**Jobos Bay (JOB) National Estuarine Research Reserve Meteorological Metadata**

January - December 2003

Latest Update: **October 11, 2023**

**I. Data Set & Research Descriptors**

**1) Principal investigator(s) & contact persons**

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**2) Entry verification**

Collected data are verified (QA/QC), using the CDMO Weather Data Management Program.

a) Data Input Procedures:

The 15-minute, 1-hour average, and 24-hour meteorological data was downloaded from each weather station instrument to Campbell Scientific CR10X data logger. The CDMO Data Logger Program (nerr30.csi) was loaded into the CR10X data logger that controls the sensors and data collection schedule (see 2b of the Entry Verification section for the data collection schedule). The CR10X was then interfaced with the PC208W software supplied by Campbell Scientific.

Data was downloaded through a storage module, at the beginning of every month, via a direct connection to a computer located in Jobos Bay Laboratory. The data was saved as a monthly raw data file (RAWjan03.dat) in a separate hard drive and backed up onto Zip disk and CD.

Once an entire month of data was available, the CDMO Weather Data Management Program (WDMP) was 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 automatically imports and converts the monthly raw data file into an Access database. There are three main steps the WDMP performs: First, it converts the comma delimited monthly raw data file into an Access database. Secondly, 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 was investigated and noted below in the Anomalous Data Section. All data corrections performed are noted in the Data Correction Section below.

Common errors noted in the monthly error report include wind speeds below the 0.5 m/s criteria, temperature change greater than 3 C in a 15minute period, and precipitation difference greater than 5mm in 15 minutes. All errors of this type were double checked with other data that could support such “anomalous” weather changes and noted in the sections that follow. Both raw data files and Access databases were saved on Compact Disc.

EQwin now replaces the WDMP as the NERR MET 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 have 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

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.

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/m^2) 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 (oC), 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 (oC), Relative Humidity (%), Barometric

Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Hourly

totals for PAR (mmol/m^2) and Precipitation (mm) are totals of 15-minute

readings.

iv) Daily average, maximum and minumum data are averages of 5-second

readings for Air Temperature (oC), Relative Humidity (%), Barometric

Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Daily totals

for PAR (mmol/m^2) and Precipitation (mm) are totals of 15-minute readings.

Data were stored on a Campbell Scientific storage module (SM192 or SM4M), which

were 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)

Photosynthetically Active Radiation (PAR):

-Sample not greater than 5000 mmol/m^2 or less than –0.5 mmol/m^2

Time:

- 15-minute interval recorded

For all data:

- No duplicate data

**3) Research objectives (Campbell Weather Station):**

The principal objective is to record long-term meteorological data to track changes in meteorological conditions that can be associated to changes in estuarine habitats and conditions. A secondary objective is to promote the access and use of reliable baseline information by federal and local agencies, universities, researchers, educators and local communities to enhance the process by which they make decisions regarding their daily activities. This data are also invaluable in the identification and development of future monitoring and research activities.

**4) Research methods:**

The Campbell Scientific weather station samples 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 are stored in array 150. The data are downloaded from the storage module to the laboratory computer by direct connection. Sensors on the weather station are inspected periodically for damage or debris. If any are found, sensors are repaired and/or cleaned. The rain gauge tends to collect the most debris and needs to be cleaned every few days. Sensors are removed and sent to Campbell Scientific for calibration at a minimum of every two years. There were no other analyses done on the meteorological data.

**5) Site location and character:**

The Jobos Bay National Estuarine Research Reserve (JBNERR) is located on the southern coastal plain of the island of Puerto Rico, the reserve is within the West Indies geographical area. JBNERR is formed by two major components: (1) Mar Negro, located on the western margin of the Bay, and (2) Cayos Caribe, a chain of 15 tear-shaped islets located to the southeast. The Mar Negro component comprises the bulk of the Reserve, and consists of mangrove forests and a complex system of lagoons and channels interspersed with salt and mud flats. Coral reefs and sea grass beds, with small beach deposits and upland areas fringe Cayos Caribe mangrove islands.

