

South Dakota's Wind Classifications



Credit to NREL for their Wind Classification Data

Credit to Microsoft Office Online for the Wind Turbine Template.

Cartographic Designs by Shanon R. Conley

Site description:

Site elevation: 625 m (2050 ft)

Site latitude: 45° 10' 44" N

Site longitude: 97° 0' 57" W

Date of activation: November 13, 2001

Data averaging interval: 10 minutes

Overall data recovery rate since

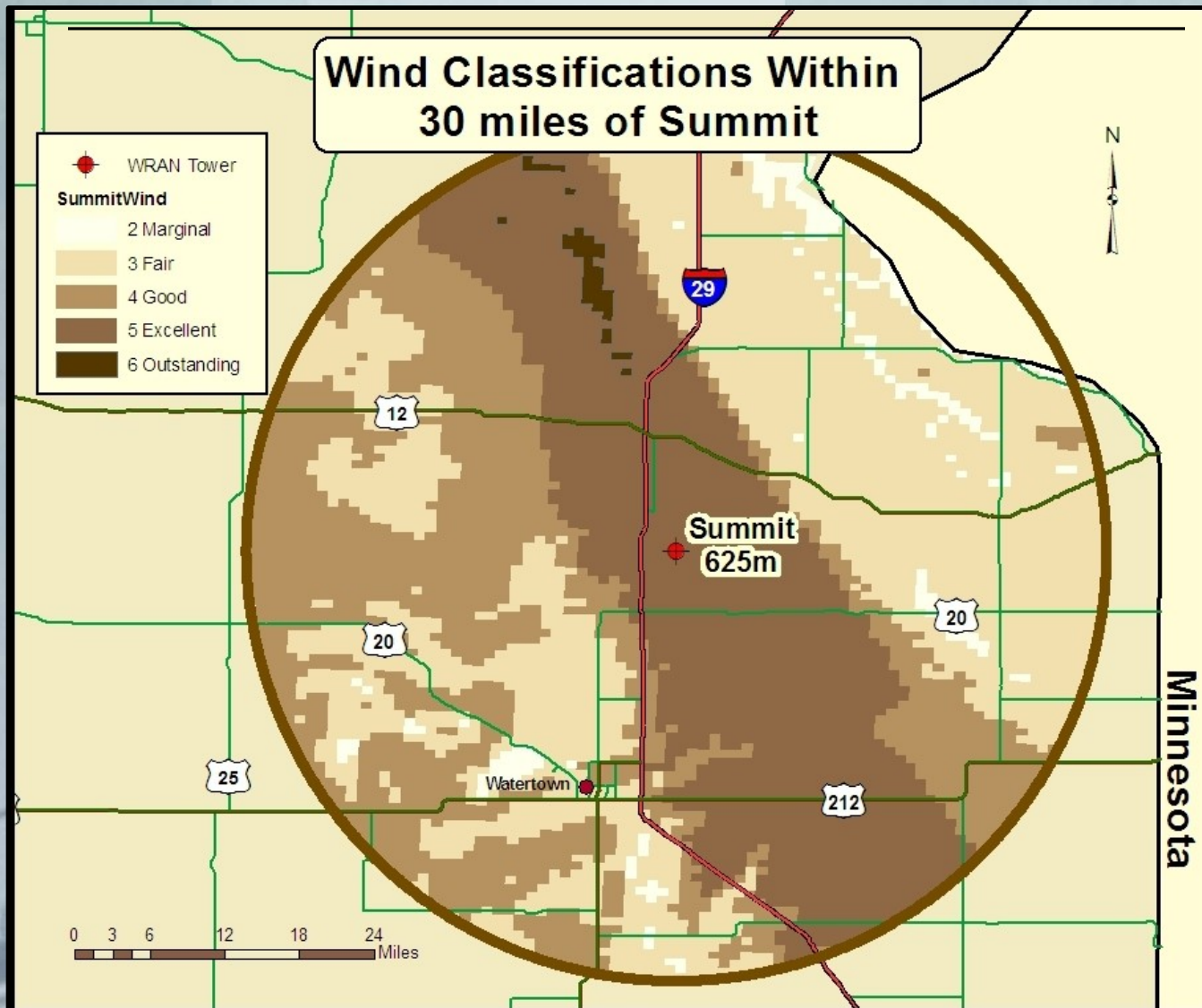
activation: 50m: 73.72%

70m :73.97%

