

South Dakota's Wind Classifications



Credit to Microsoft Office Online for the Wind Turbine Template.

Credit to NREL for their Wind Classification Data

Cartographic Design by Shanon R. Conley

Site description:

Site elevation: 578 m (1895 ft)

Site latitude: 45° 12' 21" N

Site longitude: 97° 54' 19" W

Date of activation: November 14, 2001

Data averaging interval: 10 minutes

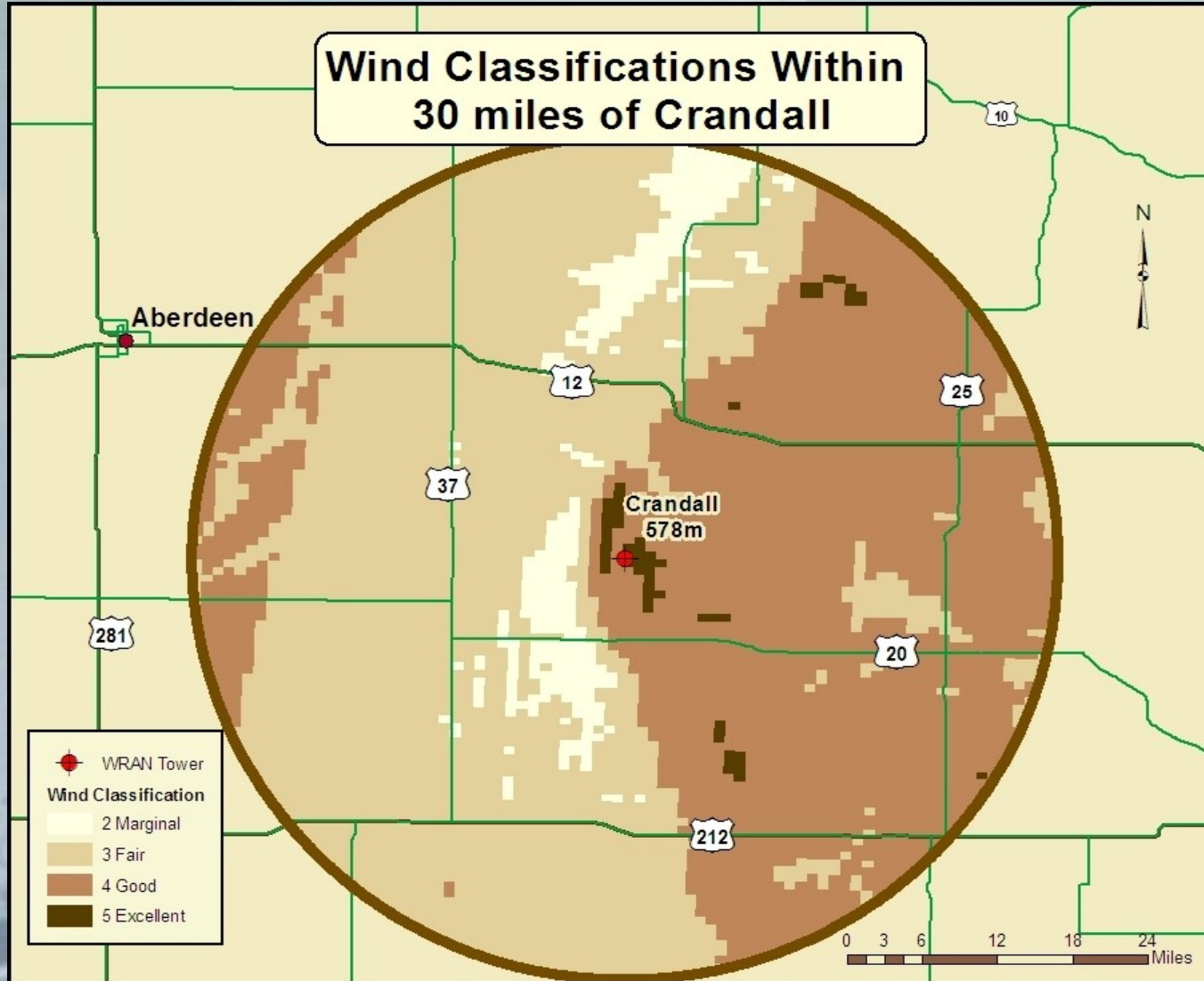
Overall data recovery rate: 90.66% (50m)

