# Wind Velocities and Direction


The prevailing wind erosion direction is the direction from which the greatest amount of soil erosion occurs during the critical wind erosion period. The direction is usually expressed as one of the 16 cardinal compass points. When predicting soil erosion by management periods, the prevailing wind direction may be different for each period.

Preponderance is a ratio between wind erosion forces parallel and perpendicular to the prevailing wind direction. Wind erosion forces parallel to the prevailing wind direction include those coming from the exact opposite direction ($180^0$). A preponderance of 1.0 indicates that the wind erosion force being exerted perpendicular to the prevailing direction is equal to the force exerted along the prevailing direction. A higher preponderance indicates that more of the erosion force is along the prevailing wind direction. Wind patterns are complex; low preponderance indicates greater wind direction complexity and as a result, less wind will be from the prevailing erosive wind direction than locations that have a high preponderance.

See Table 15 (Pages A-94 – 96 and Supplement on page B-96) in the Florida Erosion Control Hand book for Wind Directions and Preponderances for various locations in Florida.

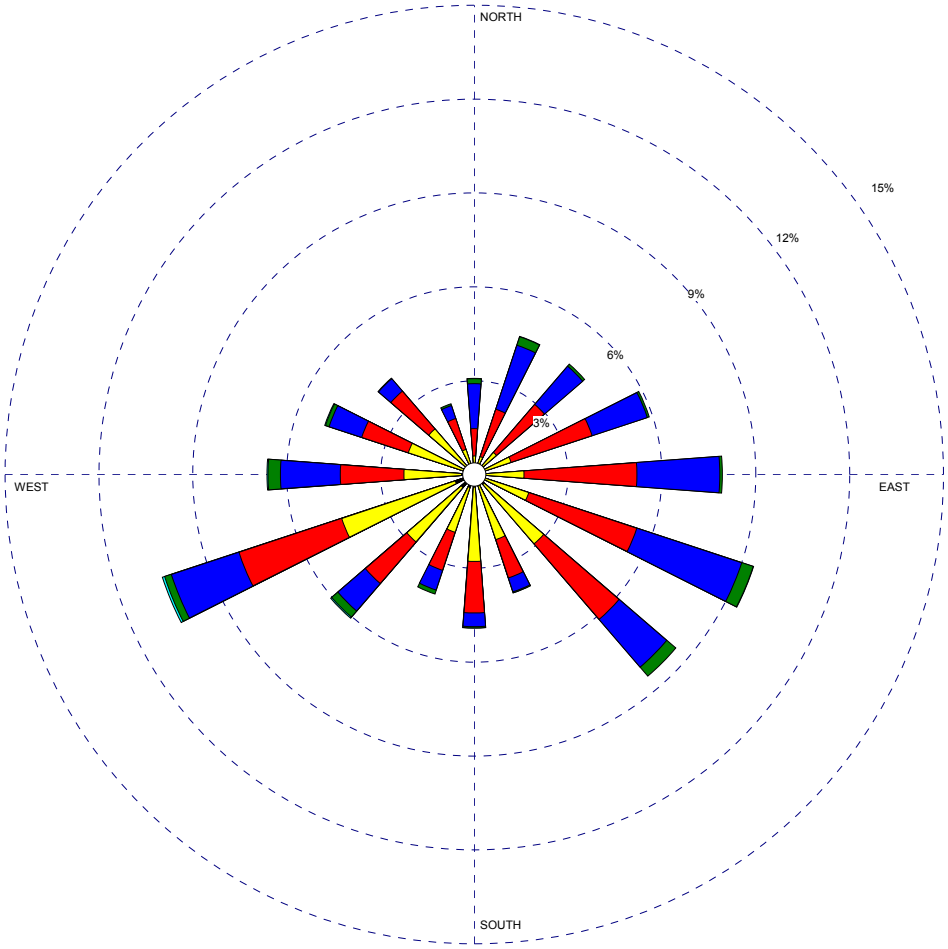
New technology to monitor wind velocities and direction used by the NRCS-National Water and Climate Center is known as Wind Rose Data. Wind Rose Data gives a very succinct, but information-laden view of how wind speed and direction are typically distributed at a particular location. Presented in a circular format, the Wind Rose Data shows the frequency of winds blowing from a particular direction. The length of each "spoke" around the circle is related to the frequency of time, in percent (%) that the wind blows from a particular direction in a normal year. Each concentric circle represents a different frequency, emanating from zero at the center to increasing frequencies of occurrence at the outer circles. The Wind Rose Data shown here contain additional information, in that each spoke is broken down into discrete frequency categories that show the percentage of time that winds blow from a particular direction within wind speed categories in meters per second (m/s).

The example of Wind Rose Data is shown from Daytona Beach Airport for the month of April. The legend at the bottom gives additional information such as the average wind speed for the month over all hours, and the percentage of time that the winds are calm, and the years and month and hours of data on which each rose was constructed. Note: Even though it says 1961 as the year, these data are based on 30 years averages (1961 – 1990), thus the software only prints the beginning year. All hours of the day (24 readings per day) are used to construct these wind roses.

Wind Rose Databases are based on hourly data from the Solar and Meteorological Surface Observation Network (SAMSON). A CD-ROM is available from the National Climatic Data Center. Go to the following web-site to get wind rose data for selected sites in Florida: ftp://ftp.wcc.nrcs.usda.gov/downloads/climate/windrose/florida/

WIND ROSE PLOT

**Station #12834 - DAYTONA BEACH/REGIONAL ARPT, FL**




Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

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|---|---|---|
| MODELER<br>**Sara West** | DATE<br>**10/24/2002** | COMPANY NAME<br>**USDA-ARS** |
| DISPLAY<br>**Wind Speed** | UNIT<br>**m/s** | COMMENTS |
| AVG. WIND SPEED<br>**4.49 m/s** | CALM WINDS<br>**8.30%** | |
| ORIENTATION<br>**Direction (blowing from)** | PLOT YEAR-DATE-TIME<br>**1961**<br>**Apr 1 - Apr 30**<br>**Midnight - 11 PM** | |

*WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com*