The weather station is situated in front of the Visitor’s Center, located in the community of Aguirre, Salinas, Puerto Rico. The Wind Sentry, Temperature and Humidity sensor, Barometric Sensor and LiCor Sensor are all located on a10m aluminum tower following the descriptions outlined in the CDMO Manual V 4.0. The Tipping Bucket Rain gauge is located to the SW side of the tower. The sensors were wired to the CR10X following the protocol in the CDMO Manual.

A description of the specific sampling station follows:

The weather station is located in front of JBNERR Visitor’s Center. Its coordinates are latitude 17o 57' 23.34"; longitude 66o 13' 22.56".

**6) Data collection period:**

The current weather station was deployed in 1999. Data have been collected for years 2000, 2001, 2002 and 2003. All data collected since year 2000 has been edited using the CDMO Weather Program.

**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 are 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.

**8) Associated researchers and projects:**

Jobos Bay NERR system-wide monitoring program has four YSI’s continuous sampling stations (s9, s10, s19, s20) that collect long term water quality data, every 30 minutes, to track changes in water quality in the Bay. Parameters include temperature, dissolve oxygen (% saturation, mg/L), specific conductivity, salinity, depth, pH and turbidity. Stations 9 and 10 were selected to represent sites that could compare human impact gradients, being Station 9 an impacted site and station 10 the reference site. Stations 19 and 20 were just recently established (July 2002) to compare an ecosystem gradient. Station 19 was deployed over sea grass beds, Thalassia testudinum, in the bay and station 20 was deployed over sea grass bed communities near Cayos Caribe coral reefs.

**II. Physical Structure Descriptors**

**9) Sensor specifications, operating range, accuracy, date of last calibration:**

LiCor Quantum Sensor

Model # LI190SB

Stability: <±2% change over 1 yr

Operating Temperature: -40 to 65°C

Sensitivity: typically 5 µA per 1000µmoles s-1 m-2

Light spectrum wavelength: 400 to 700 nm

Date of last calibration: 07-22-99

Wind Sentry

Model # 03001

Range: 0-50 m/s; 360° mechanical

Date of last calibration: 08-16-99

Temperature and Relative Humidity

Model #: HMP35C

Operating Temperature: -35 to +50°C

Temperature Measurement Range: -35 to +50°C

Temperature Accuracy: ± 0.2 °C @ 20°C

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

RH Accuracy: +/-2% RH (0-90%) and +/-3%(90-100%)

Uncertainty of calibration: ± 1.2% RH

Date of Last calibration: 07-24-99

Barometric Sensor

Model # CS-105

Operating Range: Pressure – 600 to 1060 mb

Temperature: -40 to +60C

Humidity: non-condensing

Accuracy: ±0.5 to 6.0 mb (+20-60C)

Stability: ± 0.1 mb per year

Date of Last calibration: 05-16-99

Tipping Bucket Rain Gauge

Model #: RG-2000-C

Range: 0.254 mm

Accuracy: 1.0% at <14”/hr

Date of Last calibration: 8-14-01

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 indicator and variable code definitions:**

Sampling station: Sampling site code: Station code:

Jobos Bay JB jobjbmet

**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](http://www.nerrsdata.org/get/landing.cfm) throughout the fall of 2022.

January 2003

The following data appear to be correct:

Array Date Day Time Error Message

151 6 6 915 Precip difference from 6 (6) 915 (5.334) to 6 (6) 930 (.254) is greater than 5 mm

151 24 24 1630 Precip difference from 24 (24) 1630 (.254) to 24 (24) 1645 (7.112) is greater than 5 mm

151 24 24 1645 Precip difference from 24 (24) 1645 (7.112) to 24 (24) 1700 (.762) is greater than 5 mm