90.07% (70m)

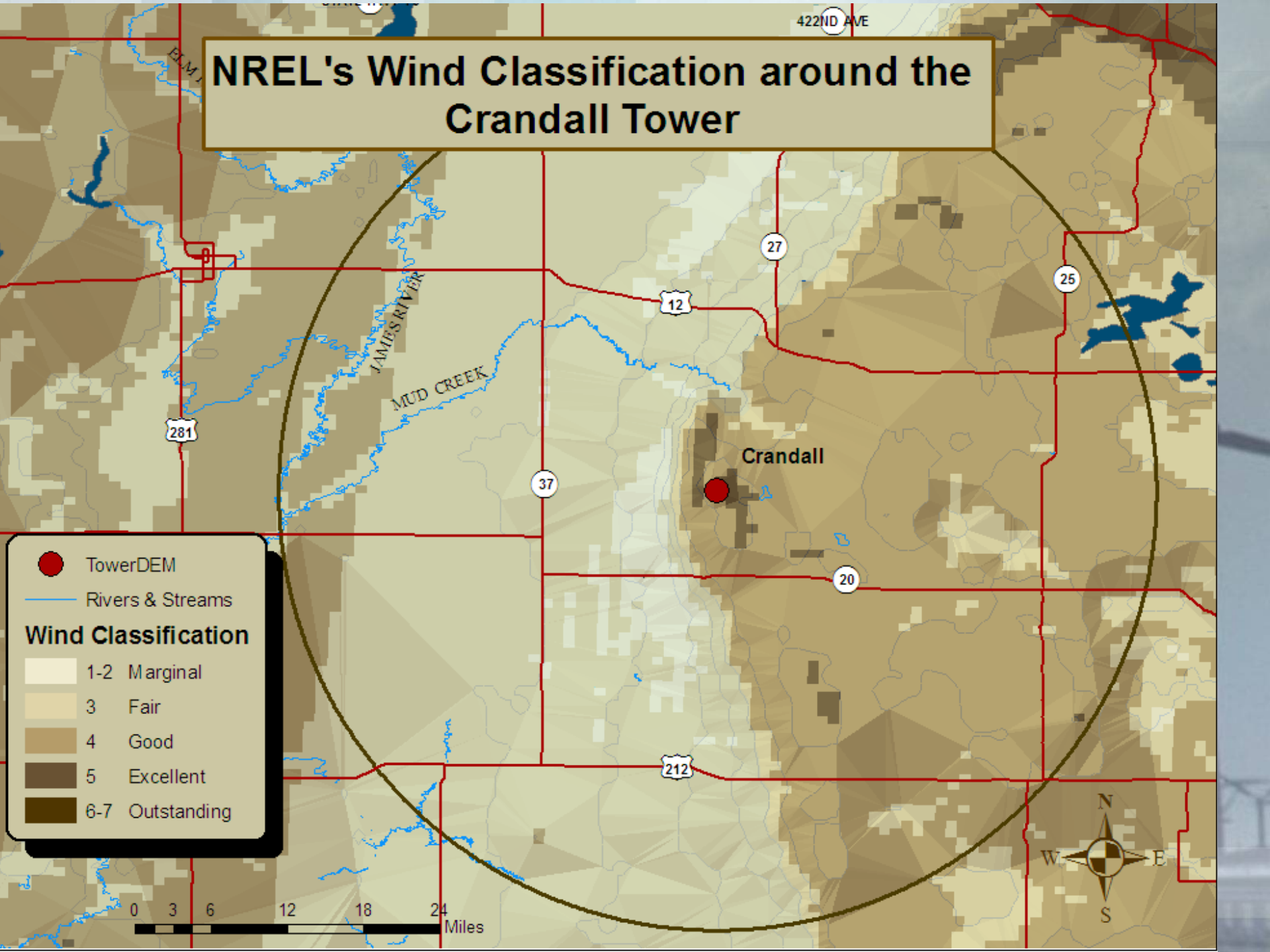


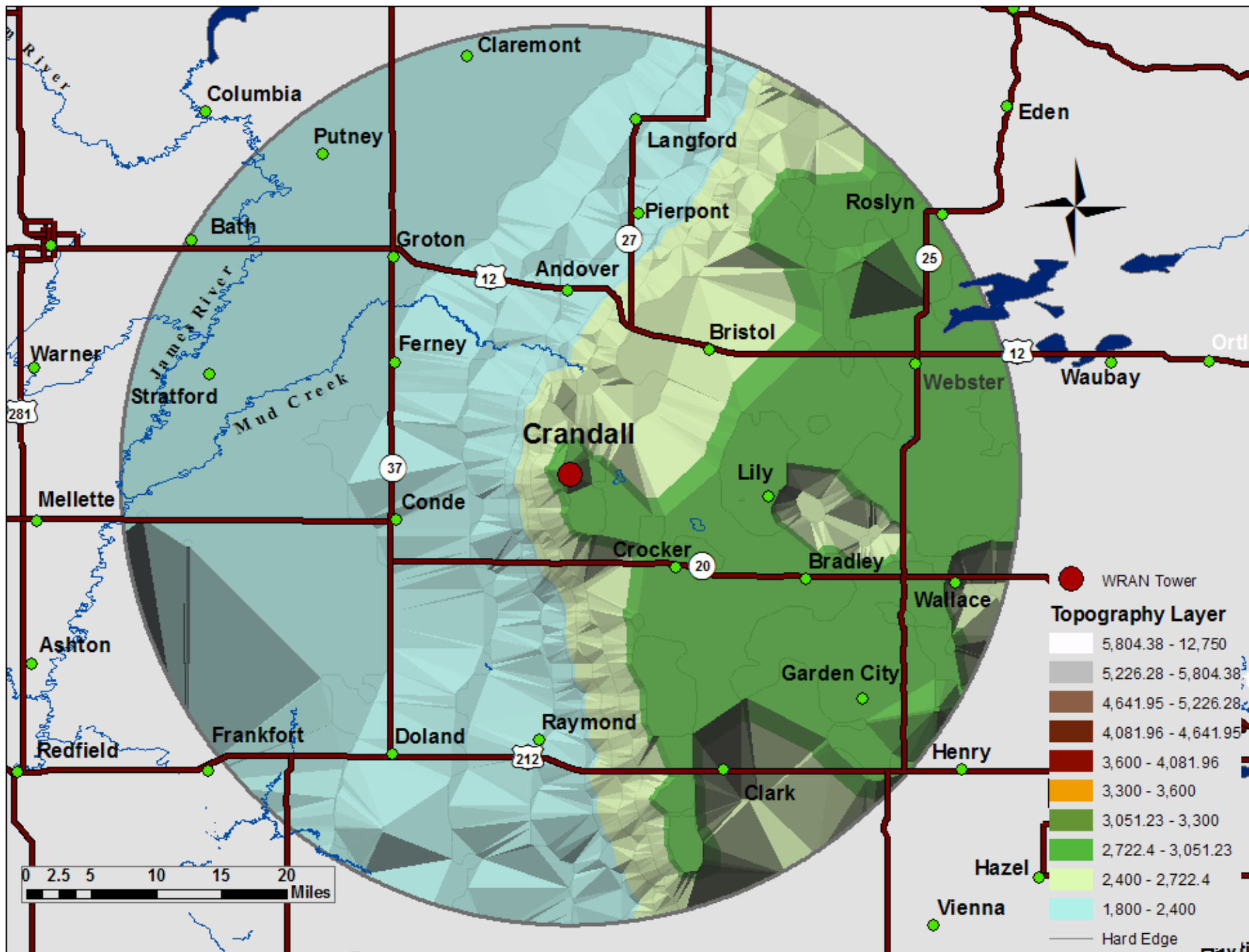
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Wind Resource Assessment Network Project
Site: Crandall

