What is a Wind Rose?

A wind rose gives a succinct view of how wind speed and direction are typically distributed at a particular location. Presented in a circular format, the wind rose shows the frequency of winds blowing from particular directions. The length of each "spoke" around the circle is related to the frequency of time that the wind blows from a particular direction. Each concentric circle represents a different frequency, emanating from zero at the center to increasing frequencies at the outer circles.

Wind Rose Example

The example is the April wind rose for Fresno, California, based on 30 years of hourly wind data (1961-1990) for all hours of the day. It shows that the winds at Fresno in April blow from the northwest much of the time. In fact, the three spokes around the northwest direction (WNW, W, and NNW) comprise 50% of all hourly wind directions. This is quickly calculated by taking the sum of the frequencies of each of these directions (16+25+9=50%). This also shows that the wind rarely blows from the northeast or the southwest.

These wind roses also provide details on speeds from different directions. Examining winds from the northwest (the longest spoke) one can determine that approximately 8% of the time in April at Fresno the wind blows from the northwest at speeds between 1.8 and 3.34 meters per second. Similarly, on this spoke it can be calculated that winds blow from the northwest at speeds between 3.34 and 5.4 m/sec about 10% of the time (18% - 8%), at speeds between 5.4 and 8.49 m/sec about 6% of the time (24-18), between 8.49 and 11.06 m/sec about 1% of the time (25-24), and less than 0.5% of the time at speeds greater than 11.06 m/sec.

The legend at the bottom gives additional information such as the unit (m/sec), the average wind speed for the month over all hours (in this case 3.61 m/sec), and percentage of time that the winds are calm (7.53%), and the years and month and hours of data on which each rose was constructed. Although it says 1961 as the year, these data are for 30 years (1961-1990).

To calculate the typical amount of time that the wind blows from a particular direction and certain speeds just multiply the respective frequency by the

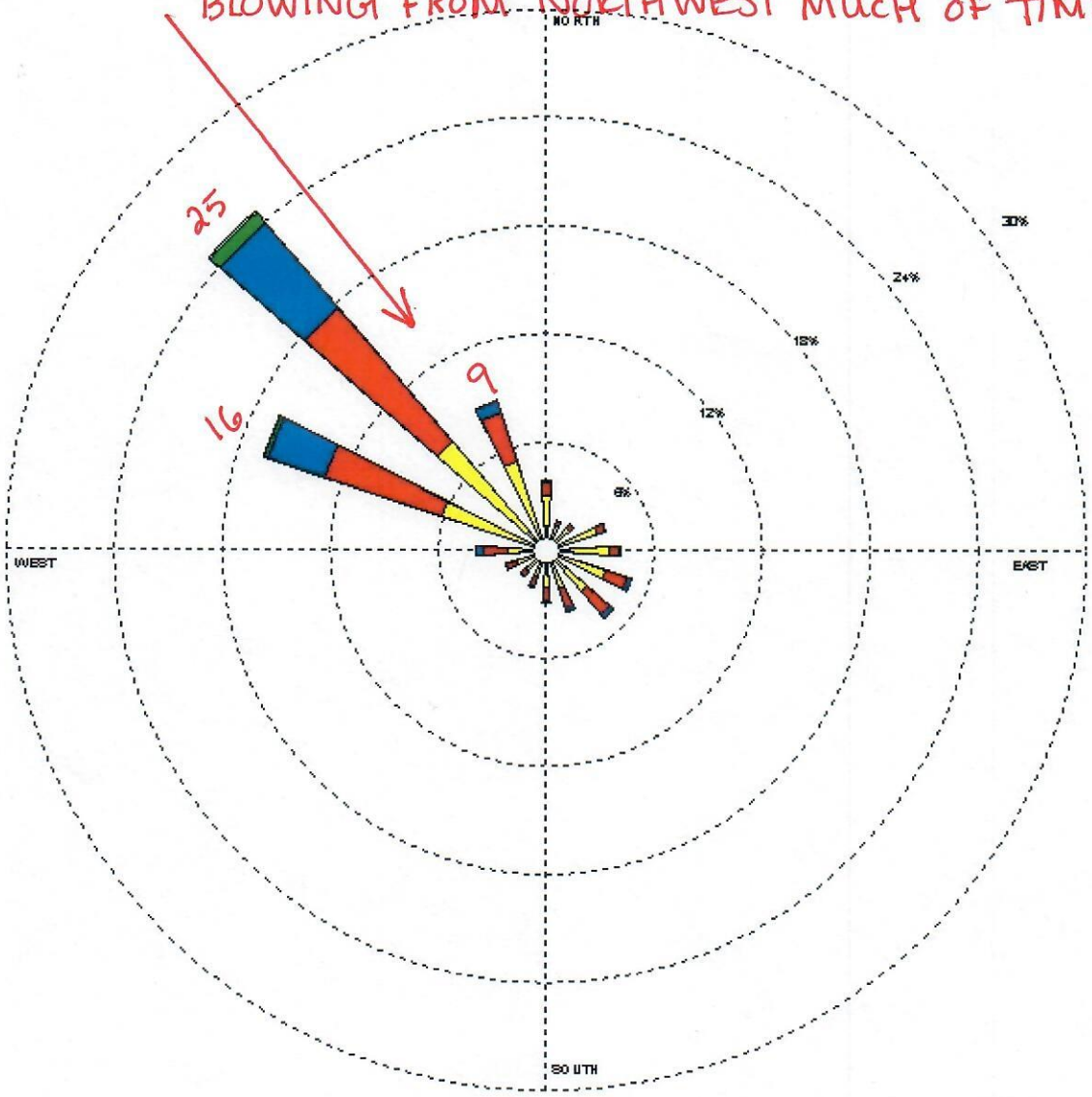
appropriate amount of time. In our example with Fresno in April, there are 30 days x 24 hours/day in April, or 720 hours. From the wind rose we calculated that winds blow from the northwest at speeds between 5.4 and 8.49 m/sec 6% of the time. This represents 0.06 x 720 = 43.2, or about 43 hours typically have winds from the northwest at these speeds at Fresno in April.

WIND ROSE PLOT

Station #93193 - FRESNO/AIR TERMINAL, CA

16 + 25 + 9 = 50%

BLOWING FROM NORTHWEST MUCH OF TIME



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

MODELER	DATE	COMPANY NAME
Sara West	8/19/2002	USDA-ARS
DISPLAY	**UNIT**	**COMMENTS**
Wind Speed	m/s	
AVG. WIND SPEED	**CALM WINDS**	
3.61 m/s	7.53%	
ORIENTATION	**PLOT YEAR-DATE-TIME**	
Direction (blowing from) *	1961 Apr 1 - Apr 30 Midnight - 11 PM	

WRPLOT View 3.3 by Lakes Environmental Software - www.lakes-environmental.com