102 4 4 2000 Wind speed is less than 0.5 m/s from 4 (4) 2000 to 5 (5) 900

102 6 6 1800 Wind speed is less than 0.5 m/s from 6 (6) 1800 to 7 (7) 900

102 7 7 1900 Wind speed is less than 0.5 m/s from 7 (7) 1900 to 8 (8) 1000

102 8 8 1800 Wind speed is less than 0.5 m/s from 8 (8) 1800 to 9 (9) 900

102 15 15 1900 Wind speed is less than 0.5 m/s from 15 (15) 1900 to 16 (16) 800

102 22 22 2000 Wind speed is less than 0.5 m/s from 22 (22) 2000 to 23 (23) 900

102 23 23 1900 Wind speed is less than 0.5 m/s from 23 (23) 1900 to 24 (24) 900

102 27 27 2000 Wind speed is less than 0.5 m/s from 27 (27) 2000 to 28 (28) 900

February 2003

Values were deleted for relative humidity for the following arrays and replaced with 55555 because the sensor was not functioning, indicating humidity values near 0% during the night and under a short period of rain:

Array Date Day Time Error Message

150 58 27 1430 Technician deleted relative humidity from 27 1430 to 1615

101 58 27 1400 Technician deleted relative humidity from 27 1400 to 1700

243 58 27 2400 Technician deleted relative humidity at 27 2400

244 58 27 2400 Technician deleted relative humidity at 27 2400

150 59 28 445 Technician deleted relative humidity from 28 445 to 1630

101 59 28 400 Technician deleted relative humidity from 28 400 to 1700

150 59 28 1830 Technician deleted relative humidity from 28 1830 to 1915

101 59 28 1900 Technician deleted relative humidity from 28 1900 to 2000

243 59 28 2400 Technician deleted relative humidity at 28 2400

244 59 28 2400 Technician deleted relative humidity at 28 2400

243 60 29 2400 Technician deleted relative humidity at 29 2400

244 60 29 2400 Technician deleted relative humidity at 29 2400

All Daily and Hourly Relative Humidity data may be suspect as the RH sensor was not functioning at times; it is recommended to use all RH data with discretion.

The following data appears to be correct:

Array Date Day Time Error Message

150 27 58 1115 Rel hum difference from 27 (58) 1115 (100) to 27 (58) 1130 (74.979) is greater than 25%

102 1 32 1900 Wind speed is less than 0.5 m/s from 1 (32) 1900 to 2 (33) 900

102 2 33 1800 Wind speed is less than 0.5 m/s from 2 (33) 1800 to 3 (34) 900

102 26 57 2000 Wind speed is less than 0.5 m/s from 26 (57) 2000 to 27 (58) 800

March 2003

The following data appears to be correct:

Array Date Day Time Error Message

150 15 74 1215 Air temp difference from 15 (74) 1215 (28.494) to 15 (74) 1230 (24.904) is greater than 3.0 degrees C

102 19 78 1900 Wind speed is less than 0.5 m/s from 19 (78) 1900 to 20 (79) 900

102 20 79 1800 Wind speed is less than 0.5 m/s from 20 (79) 1800 to 21 (80) 900

102 21 80 2000 Wind speed is less than 0.5 m/s from 21 (80) 2000 to 22 (81) 900

102 22 81 1900 Wind speed is less than 0.5 m/s from 22 (81) 1900 to 23 (82) 800

102 26 85 2000 Wind speed is less than 0.5 m/s from 26 (85) 2000 to 27 (86) 800

April 2003

Values were deleted for relative humidity for the following arrays and replaced with 55555 because the sensor was not functioning, indicating humidity values near 0% during the night and under a short period of rain:

Array Date Day Time Error Message

150 108 18 0645 Technician deleted relative humidity at 18 0645

101 108 18 0700 Technician deleted relative humidity at 18 0700

150 108 18 1530 Technician deleted relative humidity at 18 1530

101 108 18 1600 Technician deleted relative humidity at 18 1600

243 108 18 2400 Technician deleted relative humidity at 18 2400

244 108 18 2400 Technician deleted relative humidity at 18 2400

All Daily and Hourly Relative Humidity data may be suspect as the RH sensor was not functioning at times.