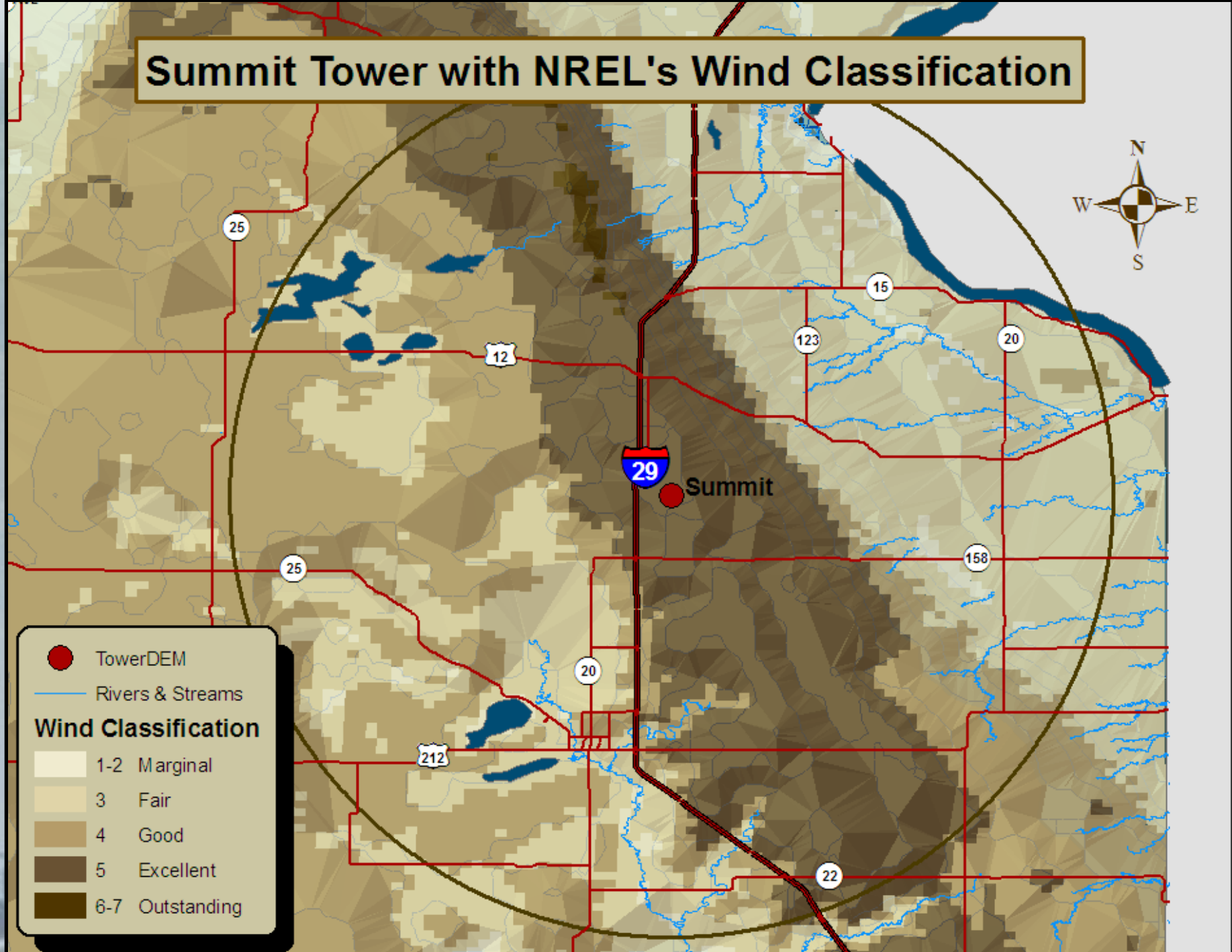


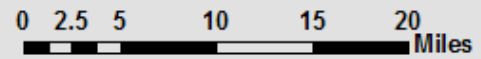
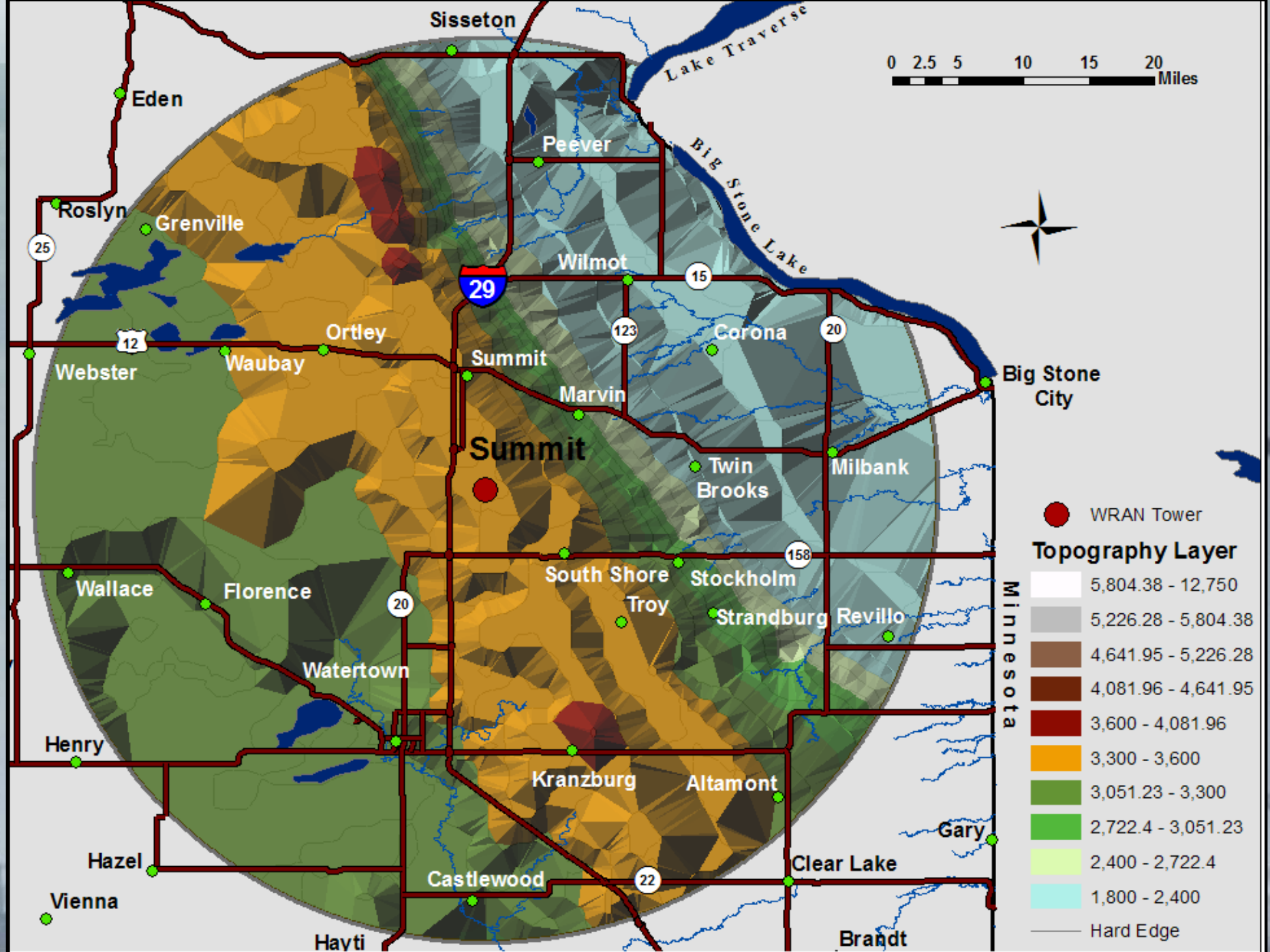
**South Dakota State University
Electrical Engineering Department
Wind Resource Assessment Network Project
Site: Summit**

