Tech Tip #4a

RAWS SIG Selector Tool

Background:

The RAWS SIG Selector Tool is designed to help users *determine which RAWS to group together to represent a given FDRA*. This tool shows how well the stations correlate with each other as well as provides information on the optimum number of station groupings for a given area which may inform the overall number of FDRAs or their delineations.

This tech tip will act as a user's guide for this online tool: https://gacc.nifc.gov/gbcc/predictive/rawsSelector/

Data:

- Hourly data for 10 years from the DRI-CEFA website was used to populate this tool. This data includes solar radiation and snowflag observations for the period of record. https://www.wfas.net/nfdrs2016/maps/
- This data was then processed through FireFamilyPlus 5.1 to calculate the 1300 ERC-Y value for all days in the period of record.

Layout: The tool is comprised of 4 data windows (RAWS Map, Climatology Graph, Correlation Matrix, and Silhouette Analysis).
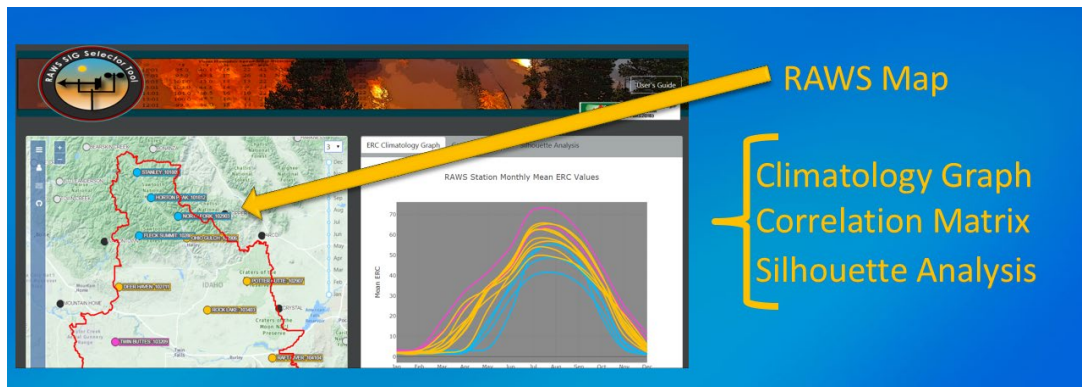
Steps to Complete an Analysis:

Step 1 – Select the stations

- Users can draw a polygon to identify their area of interest by selecting "Layers", then check the box next to "Custom Polygon Layer" (Image 1).
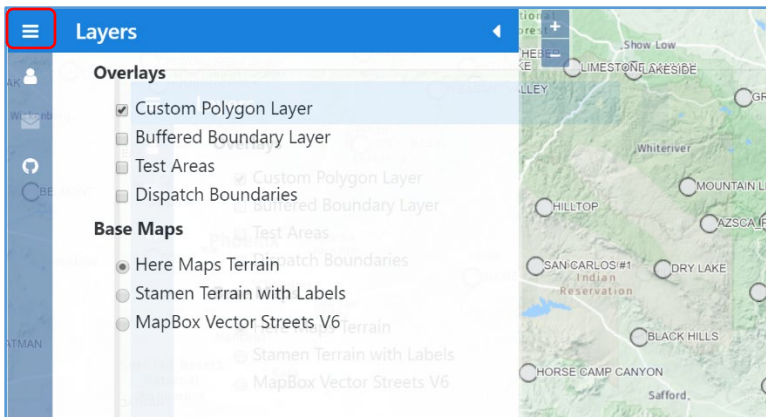
Image 1. Layer options menu located in the upper left corner of the map display.

- Users can draw a polygon around the RAWS stations they are interested in analyzing. The area of interest does not have to be limited to a single FDRA (Example 2).
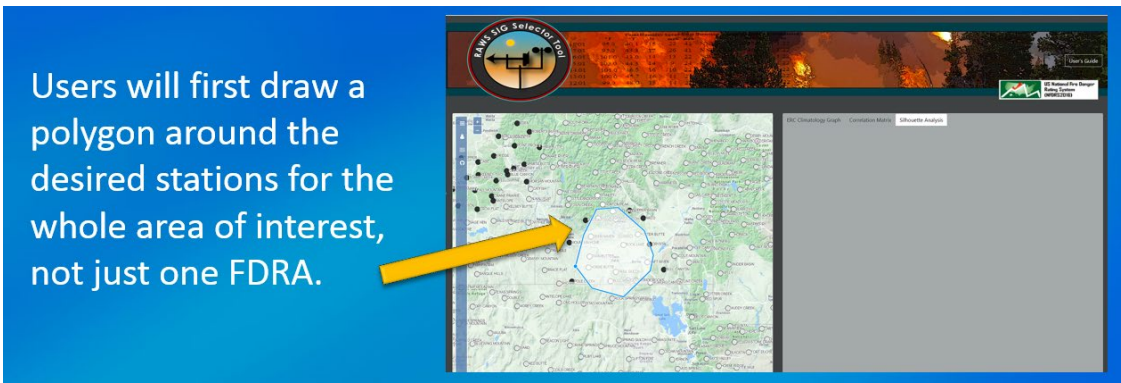

Users will first draw a polygon around the desired stations for the whole area of interest, not just one FDRA.

Image 2. User defines the size of the polygon and number of RAWS stations to be analyzed.

