
06/19/2004	171	06:15	15
06/19/2004	171	06:45	15
06/19/2004	171	07:00	60
06/19/2004	171	10:45	15
06/19/2004	171	11:00	60
06/19/2004	171	24:00	144
06/21/2004	173	06:00	15
06/21/2004	173	06:00	60
06/21/2004	173	24:00	144
06/22/2004	174	12:15	15
06/22/2004	174	13:00	60
06/22/2004	174	24:00	144
06/25/2004	177	07:00	15
06/25/2004	177	07:00	60
06/25/2004	177	07:15	15
06/25/2004	177	08:00	60
06/25/2004	177	17:30	15
06/25/2004	177	18:00	60
06/25/2004	177	24:00	144
06/27/2004	179	09:30	15

06/27/2004	179	10:00	60
06/27/2004	179	24:00	144
07/05/2004	187	06:30	15
07/05/2004	187	07:00	60
07/05/2004	187	16:45	15
07/05/2004	187	17:00	60
07/05/2004	187	24:00	144
07/20/2004	202	18:45	15
07/20/2004	202	19:00	60
07/20/2004	202	19:30	15
07/20/2004	202	20:00	60
07/20/2004	202	24:00	144
07/21/2004	203	19:45	15
07/21/2004	203	20:00	15
07/21/2004	203	20:00	60
07/21/2004	203	24:00	144
07/25/2004	207	19:00	15
07/25/2004	207	19:00	60
07/25/2004	207	19:15	15
07/25/2004	207	19:30	15
07/25/2004	207	20:00	60
07/25/2004	207	24:00	144
07/27/2004	209	07:45	15
07/27/2004	209	08:00	60
07/27/2004	209	24:00	144
07/28/2004	210	19:30	15
07/28/2004	210	19:45	15
07/28/2004	210	20:00	60
07/28/2004	210	24:00	144
08/02/2004	215	19:15	15
08/02/2004	215	20:00	60
08/02/2004	215	24:00	144
08/03/2004	216	07:30	15
08/03/2004	216	08:00	60
08/03/2004	216	24:00	144
08/12/2004	225	19:30	15
08/12/2004	225	20:00	60
08/12/2004	225	24:00	144
08/14/2004	227	12:30	15
08/14/2004	227	13:00	60
08/14/2004	227	24:00	144
08/24/2004	237	01:15	15
08/24/2004	237	02:00	60
08/24/2004	237	24:00	144
08/26/2004	239	18:45	15
08/26/2004	239	19:00	60
08/26/2004	239	24:00	144
09/16/2004	260	16:00	15
09/16/2004	260	16:00	60
09/16/2004	260	18:30	15

09/16/2004	260	19:00	60
09/16/2004	260	24:00	144
09/23/2004	267	11:00	15
09/23/2004	267	11:00	60
09/23/2004	267	24:00	144
09/26/2004	270	21:00	15
09/26/2004	270	21:00	60
09/26/2004	270	24:00	144
10/04/2004	278	09:45	15
10/04/2004	278	10:00	60
10/04/2004	278	24:00	144
10/05/2004	279	08:15	15
10/05/2004	279	09:00	60
10/05/2004	279	24:00	144
10/09/2004	283	13:00	15
10/09/2004	283	13:00	60
10/09/2004	283	24:00	144
10/11/2004	285	16:30	15
10/11/2004	285	17:00	60
10/11/2004	285	24:00	144
10/12/2004	286	08:00	15
10/12/2004	286	08:00	60
10/12/2004	286	24:00	144
10/18/2004	292	13:15	15
10/18/2004	292	14:00	60
10/18/2004	292	24:00	144
10/29/2004	303	13:45	15
10/29/2004	303	14:00	60
10/29/2004	303	24:00	144
11/07/2004	312	09:45	15
11/07/2004	312	10:00	60
11/07/2004	312	13:30	15
11/07/2004	312	14:00	60
11/07/2004	312	24:00	144
11/12/2004	317	11:45	15
11/12/2004	317	12:00	60
11/12/2004	317	24:00	144
12/03/2004	338	09:45	15
12/03/2004	338	10:00	15
12/03/2004	338	10:00	60
12/03/2004	338	24:00	144
12/19/2004	354	13:15	15
12/19/2004	354	14:00	60
12/19/2004	354	24:00	144

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 maintenance or calibration of equipment, or repair/replacement of a 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 data.

14. Other remarks/notes

On 10/12/2023 this dataset was updated to include embedded QAQC flags for anomalous/suspect data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than detailed in the metadata alone (as in the anomalous/suspect, deleted, and missing data sections above). Prior to 2007, rejected data were deleted from the dataset so they are unavailable to be used at all, but suspect data were only noted in the metadata document. Suspect data flags <1> were embedded retroactively in order to allow suspect data to be easily identified and filtered from the dataset if desired for analysis and reporting purposes. No other flags or codes were embedded in the dataset and users should still refer to the detailed explanations above for more information.

