WIND PATTERNS ON THE SOUTHERN END OF THE BRUNEAU DUNES COMPARED TO REMOTE AUTOMATIC WEATHER STATION DATA FROM MOUNTAIN HOME, IDAHO. C. A. Wishard[1,2] and J. R. Zimbelman[2], [1]The University of Alabama MSC 871222, 1831 University Station, Tuscaloosa, AL 35487-0268, cawishard@crimson.ua.edu, [2]CEPS/NASM MRC 315, Smithsonian Institution, Washington, D.C. 20013-7012, zimbelmanj@si.edu.

Introduction: A reversing sand dune is a dune that grows vertically instead of traveling horizontally across the landscape. Seasonal shifts in the dominant wind direction (from the northwest or the southeast) cause the dune to remain stationary throughout the year [1] [2]. The purpose of this study was to determine if the Remote Automatic Weather Station (RAWS) data taken from the Mountain Home Air Force Base (about 20 kilometers from Bruneau Dunes State Park) is an accurate portrayal of the wind patterns on the Bruneau reversing sand dune [3]. This study took data from the RAWS and from the GardenWatchCam (GWC) stationed at the dune and compared the two data types. Should the two data types have a reasonable correlation, RAWS data from the Mountain Home Air Force Base can be used to further study the Bruneau sand dune.

Procedure: In this study, the term "saltation frame" is used to describe a still frame taken by the GWC in which saltation is visible. The term "wind count" is used to describe the number of instances of wind in any specified direction recorded by the RAWS. The RAWS takes data at a one hour interval. Therefore, the wind counts per month would be the number of hour intervals per month in which the RAWS detected wind.

GardenWatchCam: On April 27th, 2011, the GWC was set up on the eastern side of the Bruneau sand dune. The GWC was attached to a pole about five and a half feet off the ground and aimed at the dune. Depending on the data set, the GWC took photos of the dune at one hour, two hours, or one-half hour intervals over the next two and a half years. Data was adjusted to fit a standard one hour interval. From April 27th, 2011, to August 31st, 2013 ten individual photo sets were collected from the GWC.

In this portion of the study, saltation was used as the means to determine if wind was blowing over the dune. It is important to note that saltation to the west or northwest is a sign of wind from the east or southeast and vice versa.

Remote Automatic Weather Station: A wind frequency table with an output of total wind counts was generated each month from May 2011 to February 2013. Based on the Beaufort scale, a wind velocity of 8 m/s was chosen to be the calm threshold for the RAWS data [4].

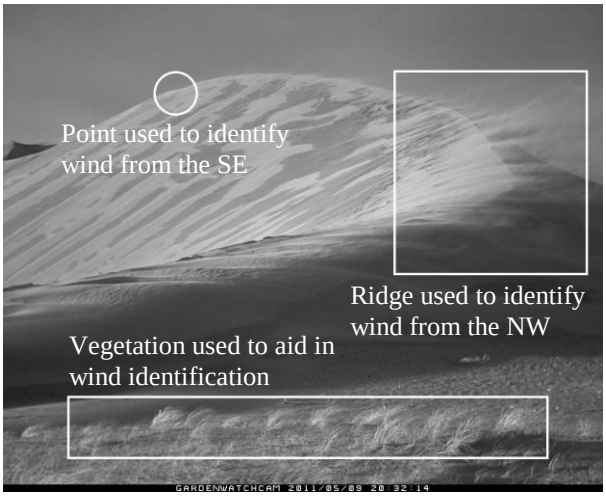

Fig. 1. GardenWatchCam image of the southern end of the Bruneau Dunes. Key areas of the dune have been highlighted. This image shows strong saltation caused by wind from the NW (05/09/11 at 20:32:14).

This table of total counts was divided into 16 cardinal wind directions but because the GWC data could not be reported to that level of accuracy, the RAWS data was simplified in order to compare the two data types. Wind resulting from any of the seven eastern directions was grouped together under southeast as the vast majority of eastern type winds came from the southeast. All northern directions were grouped under northwest in a similar fashion.

Results: The results from the GWC and RAWS were analyzed by wind counts from the SE and NW per month. For the GWC, the number of sightings of saltation per month gives a rough estimate of how often the wind was able to move sand in either the north-western or south-eastern direction per month. For the RAWS, the total amount of wind counts in all directions gives a rough estimate of the amount of strong wind affecting the dune each month.

