WEATHER STATIONS

Contents

OBJECTIVE(S)

Upon completion of this lesson, participants will be able to:

1. Learn how to interpret graphical weather data for delineating fire danger rating areas.

NARRATIVE

I. **INTRODUCTION**

Both general and data-based assessments of weather stations can be made to inform the selection of stations to represent each Fire Danger Rating Area (FDRA). This lesson will look at both qualitative and quantitative ways to approach this. Through application of knowledge gained in this lesson, you will be able to:

A. Both general and data-based assessments of weather stations can be made to inform the selection of stations to represent each Fire Danger Rating Area (FDRA). This lesson will look at both qualitative and quantitative ways to approach this. Through application of knowledge gained in this lesson, you will be able to:

B. Demonstrate the application of the RAWS SIG Selector Tool to provide visual and statistical analysis to provide rationale for weather station grouping.

II. **GENERAL CONSIDERATIONS FOR FDRA STATION SELECTION**

These general considerations are just a first step in assessing weather stations.

A. Representativeness – All weather stations provide weather data representative of their specific location. It's a good first step to consider whether:

   1. Stations meet agreed upon interagency siting standards.

   2. Station locations are representative of the FDRA fire environment.

B. Management objectives – It's desirable to select stations that align with fire management objectives, including target communication groups and the causes and locations of predominant fire activity. Sometimes the closest weather station is the wrong one to use.

C. Past station selection – It's not uncommon to have (or be given) a list of weather stations which have been used or relied upon in the past. It's a good idea to validate all the stations you're considering whether they've been used in the past or not. Don't get decision trapped by tradition.

D. Location relative to FDRA

   1. Stations don't have to be strictly within FDRA (or even project area) boundaries.

2. Individual stations can be used to represent more than one FDRA.

E. Single station or multiple stations (SIGs)

1. Single stations represent points, and can be singular points of failure.

2. Multiple stations better represent areas, and provide data redundancy.

3. Most FDRA's represented by SIGs with 2-4 stations.

4. Need data-based validation.

III. DATA-BASED CONSIDERATIONS FOR FDRA STATION SELECTION

A. Period of record & data completeness

1. Seeking an analysis period of 10+ years with complete station data (quality comes next).

2. FFP Data Count Report can help, as can external applications.

3. Important to remember that solar radiation and snow flag observations are required data elements for NFDRS2016.

B. Data quality - A lengthy and complete data set with poor data quality isn't helpful.

1. Data quality can be assessed both within and outside of FFP in various ways

2. There's no real strategy right now for correcting poor quality hourly data, because it is so vast.

3. For now, it's best to delete poor data or set an analysis period which avoids it.

C. For now, it's best to delete poor data or set an analysis period which avoids it.

1. Important to establish a project area station list and accompanying general analysis period, which should be 10+ years where all or most stations have complete and quality data

2. Similarity of station data can be assessed both qualitatively and quantitatively by using the *RAWS SIG Selector Tool*. *See the included tech tip for more details.*

    a. a. ERC Climatological Graph:

      (1) Stations being considered for SIGs should trend similarly and have similar values.

      (2) Stations which trend the same, but with significantly different values, could present a day-to-day operational problem if one station doesn't report.

   b. Correlation Matrix:

      (1) Demonstrates the strength of correlation (r-squared values) between any combination of two stations.

      (2) The higher the values the stronger the correlation.

   c. Dimensionality Reduction:

      (1) Reduces each station's data to one dot on this graph.

      (2) Stations will be grouped together according to their proximity to each other.

      (3) The station groupings will change as the user changes the number of desired groupings.

   d. Silhouette Score:

      (1) The Silhouette Score demonstrates the uniqueness of each grouping. The higher the number the more unique that grouping.

      (2) The Silhouette Score can help users determine the 'best-fit' number of groupings by selecting a number that does not include negative scores.

IV. CONCLUSION

Qualitative generalized considerations, and data based qualitative & quantitative considerations, can be used in combination for comparing and grouping weather stations to best represent Fire Danger Rating Areas.

V. SUMMARY

Both general and data-based assessments of weather stations can be made to assist with the selection of weather stations to represent each Fire Danger Rating Area (FDRA). When selecting weather stations to include in a Special Interest Group (SIG) to represent the climatology of an FDRA, all weather stations should provide weather data representative of their specific location. Station selections should align with fire management objectives, including target communication groups as well as the causes and locations of predominant fire activity. All

weather stations being considered need to be validated, whether they've been used in the past or not.

Compile an analysis period of 10+ years with complete, high quality station data. Data quality can be assessed both within and outside of FireFamilyPlus in various ways.

Similarity of station data can be assessed both qualitatively and quantitatively by using the RAWS SIG Selector Tool. Data similarity using the RAWS SIG Selector Tool can be assessed by evaluating the ERC Climatological Graphs, Correlation Matrix, Dimensionality Reduction, or the Silhouette Scores.

REVIEW OBJECTIVE(S)

Upon completion of this lesson, participants will be able to:

1. Learn how to interpret graphical weather data for delineating fire danger rating areas.

REFERENCES

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