Data collection period:
December 5, 2001 –
July 31, 2007



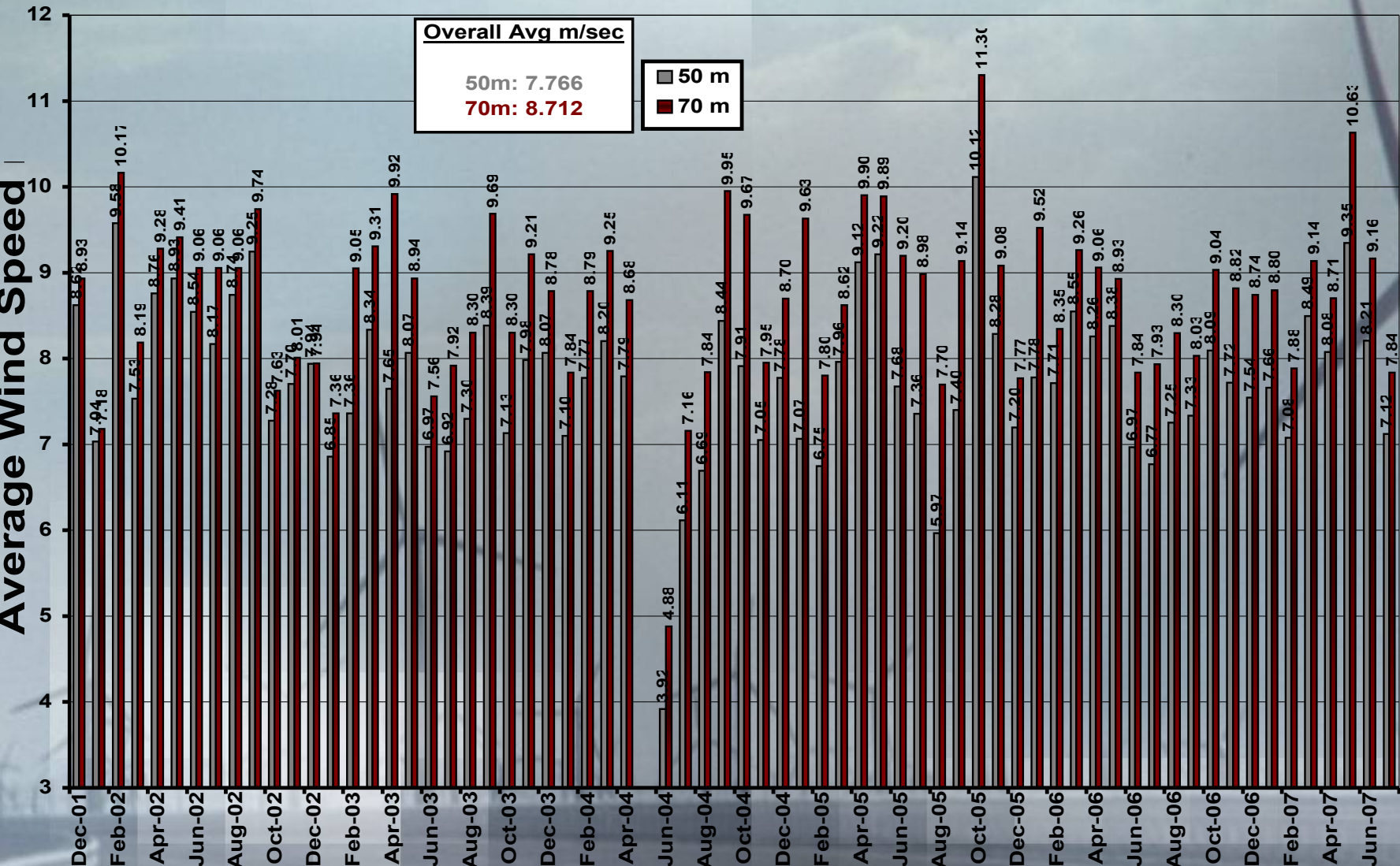
NREL's Wind Classification around the Crandall Tower





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This slide shows the monthly average wind speed in meters per second at this site, and also the overall average wind speed, measured in m/sec, at each measurement height. This is taken over the entire period of data collection. Last updated 08/01/2007.