**Data collection period:
November 13, 2001 –
July 31, 2007**



Summit Tower with NREL's Wind Classification





● WRAN Tower

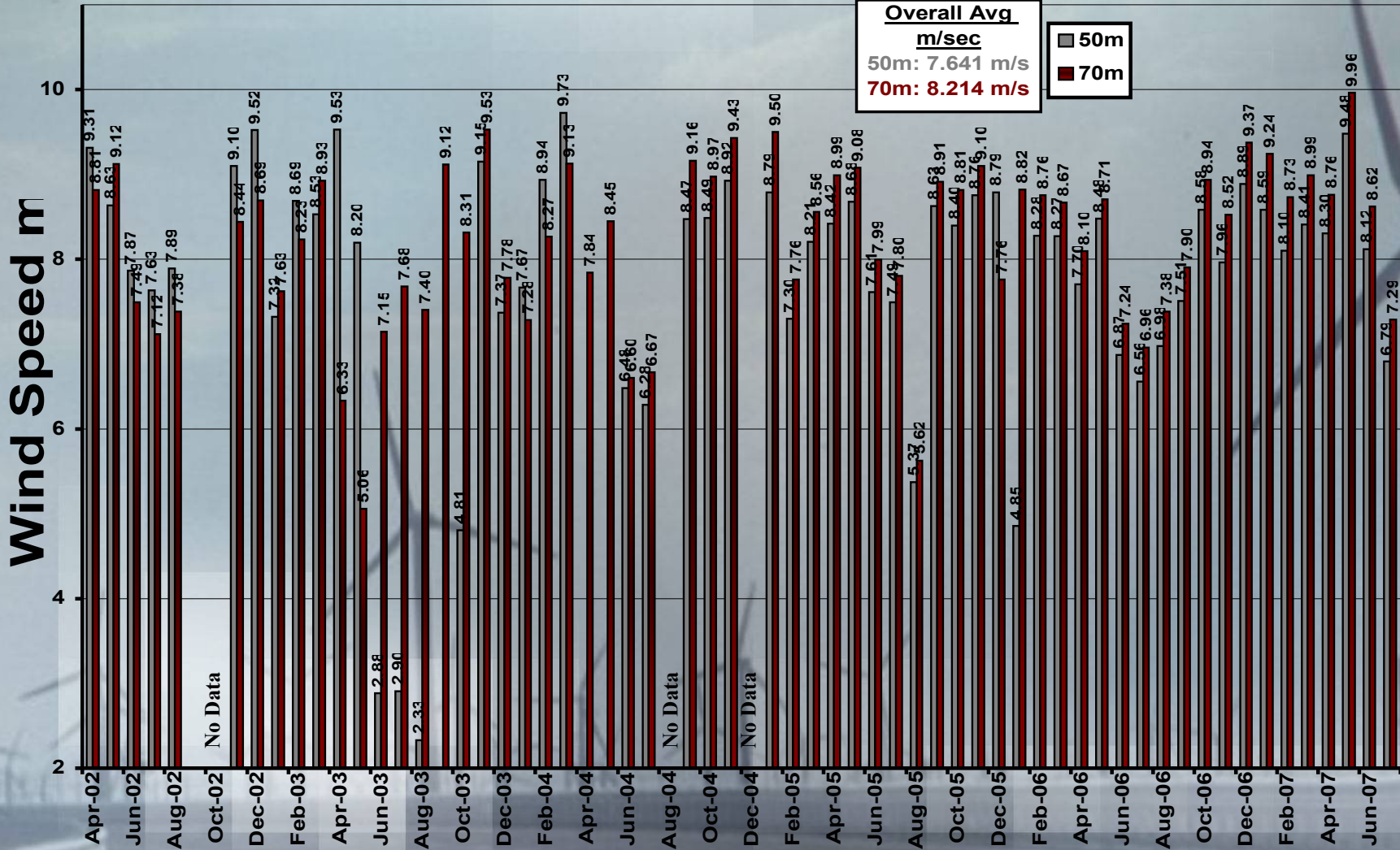
Topography Layer

- 5,804.38 - 12,750
- 5,226.28 - 5,804.38
- 4,641.95 - 5,226.28
- 4,081.96 - 4,641.95
- 3,600 - 4,081.96
- 3,300 - 3,600
- 3,051.23 - 3,300
- 2,722.4 - 3,051.23
- 2,400 - 2,722.4
- 1,800 - 2,400
- Hard Edge

Minnesota

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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 (in the inset box), at each measurement height. Last updated 8/01/2007.



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Site: Summit**

**Notes for data
interpretation—pg 1/3**

As a general note, we have had a lot of trouble with the Summit site. The overall data recovery rate (as noted in the Site Description) for this site has been very low because of these troubles.

| Month | Notes |
|--------------------------------------|--|
| November 2001 – April 2002 | We have presented none of the data from this time period because it was corrupted by a series of instrument malfunctions, communications problems, and data garbling. |
| August 28 – November 15, 2002 | The Summit Datalogger was damaged by ESD during an August 28 site visit and was removed for repair. It was returned to us in early November 2002 and reinstalled on November 15, 2002. |
| December 2002 | There was one significant icing event in this month that affected all anemometers at both heights. These data points have been excluded from the statistics presented here. |
| January 2003 | The data set for January starts on Jan 18. We hope to recover the rest of the Jan 2003 data shortly. |