The following data appears to be correct:

Array Date Day Time Error Message

150 9 99 945 Air temp difference from 9 (99) 945 (27.709) to 9 (99) 1000 (23.93) is greater than 3.0 degrees C

150 18 108 1215 Rel hum difference from 18 (108) 1215 (89.021) to 18 (108) 1230 (50.132) is greater than 25%

150 18 108 1230 Rel hum difference from 18 (108) 1230 (50.132) to 18 (108) 1245 (88.095) is greater than 25%

150 20 110 915 Rel hum difference from 20 (110) 915 (74.325) to 20 (110) 930 (47.407) is greater than 25%

151 17 107 1230 Precip difference from 17 (107) 1230 (9.906) to 17 (107) 1245 (2.794) is greater than 5 mm

102 1 91 1800 Wind speed is less than 0.5 m/s from 1 (91) 1800 to 2 (92) 900

102 19 109 2100 Wind speed is less than 0.5 m/s from 19 (109) 2100 to 20 (110) 900

102 21 111 2000 Wind speed is less than 0.5 m/s from 21 (111) 2000 to 22 (112) 800

102 23 113 2000 Wind speed is less than 0.5 m/s from 23 (113) 2000 to 24 (114) 800

102 24 114 1700 Wind speed is less than 0.5 m/s from 24 (114) 1700 to 25 (115) 900

May 2003

The following data appears to be correct:

Array Date Day Time Error Message

150 8 128 1115 Air temp difference from 8 (128) 1115 (27.657) to 8 (128) 1130 (24.313) is greater than 3.0 degrees C

150 13 133 1300 Air temp difference from 13 (133) 1300 (29.787) to 13 (133) 1315 (26.584) is greater than 3.0 degrees C

150 14 134 945 Air temp difference from 14 ( 134) 945 (27.007) to 14 (134) 1000 (23.83) is greater than 3.0 degrees C

102 19 139 2000 Wind speed is less than 0.5 m/s from 19 (139) 2000 to 20 (140) 1000

102 20 140 2100 Wind speed is less than 0.5 m/s from 20 (140) 2100 to 21 (141) 900

102 21 141 1900 Wind speed is less than 0.5 m/s from 21 (141) 1900 to 22 (142) 900

June 2003

The following data appears to be correct:

Array Date Day Time Error Message

150 2 153 930 Air temp difference from 2 (153) 930 (27.198) to 2 (153) 945 (24.082) is greater than 3.0 degrees C

150 7 158 1000 Air temp difference from 7 (158) 1000 (27.965) to 7 (158) 1015 (23.617) is greater than 3.0 degrees C

151 6 157 1000 Precip difference from 6 (157) 1000 (7.874) to 6 (157) 1015 (2.794) is greater than 5 mm

July 2003

The following data appears to be correct:

Array Date Day Time Error Message

150 5 186 930 Air temp difference from 5 (186) 930 (27.523) to 5 (186) 945 (24.49) is greater than 3.0 degrees C

150 6 187 1715 Air temp difference from 6 (187) 1715 (31.035) to 6 (187) 1730 (27.933) is greater than 3.0 degrees C

August 2003

The following data appears to be correct:

Array Date Day Time Error Message

150 18 230 1230 Air temp difference from 18 (230) 1230 (30.589) to 18 (230) 1245 (26.896) is greater than 3.0 degrees C

151 25 237 2330 Precip difference from 25 (237) 2330 (4.064) to 25 (237) 2345 (11.176) is greater than 5 mm

151 25 237 2400 Precip difference from 25 (237) 2400 (7.62) to 26 (238) 15 (1.524) is greater than 5 mm

151 26 238 15 Precip difference from 26 (238) 15 (1.524) to 26 (238) 30 ( 10.668) is greater than 5 mm

151 26 238 45 Precip difference from 26 (238) 45 (12.446) to 26 (238) 100 (3.81) is greater than 5 mm

102 4 216 2000 Wind speed is less than 0.5 m/s from 4 (216) 2000 to 5 (217) 800

102 11 223 2000 Wind speed is less than 0.5 m/s from 11 (223) 2000 to 12 (224) 800

102 14 226 2000 Wind speed is less than 0.5 m/s from 14 (226) 2000 to 15 (227) 800

September 2003

The following data appears to be correct:

Array Date Day Time Error Message

150 15 258 1100 Air temp difference from 15 (258) 1100 (30.746) to 15 (258) 1115 (26.469) is greater than 3.0 degrees C

151 5 248 1945 Precip difference from 5 (248) 1945 (.762) to 5 (248) 2000 (8.636) is greater than 5 mm

102 1 244 1900 Wind speed is less than 0.5 m/s from 1 (244) 1900 to 2 (245) 900

102 2 245 1800 Wind speed is less than 0.5 m/s from 2 (245) 1800 to 3 (246) 900

102 3 246 1800 Wind speed is less than 0.5 m/s from 3 (246) 1800 to 4 (247) 900

102 4 247 1900 Wind speed is less than 0.5 m/s from 4 (247) 1900 to 5 (248) 800

102 10 253 1900 Wind speed is less than 0.5 m/s from 10 (253) 1900 to 11 (254) 800

102 11 254 2100 Wind speed is less than 0.5 m/s from 11 (254) 2100 to 12 (255) 1000

102 12 255 1800 Wind speed is less than 0.5 m/s from 12 (255) 1800 to 13 (256) 900

102 13 256 1900 Wind speed is less than 0.5 m/s from 13 (256) 1900 to 14 (257) 800

102 16 259 2000 Wind speed is less than 0.5 m/s from 16 (259) 2000 to 17 (260) 800

102 17 260 1900 Wind speed is less than 0.5 m/s from 17 (260) 1900 to 18 (261) 700

102 21 264 2100 Wind speed is less than 0.5 m/s from 21 (264) 2100 to 22 (265) 900

102 22 265 1900 Wind speed is less than 0.5 m/s from 22 (265) 1900 to 23 (266) 800

102 23 266 1900 Wind speed is less than 0.5 m/s from 23 (266) 1900 to 24 (267) 800

102 24 267 2000 Wind speed is less than 0.5 m/s from 24 (267) 2000 to 25 (268) 800

102 25 268 1900 Wind speed is less than 0.5 m/s from 25 (268) 1900 to 26 (269) 700

October 2003

Values were deleted for relative humidity for the following arrays and replaced with 55555 because the sensor was not functioning, indicating humidity values near 0% during the night and under a period of rain:

Array Date Day Time Error Message

150 284 11 0400 Technician deleted relative humidity at 11 0400

101 284 11 0500 Technician deleted relative humidity at 11 0500

150 284 11 2015 Technician deleted relative humidity from 11 2015 to 2215

101 284 11 2100 Technician deleted relative humidity from 11 2100 to 2300

243 284 11 2400 Technician deleted relative humidity at 11 2400

244 284 11 2400 Technician deleted relative humidity at 11 2400

All Daily and Hourly Relative Humidity data may be suspect as the RH sensor was not functioning at times; it is recommended to use the RH data with discretion.

The following data appears to be correct:

Array Date Day Time Error Message

150 9 282 1030 Air temp difference from 9 (282) 1030 (30.4) to 9 (282) 1045 (26.728) is greater than 3.0 degrees C

150 30 303 1345 Air temp difference from 30 (303) 1345 (30.652) to 30 ( 303) 1400 (27.529) is greater than 3.0 degrees C

150 11 284 530 Rel hum difference from 11 (284) 530 (97.84) to 11 (284) 545 ( 67.539) is greater than 25%

150 11 284 545 Rel hum difference from 11 (284) 545 (67.539) to 11 (284) 600 ( 92.542) is greater than 25%

150 11 284 815 Rel hum difference from 11 (284) 815 (59.392) to 11 (284) 830 (86.508) is greater than 25%

150 12 285 15 Rel hum difference from 12 (285) 15 (91.076) to 12 (285) 30 (54.963) is greater than 25%

150 12 285 30 Rel hum difference from 12 (285) 30 (54.963) to 12 (285) 45 (88.103) is greater than 25%

150 12 285 45 Rel hum difference from 12 (285) 45 (88.103) to 12 (285) 100 (45.837) is greater than 25%

150 12 285 100 Rel hum difference from 12 (285) 100 (45.837) to 12 (285) 115 (91.542) is greater than 25%