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**Notes for proper data
interpretation (pg 1/3)**

Month	Notes
Dec 2001-Mar 2002	<p>There were a number of short icing events during this period. These will reduce the average wind speed values somewhat.</p>
Dec 2002	<p>There was a significant icing event in December which immobilized all anemometers for a period of approximately nine days (Dec 17-26). The data shown here have been adjusted by removing those data points. It is known that there were significant strong winds during the icing period, and it is possible that the instruments read incorrectly just before and after the icing incident as ice built up and melted off. Thus, we suspect that the monthly average shown for December 2002 is somewhat lower than it really was; that is, the true average wind speed is higher than that shown.</p>
Feb 2003	<p>There were two icing events in February 2003, the 3rd –10th and the 20th-23rd. During the first of these, at each elevation the direction vane and one anemometer were immobilized. During that period, we took the data from the remaining operational anemometer. During the other incident, only the direction vanes seem to have been affected.</p>
March/April 2004	<p>We changed the type of turbine used in wind capacity factors simulations from a Vestas V47 to a newer GE 1.5s (1.5 MW) turbine. This change produced higher capacity factors at both measurement heights as a result of newer and better technology within the turbines themselves. The data used did not change, only the turbine type.</p>

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**Notes for proper data
interpretation (pg 2/3)**

Month	Notes
May/June 2004	A communications problem occurred during this time frame. Consequently, we have no data for May 2004, and the June 2004 data begin on June 26 at 12:20 am. The June 2004 data are given here for completeness, but they should be considered outliers, skewed by the low recovery rate in that month.
October 2004- November 2004	There was an undetected anemometer failure at 70 meters during these months. The data recovery rate during this period is thus a bit low. At this time, we have discarded all data points that would have relied on the defective sensor. It might be possible to rehabilitate some of these points based on data from the working redundant sensor; more on this in the future.
January 2005	A problem with the base station computer led to data loss from December 30, 2004 at 12:30 am to January 23, 2005 at 2:10 pm. Some of these data may be recoverable; we're working on it.
August 2005	A problem with the base station computer led to data loss from August 10, 2005 at 12:00 am to August 31, 2005 at 12:00 am. Some of these data may be recoverable; we're working on it.
September 2005	The same base station problem continued throughout the month, with a small amount of data recovered. Due to the small data window, Sept. averages are not very inclusive.