| February 2003 | This data was affected by two significant icing events. All points at which all instruments were frozen have been removed from the figures shown here. |

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**Notes for data
interpretation—pg 2/3**

| Month | Notes |
|---------------------------------|---|
| April 2003 | <p>There are some serious problems with the April 2003 data from Summit. There are very anomalous numbers from the 50 meter instruments. There are also what appear to be icing events. A couple of these are probably real, but a couple occur when the on-site temperature sensor indicates above-freezing temperatures, so these are probably some other type of malfunction. We have attempted to correct for this by eliminating all known bad data from the averages presented here, but this reduces the size, and thus statistical accuracy, of the data set.</p> |
| June-Sept 2003 | <p>In mid-June 2003, there was an apparent malfunction of the 50 meter anemometers that went undetected. We lost all the 50 meter data from June 2003 until November 2003.</p> |
| April-May 2004 | <p>Our struggles with Summit continue. Once again, 50-meter sensor problems cost us the data for these two months.</p> |
| August and December 2004 | <p>In August and December 2004, communications problems led to data loss.</p> |
| August 2005 | <p>The data set for August was somewhat incomplete. One week worth of data was missing, due to a data logger or communication error. The problem is currently being looked into. Also, the overall wind speed averages are currently being reevaluated due to switched signal wires at the site.</p> |

