

Cape Lookout National Seashore

National Park Service
U.S. Department of the Interior

Inventory & Monitoring Program
Southeast Coast Network



Summary of Weather and Climate Monitoring, 2011

Vital Sign Overview

Weather and climate are key drivers for ecosystem patterns and processes, affecting both biotic and abiotic components alike. Continuous weather monitoring is an important factor in separating the effects of climate from the effects of human-induced disturbance on other vital signs (e.g., plant and animal communities and population dynamics). In support of these efforts, the SECN has compiled and analyzed data from existing sources to (1) determine status, trends, and variability of precipitation and temperature over time inside and around SECN park units; (2) determine the status, trends, and variability of derived weather data (i.e., drought indices) inside and around SECN park units; (3) track the location, magnitude, and frequency of extreme weather events that affect SECN park resources.

Significant Findings

Average monthly temperatures across all relevant weather stations ranged from a low of 40.0°F at Ocracoke to a high of 81.6°F at Morehead City 2WNW.

Average monthly temperatures were generally above normal during the late spring and throughout the summer, as well as during November and December.

Average monthly precipitation was generally below average during the spring, early summer (June–July) and early winter.

Average monthly maximum relative humidity for Croatan station ranged 91–99%, with the lowest maximum relative humidity occurring in December and the highest occurring during January and February (Table 5). Average monthly minimum relative humidity ranged 48–64%, with the lowest

minimum relative humidity occurring in October and the highest occurring during September.

Derivative climate measures indicated that growing season length varied 288–342 days between weather stations used in this analysis and variation was also present in other measures including the date of last freeze (Table 1).

Table 1. Derived climate measures across all relevant weather stations for annual temperature-based events at CALO.

Measure	Range
Growing Season Length	288–342 days
Maximum Temperature (T_{max})	89–97°F
Number of Days $T_{max} \geq 90^\circ\text{F}$	0–17 days
Number of Days $T_{min} \leq 32^\circ\text{F}$	7–27 days
Last Spring Date $T_{min} \leq 32^\circ\text{F}$	23-Jan to 16-Feb
Earliest Fall Date $T_{min} \leq 32^\circ\text{F}$	2-Dec

Status of Conditions – Temperature

Comparisons of 2011 temperature data to the 30-year temperature average at Morehead City 2WNW station shows that monthly temperatures were warmer than the 30-year average during April, May, June, July, August, November and December, though not outside the range of variation for the long-term average. At Ocracoke station, April through September and November and December were also warmer than average (Figure 1), though not outside the range of variation for the long-term average.

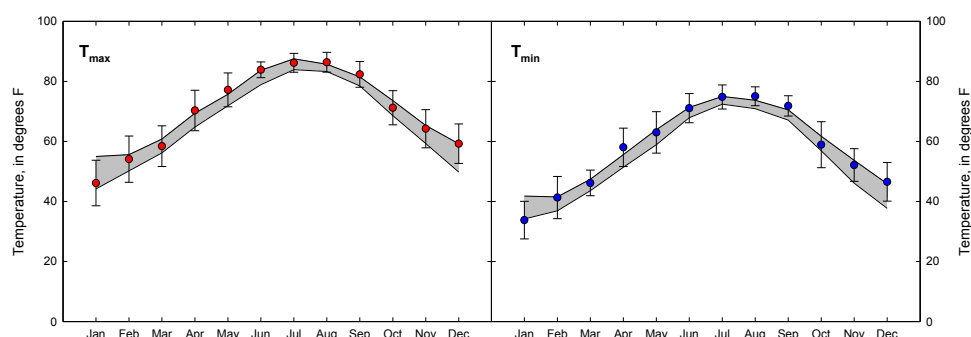


Figure 1. 2011 temperature departures from 30-year (1981 – 2010) average for Ocracoke weather station. Depicted in these graphs are average maximum monthly temperature (T_{max}) and average minimum monthly temperature (T_{min}). Gray shaded region represents 30-year average and standard deviation. Error bars represent standard deviation of T_{max} and T_{min} during 2011.