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:

Prior to the installation of the new NERR_4.CSI program in November 2003, all values less than 0 were altered in the raw data to read 0. These values may indicate an incorrect multiplier, calibration problems, or a sensor malfunction. Because these values are changed in the raw data, we cannot confirm that they are all valid data points.

Relative Humidity:

Prior to the installation of the new NERR_4.CSI program in November 2003, all values over 100% were altered in the raw data to read 100%. These values may indicate super saturated air, calibration problems, or a sensor malfunction. Because these values are changed in the raw data, we cannot confirm that they are all valid data points.

Tropical Storm Charley passed over the area on 14 August 2004.

Rain Events:

January

Date	Daily Precipitation Totals (mm)
01/02/2004	0.3
01/06/2004	2.0
01/09/2004	7.6
01/18/2004	2.3
01/25/2004	5.1
01/26/2004	37.6
01/27/2004	0.5

Monthly Total (mm) 55.4

February

Date	Daily Precipitation Totals (mm)
02/03/2004	7.9
02/04/2004	0.3
02/06/2004	1.0
02/09/2004	0.5
02/12/2004	27.2
02/14/2004	17.8
02/15/2004	10.2
02/17/2004	10.7
02/23/2004	0.5

02/24/2004	8.9
02/26/2004	22.6

Monthly Total (mm) 107.6

March

Date	Daily Precipitation Totals (mm)
03/30/2004	0.5
03/31/2004	20.1

Monthly Total (mm) 20.6

April

Date	Daily Precipitation Totals (mm)
04/12/2004	3.8
04/13/2004	11.7
04/26/2004	1.3
04/27/2004	9.4

Monthly Total (mm) 26.2

May

Date	Daily Precipitation Totals (mm)
05/01/2004	47.0
05/02/2004	25.1
05/03/2004	16.8
05/20/2004	7.6
05/28/2004	12.4
05/29/2004	0.3
05/30/2004	9.7

Monthly Total (mm) 118.9

June

Date	Daily Precipitation Totals (mm)
06/03/2004	1.0
06/04/2004	0.8
06/07/2004	3.8
06/09/2004	2.0
06/10/2004	7.9
06/12/2004	15.0
06/17/2004	0.3
06/18/2004	1.3
06/19/2004	2.0
06/24/2004	1.0
06/25/2004	0.3

06/28/2004	9.7
06/29/2004	6.4
06/30/2004	4.1

Monthly Total (mm) 55.6

July

Date	Daily Precipitation Totals (mm)
07/02/2004	1.8
07/03/2004	0.5
07/04/2004	8.1
07/11/2004	3.3
07/12/2004	0.8
07/13/2004	0.5
07/14/2004	0.3
07/17/2004	41.7
07/18/2004	9.4
07/23/2004	6.6
07/24/2004	0.8
07/27/2004	2.3
07/28/2004	6.9
07/29/2004	65.5
07/31/2004	12.7

Monthly Total (mm) 161.2

August

Date	Daily Precipitation Totals (mm)
08/01/2004	16.5
08/02/2004	13.0
08/03/2004	5.8
08/05/2004	13.2
08/06/2004	2.0
08/12/2004	45.2
08/13/2004	25.7
08/14/2004	51.8
08/15/2004	83.1
08/16/2004	1.3
08/25/2004	2.3
08/26/2004	2.5
08/27/2004	0.8
08/29/2004	14.5
08/31/2004	6.4

Monthly Total (mm) 284.1

September

Date	Daily Precipitation Totals (mm)
09/01/2004	32.3
09/06/2004	23.4
09/07/2004	6.1
09/08/2004	5.8
09/09/2004	23.9
09/10/2004	2.0
09/11/2004	4.6
09/14/2004	109.2
09/15/2004	8.1
09/16/2004	1.0
09/17/2004	12.4
09/26/2004	1.0
09/27/2004	6.9
09/28/2004	17.5

Monthly Total (mm) 254.2

October

Date	Daily Precipitation Totals (mm)
10/01/2004	13.0
10/02/2004	1.5
10/03/2004	4.3
10/05/2004	0.3
10/15/2004	29.0
10/19/2004	6.1
10/20/2004	0.8

Monthly Total (mm) 55.0

November

Date	Daily Precipitation Totals (mm)
11/03/2004	0.8
11/04/2004	3.8
11/11/2004	1.3
11/12/2004	20.1
11/13/2004	0.3
11/23/2004	9.1
11/24/2004	0.8
11/25/2004	0.8
11/27/2004	16.8
11/28/2004	4.6

Monthly Total (mm) 58.4

December

Date	Daily Precipitation Totals (mm)
12/01/2004	0.3
12/09/2004	1.0
12/10/2004	23.1
12/19/2004	1.5
12/23/2004	4.3
12/24/2004	0.8
12/25/2004	3.0
12/26/2004	25.9

Monthly Total (mm) 59.9

Annual Total (mm) 1257.1