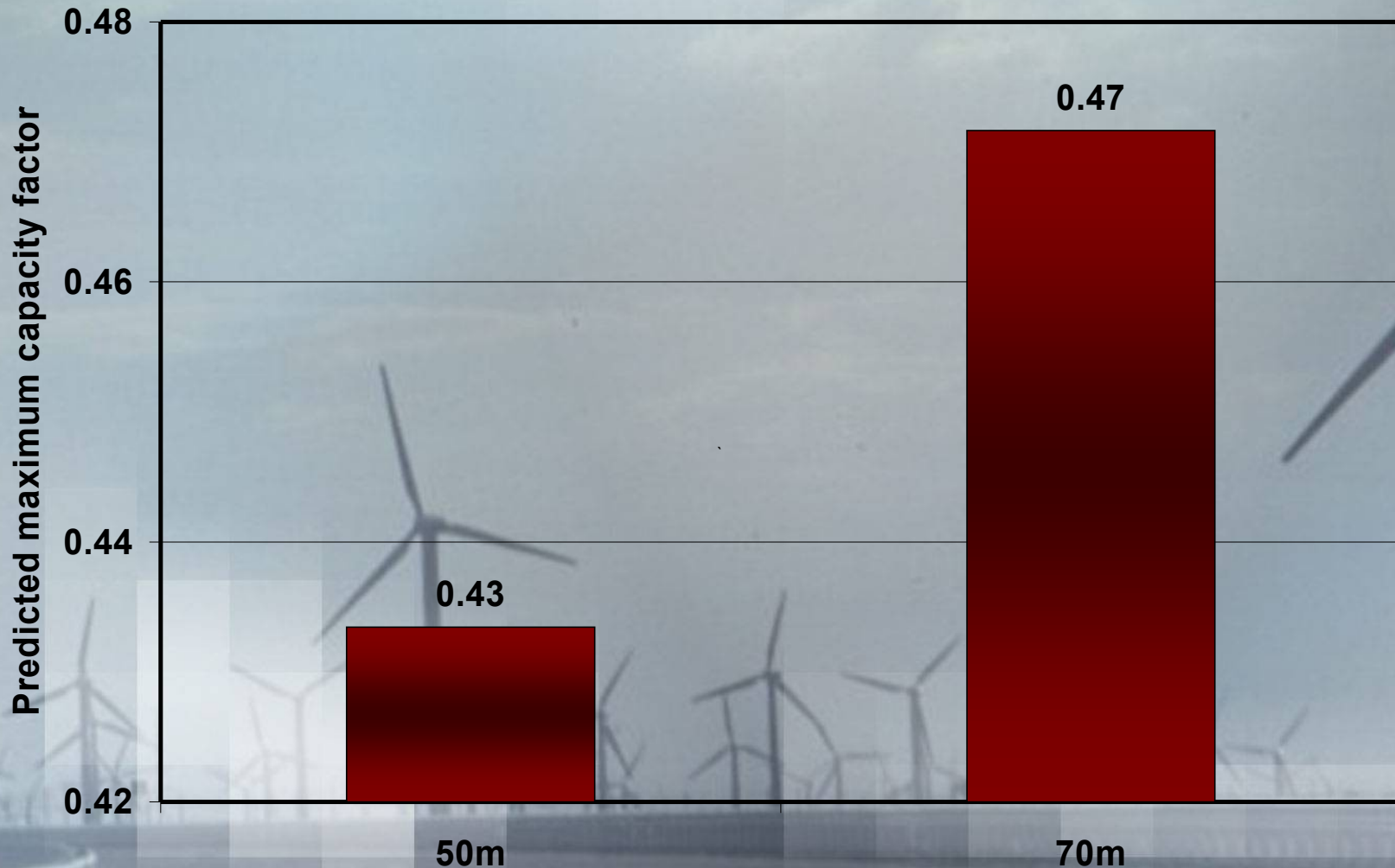
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**Notes for data
interpretation—pg 3/3**

| Month | Notes |
|--------------------------|---|
| November 2005 | The November data exhibited some data loss at the end of the month due to an ice storm. The data will be monitored closely to watch for broken instruments in the coming weeks. |
| December 2005 | The December data exhibited larger data losses than November. This was partly due to the ice remaining on the equipment. Also, it appears some sensors were permanently damaged in the storm and will need to be replaced. |
| June 2006 | The June data exhibited larger data losses than previous months. One day worth of data was missing, due to a data logger or communication error. |
| December 2006 | The December data was only partially complete due to ice accumulation at the middle and end of the month on the sensors. The sensors appeared to work intermittently throughout the month. |
| June 2007 | An error was found in the monthly data sheets between October 2006 - May 2007. The wrong directional wind vane was used to choose the best anemometer's wind speed at both 50-m and 90-m. This was caused from a differing channel wiring pattern at Summit as compared to WRAN's other towers. The error has been rectified for all past monthly data sheets and the data archive now shows the best wind speeds at each height. The difference is negligible for the wind capacity factor and the wind speed average is slightly lower at 50m and slightly higher at 70m. |
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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. This is taken from the initial data collection to 08/01/2007.



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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 the entire period of data collection.