Status of Conditions – Rainfall

Comparisons of 2011 precipitation data to the 30-year average at Morehead City 2WNW station show that January, August, September and October experienced higher than average precipitation (Figure 2), with August having higher total precipitation than the 75th percentile of the 30-year average. Precipitation during the rest of 2011 was lower than average with May, July and December experiencing lower precipitation than the 25th percentile of the 30-year average. Total annual precipitation was 48.38 inches at Morehead City 2WNW station during 2011, which is 10.64 inches below normal.

Comparisons of 2011 precipitation data to the 30-year average at Ocracoke station show that January, August, September, October and November experienced higher than average precipitation (Figure 2), with January, September and October having higher total precipitation than the 75th percentile of the 30-year average. Precipitation during the rest of 2011 was lower than average. Total annual precipitation at Ocracoke station was 57.13 inches, which is 1.06 inches below normal.

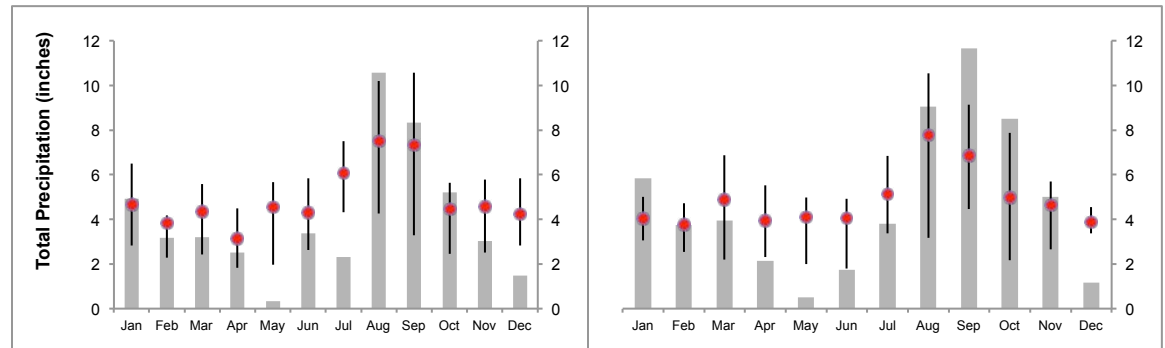


Figure 2. Total monthly precipitation during 2011 and the 30-year (1981 - 2010) monthly averages for Morehead City (left) and Ocracoke (right) stations. The gray columns represent 2011 total monthly precipitation. The red circles represent the 30-year average; the lines indicate the 25th and 75th percentile of the 30-year normal data for each month.

About the Southeast Coast Network

The Southeast Coast Network (SECN) includes 20 parks, 17 of which contain significant and diverse natural resources. In total, SECN parks encompass more than 184,000 acres of federally-managed land across North Carolina, South Carolina, Georgia, Alabama, and Florida. The parks span a wide diversity of cultural missions also, including four national seashores, two national historic sites, two

national memorials, seven national monuments, two national military parks, as well as a national recreation area, national battlefield and an ecological and historic preserve. The parks range in size from slightly more than 20 to nearly 60,000 acres, and when considered with non-federal lands jointly managed with NPS, the Network encompasses more than 253,000 acres.

About the Inventory & Monitoring Program

In 1999, the National Park Service initiated a long-term ecological monitoring program, known as “Vital Signs Monitoring”, to provide the minimum infrastructure to allow more than 270 national park system units to identify and implement long-term monitoring of their highest-priority measurements of resource condition. The overarching purpose of natural resource monitoring in parks is to develop scientifically sound information on the current status and long-term trends in the composition, structure, and function of park ecosystems, and to determine how well current management practices are sustaining those ecosystems.

The NPS Vital Signs Monitoring Program addresses

five goals for all parks with significant natural resources:

- Determine the status and trends in selected indicators of the condition of park ecosystem,
- Provide early warning of abnormal conditions,
- Provide data to better understand the dynamic nature and condition of park ecosystems,
- Provide data to meet certain legal and Congressional mandates, and
- Provide a means of measuring progress towards performance goals.

For More Information

SECN Reports & Publications: <http://science.nature.nps.gov/im/units/SECN/reports.cfm>

Inventory & Monitoring Program: <http://science.nature.nps.gov/im/index.cfm>

Data Downloads via the Natural Resource Information Portal: <http://nrinfo.nps.gov/Home.mvc>

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