151 10 283 1000 Precip difference from 10 (283) 1000 (2.286) to 10 (283) 1015 (11.684) is greater than 5 mm

151 10 283 1030 Precip difference from 10 (283) 1030 (16.51) to 10 (283) 1045 (2.286) is greater than 5 mm

151 10 283 1245 Precip difference from 10 (283) 1245 (7.112) to 10 (283) 1300 (.508) is greater than 5 mm

102 1 274 1900 Wind speed is less than 0.5 m/s from 1 (274) 1900 to 2 (275) 800

102 2 275 1800 Wind speed is less than 0.5 m/s from 2 (275) 1800 to 3 (276) 900

102 3 276 1800 Wind speed is less than 0.5 m/s from 3 (276) 1800 to 4 (277) 900

102 4 277 1800 Wind speed is less than 0.5 m/s from 4 (277) 1800 to 5 (278) 800

102 5 278 2000 Wind speed is less than 0.5 m/s from 5 (278) 2000 to 6 (279) 800

102 7 280 2000 Wind speed is less than 0.5 m/s from 7 (280) 2000 to 8 (281) 800

102 8 281 1900 Wind speed is less than 0.5 m/s from 8 (281) 1900 to 9 (282) 700

102 13 286 2000 Wind speed is less than 0.5 m/s from 13 (286) 2000 to 14 (287) 1000

102 14 287 2000 Wind speed is less than 0.5 m/s from 14 ( 287) 2000 to 15 (288) 1000

102 15 288 1700 Wind speed is less than 0.5 m/s from 15 (288) 1700 to 16 (289) 800

102 16 289 2000 Wind speed is less than 0.5 m/s from 16 (289) 2000 to 17 (290) 800

102 17 290 2000 Wind speed is less than 0.5 m/s from 17 (290) 2000 to 18 (291) 800

102 18 291 1900 Wind speed is less than 0.5 m/s from 18 (291) 1900 to 19 (292) 800

102 22 295 1800 Wind speed is less than 0.5 m/s from 22 (295) 1800 to 23 (296) 2200

102 24 297 1900 Wind speed is less than 0.5 m/s from 24 (297) 1900 to 25 (298) 700

102 25 298 1900 Wind speed is less than 0.5 m/s from 25 (298) 1900 to 26 (299) 800

102 27 300 1700 Wind speed is less than 0.5 m/s from 27 (300) 1700 to 28 (301) 900

102 29 302 1800 Wind speed is less than 0.5 m/s from 29 (302) 1800 to 30 (303) 900

102 30 303 2100 Wind speed is less than 0.5 m/s from 30 (303) 2100 to 31 (304) 1000

November 2003

Values were deleted for relative humidity for the following arrays and replaced with 55555 because the sensor was not functioning, indicating humidity values near 0% during the night and under a period of rain:

Array Date Day Time Error Message

150 318 14 745 Technician deleted relative humidity from 14 745 to 800

101 318 14 800 Technician deleted relative humidity at 14 800

150 318 14 1000 Technician deleted relative humidity from 14 1000 to 1015

101 318 14 1000 Technician deleted relative humidity from 14 1000 to 1100

243 318 14 2400 Technician deleted relative humidity at 14 2400

244 318 14 2400 Technician deleted relative humidity at 14 2400

150 319 15 945 Technician deleted relative humidity from 15 945 to 30 2400

101 319 15 1000 Technician deleted relative humidity from 15 1000 to 30 2400

243 319 15 2400 Technician changed 243 Array data from 15 2400 to 30 2400

244 13 317 2400 Technician changed 244 Array data from 15 2400 to 30 2400

All Daily and Hourly Relative Humidity data may be suspect as the RH sensor was not functioning at times; it is recommended to use the RH data with discretion.