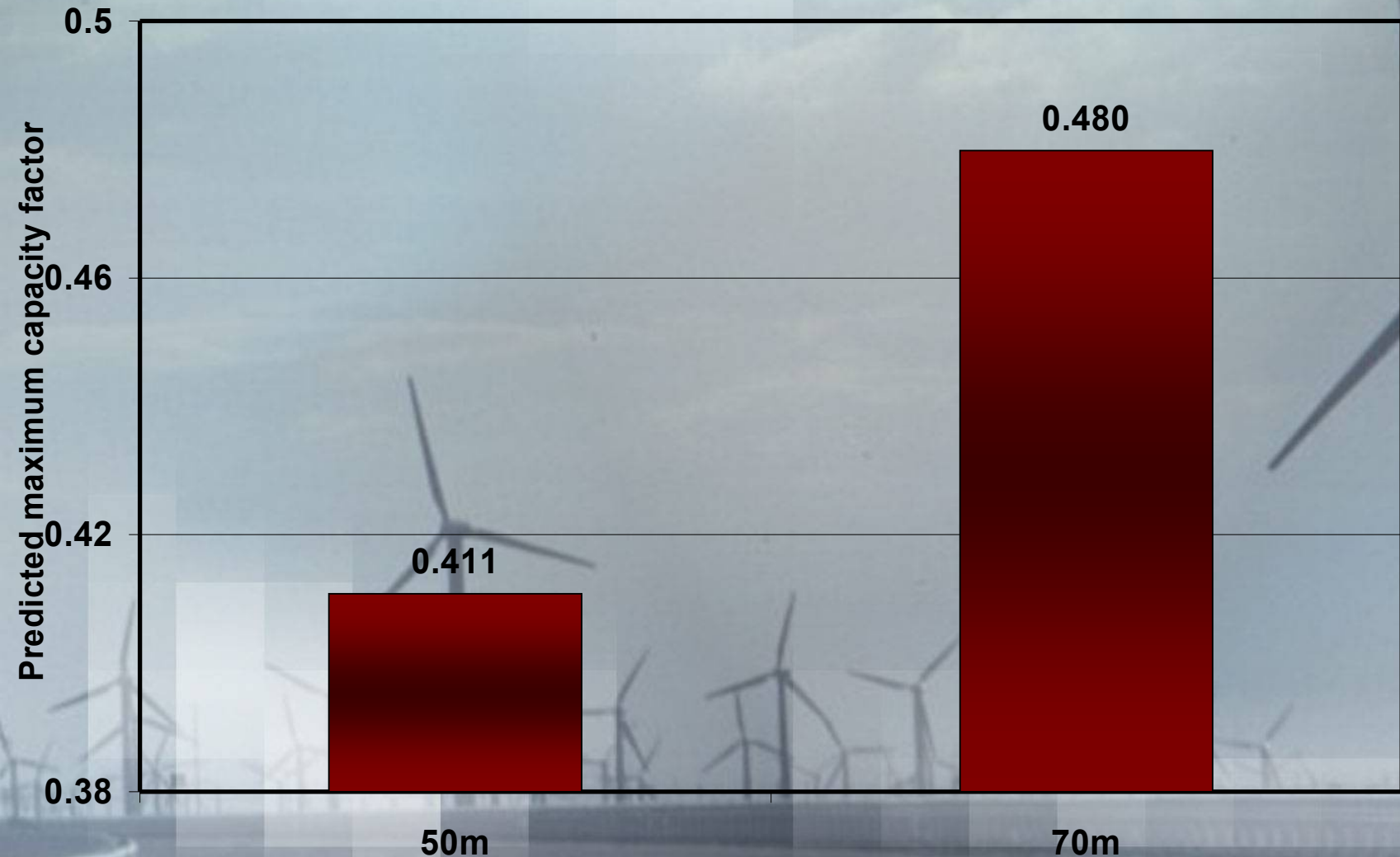
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**Notes for proper data
interpretation (pg 3/3)**

Month	Notes
October 2005	A recurring communications problem occurred this month, causing the loss of several days worth of data. This loss consequently skewed the average data high.
November 2005	An ice storm caused some sensor failure this month, more so at the 70 meter level than the 50 meter level. The sensor performance will have to be monitored closely to detect permanent sensor failure.
December 2005	Ice storm failures continued into December for almost two weeks, further dropping the data recovery rate. It appears that a 70 meter anemometer was permanently damaged from the storm and will be replaced.
January 2006	There was a moderate amount of irrelevant data due to ice accumulation on the sensors this month. Broken sensors were replaced from December. Monthly averages appear to follow past trends.
August 2006	A recurring communications problem occurred this month, causing the loss of several days worth of data. This loss consequently skewed the average data high.
December 2006	The December data was only partially complete due to ice accumulation on the sensors. The sensors appeared to work intermittently throughout the month.

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This slide shows the expected maximum capacity factor that could be expected from a wind turbine on this site. The capacity factor can be thought of as the percentage of maximum possible energy that the turbine would actually produce, given the variability of the wind resource at the site. Updated 8/01/2007



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This slide shows the diurnal variation of the wind speed (that is, the average wind speed as a function of time of day) at each measurement height, over all data from activation until Dec 31, 2002.