Discussion: As to be expected from wind causing a reversing sand dune, the wind affecting the Bruneau dune is roughly cyclical. In both 2011 and 2012, the amount of GWC saltation frames and RAWS wind counts drop to below 20 in late summer and early fall. The number of wind counts and saltation frames remains around 10 for a few consecutive months and

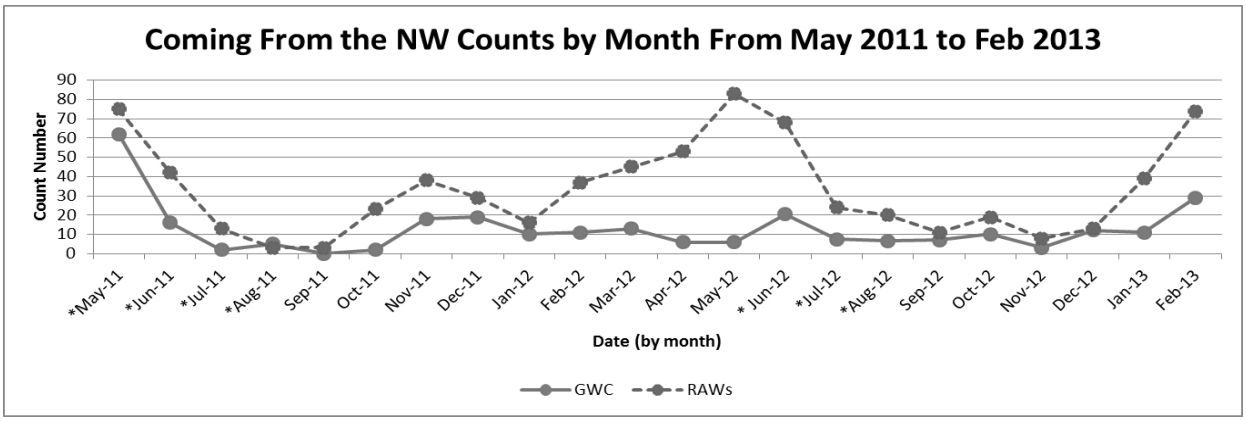

Fig. 2. NW wind counts by month. An "*" denotes a month in which the wind counts were adjusted to fit a one hour interval.

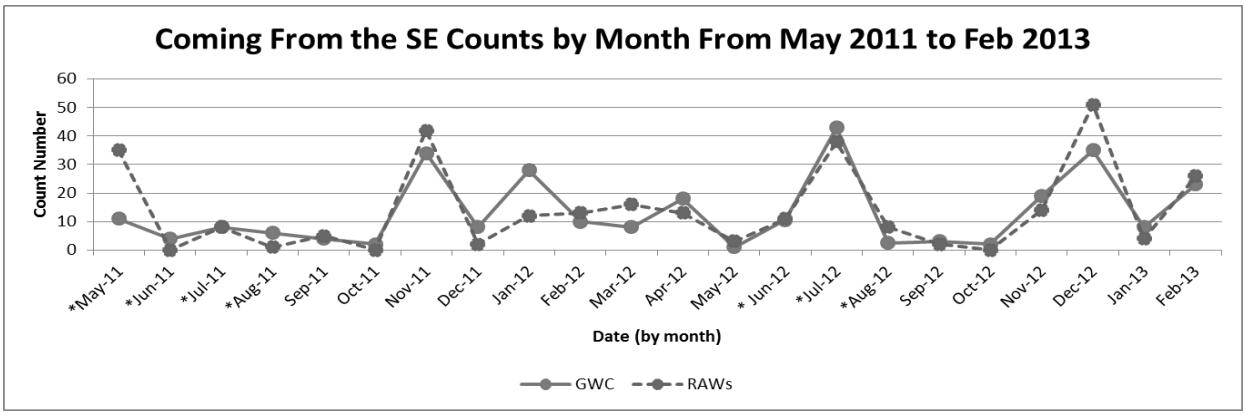

Fig. 3. SE wind counts by month. An "*" denotes a month in which the wind counts were adjusted to fit a one hour interval.

then rises again around November of both years. This is a sign that the winds affecting the dunes are undergoing a change in late summer and early fall.

The NW overlay shows a rough pattern of one large peak during late spring or early summer, followed by a small peak about 6 months later, in late fall early winter (see **Fig. 2**). The SE overlay shows a rough pattern of two large peaks in late fall and mid-summer and a lower continuous period of heightened wind count numbers from mid-winter to late spring (see **Fig. 3**). The SE and NW wind operating on different patterns explains the large dips in wind counts in late summer.

There are two main sources of potential error that could have affected the accuracy of the GWC data. The first is the angle at which the GWC photographed the dune. The GWC was positioned facing north. Because roughly half of the wind affecting the dune came from the SE (causing saltation to the NW), some saltation could have been missed as it blew over the crest of the dune. This would cause the SE GWC saltation frames to be less than the SE RAWS wind counts.

The second potential source of error came in the form of a large gray blur appearing on the lens of the GWC on October 4th, 2012 at 12:27:07. This blur slowly faded away due to rain or wind exposure but it fully did not disappear until December 27th, 2012 at 14:27:07. In this time, GWC data was still taken (as the blur got more translucent with time); however, it is possible that some saltation was missed.

References:

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