The following data appears to be correct:

Array Date Day Time Error Message

150 13 317 1645 Rel hum difference from 13 (317) 1645 (78.042) to 13 (317) 1700 (47.288) is greater than 25%

150 13 317 1700 Rel hum difference from 13 (317) 1700 (47.288) to 13 (317) 1715 (84.193) is greater than 25%

150 14 318 800 Rel hum difference from 14 (318) 800 (59.078) to 14 (318) 815 (88.843) is greater than 25%

150 14 318 1315 Rel hum difference from 14 (318) 1315 (80.803) to 14 (318) 1330 ( 51.574) is greater than 25%

150 14 318 1330 Rel hum difference from 14 (318) 1330 (51.574) to 14 (318) 1345 (87.409) is greater than 25%

151 6 310 1430 Precip difference from 6 (310) 1430 (6.35) to 6 (310) 1445 (.254) is greater than 5 mm

151 7 311 715 Precip difference from 7 (311) 715 (3.048) to 7 (311) 730 (10.414) is greater than 5 mm

151 7 311 800 Precip difference from 7 (311) 800 (6.604) to 7 ( 311) 815 (.254) is greater than 5 mm

151 9 313 145 Precip difference from 9 (313) 145 (.762) to 9 (313) 200 (6.858) is greater than 5 mm

151 9 313 200 Precip difference from 9 (313) 200 (6.858) to 9 (313) 215 (.254) is greater than 5 mm

151 10 314 1900 Precip difference from 10 (314) 1900 (2.286) to 10 (314) 1915 (7.62) is greater than 5 mm

151 10 314 1915 Precip difference from 10 (314) 1915 (7.62) to 10 (314) 1930 (1.778) is greater than 5 mm

151 11 315 1245 Precip difference from 11 (315) 1245 (.508) to 11 (315) 1300 (11.938) is greater than 5 mm

151 11 315 1315 Precip difference from 11 (315) 1315 (12.954) to 11 (315) 1330 (7.366) is greater than 5 mm

151 11 315 1430 Precip difference from 11 (315) 1430 (11.938) to 11 (315) 1445 (19.05) is greater than 5 mm

151 11 315 1500 Precip difference from 11 (315) 1500 (20.828) to 11 (315) 1515 (12.7) is greater than 5 mm

151 11 315 1515 Precip difference from 11 (315) 1515 (12.7) to 11 (315) 1530 (19.558) is greater than 5 mm

151 11 315 1530 Precip difference from 11 (315) 1530 (19.558) to 11 (315) 1545 (11.43) is greater than 5 mm

151 12 316 800 Precip difference from 12 (316) 800 (6.096) to 12 (316) 815 (11.176) is greater than 5 mm

151 12 316 2045 Precip difference from 12 (316) 2045 (.254) to 12 (316) 2100 (7.112) is greater than 5 mm

151 13 317 1900 Precip difference from 13 (317) 1900 (1.27) to 13 (317) 1915 (6.35) is greater than 5 mm

102 1 305 2100 Wind speed is less than 0.5 m/s from 1 (305) 2100 to 2 (306) 900

102 2 306 1900 Wind speed is less than 0.5 m/s from 2 (306) 1900 to 3 (307) 700

102 14 318 1600 Wind speed is less than 0.5 m/s from 14 (318) 1600 to 16 (320) 900

102 19 323 2200 Wind speed is less than 0.5 m/s from 19 (323) 2200 to 20 (324) 1000

102 24 328 2100 Wind speed is less than 0.5 m/s from 24 (328) 2100 to 25 (329) 900

December 2003

All values for December were deleted for Array 150, 101, 241, 243 and 244 for relative humidity and replaced with 55555 because the sensor was not functioning.

The following data appears to be correct:

Array Date Day Time Error Message

150 7 341 2030 Air temp difference from 7 (341) 2030 (26.753) to 7 (341) 2045 (22.989) is greater than 3.0 degrees C

151 5 339 2030 Precip difference from 5 (339) 2030 (.254) to 5 (339) 2045 (5.334) is greater than 5 mm

151 5 339 2230 Precip difference from 5 (339) 2230 (.254) to 5 (339) 2245 (8.128) is greater than 5 mm

151 6 340 445 Precip difference from 6 (340) 445 (1.524) to 6 (340) 500 (7.874) is greater than 5 mm

151 7 341 2100 Precip difference from 7 (341) 2100 (8.636) to 7 (341) 2115 (1.27) is greater than 5 mm

102 11 345 1900 Wind speed is less than 0.5 m/s from 11 (345) 1900 to 12 ( 346) 900

102 12 346 1900 Wind speed is less than 0.5 m/s from 12 (346) 1900 to 13 (347) 900

102 24 358 2100 Wind speed is less than 0.5 m/s from 24 (358) 2100 to 25 (359) 900

150 3 337 430 Wind direction is greater than 360 or less than 0 on 3 (337) 430

(-.09396)

**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](http://www.nerrsdata.org/get/landing.cfm) throughout the fall of 2022.

January 2003

None

February 2003

None

March 2003

None

April 2003

None

May 2003

None

June 2003

None

July 2003

None

August 2003

None

September 2003

None

October 2003

None

November 2003

None

December 2003

None

**13) Other remarks:**

**On 10/11/2023 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](http://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](http://www.nerrsdata.org/get/landing.cfm) throughout early 2023.

LiCor:

Prior to the installation of the new NERR\_4.CSI program, 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, 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. The site had many problems with the RH sensor but tried to make sure the data were as close to reality as possible. It is recommended to use this data with discretion.

Daily Rainfall Totals For: Jan 2003

2 1.016

3 .762

5 6.096

6 9.906

18 6.604

23 2.032

24 16.002

25 1.016

31 3.302

Monthly Total 46.7

Daily Rainfall Totals For: Feb 2003

2 2.794

5 .762

7 4.572

8 2.540

10 .762

16 1.016

17 4.318

18 .254

20 1.270

21 5.080

25 3.048

27 4.826

Monthly Total 31.2

Daily Rainfall Totals For: Mar 2003

2 .254

4 .508

10 .762

13 .254

18 1.524

19 18.034

20 .254

22 6.858

24 1.778

26 1.778

Monthly Total 32.0

Daily Rainfall Totals For: Apr 2003

1 4.064

2 .508

3 1.524

4 .254

5 .254

8 3.556

9 11.176

10 3.810

11 19.558

12 10.922

13 4.826

14 10.160

15 5.080

16 5.334

17 62.992

18 31.242

19 1.524

20 2.286

23 .508

26 2.032

Monthly Total 181.6

Daily Rainfall Totals For: May 2003

6 3.810

7 .254

8 3.810

13 4.572

14 14.224

18 3.048

19 1.778

20 9.652

Monthly Total 41.1

Daily Rainfall Totals For: Jun 2003

2 4.064

3 1.778

6 17.780

7 13.462

15 1.778

19 8.890

Monthly Total 47.8

Daily Rainfall Totals For: Jul 2003

1 .254

2 3.810

3 .762

4 .254

5 1.778

15 .254

16 .254

22 .508

27 5.842

28 1.524

31 1.524

Monthly Total 16.8

Daily Rainfall Totals For: Aug 2003

1 10.922

2 3.556

6 3.302

7 1.778

9 1.016

11 .762

16 15.748

17 3.302

18 8.890

21 1.524

22 1.016

23 1.016

25 22.860

26 31.242

27 1.778

28 2.032

29 .254

Monthly Total 111.0

Daily Rainfall Totals For: Sep 2003

1 7.620

2 1.270

4 .762

5 9.398

8 3.810

11 1.270

12 .508

15 6.604

16 .508

17 .508

Monthly Total 32.3

Daily Rainfall Totals For: Oct 2003

9 36.322

10 108.458

11 .254

15 .254

21 2.794

23 4.826

24 1.270

26 1.270

30 10.160

Monthly Total 165.6

Daily Rainfall Totals For: Nov 2003

1 1.016

2 2.540

6 8.890

7 33.020

8 1.778

9 9.652

10 39.624

11 221.234

12 161.290

13 51.054

14 6.604

15 11.430

16 6.604

17 7.366

18 1.270

19 4.826

22 10.160

24 .762

Monthly Total 579.1

Daily Rainfall Totals For: Dec 2003

5 22.352

6 44.704

7 33.528

14 1.016

16 .254

17 .254

20 2.540

23 .762

27 1.524

Monthly Total 106.9