Step 2 – Select the desired months and number or groupings for analysis

- Users can set the range of months to include in the analysis as well as the number of station groupings. The map will color code the stations based on which group they fall into.
- As the user changes these settings the stations' colors will automatically refresh (Image 3).
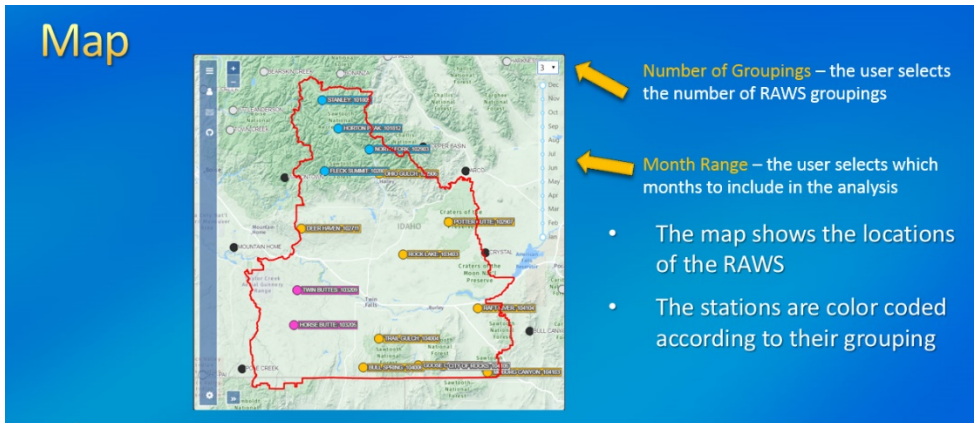
Image 3. This example shows 15 RAWS selected, the user decided on three groups. Each group is color-coded: blue (4 stations), yellow (9 stations), pink (2 stations). The months selected are from January through December.

Results Windows:

1 - ERC Climatology Graph

The climatology graph depicts the 10-year monthly average ERC values for each RAWS for the months selected. Users can hold their cursor over any ERC line in the graph and see the station name and the calculated ERC value for any month within the selected range (Image 4). As users change the month range and number of groups, the ERC Climatology graphs will automatically refresh.
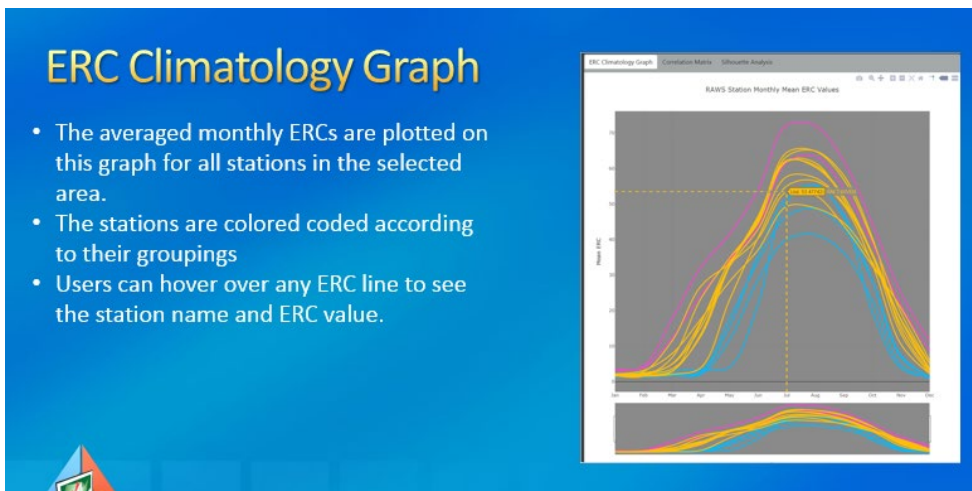

Image 4. ERC Climatology graph for the selected RAWS (15 RAWS, three groups), the months selected for analysis are January through December. The cursor shows the Raft River RAWS 10-year average ERC value for the month of July.

2- Correlation Matrix

The Correlation Matrix displays the calculated r-squared correlation values between all of the RAWS within the user-defined area for analysis. Boxes in the matrix are color

coded according to the strength of correlation. The green colors show good to strong degrees of correlation; yellow colors depict a moderate degree of correlation; orange to red colors depict a lower degree of correlation (Image 5).   As users change the month range and number of groups, the ERC Correlation Matrix display will automatically update.
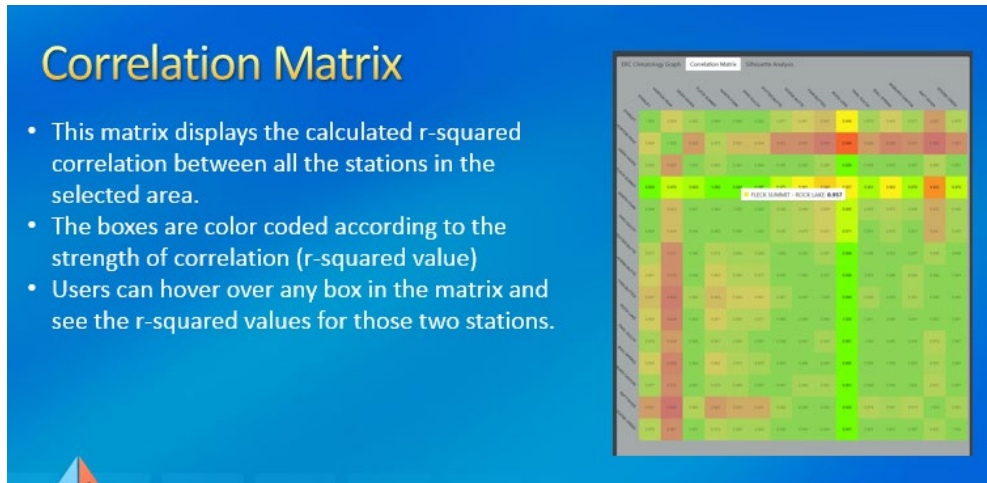

Image 5. Correlation matrix shows calculated r-squared values between all RAWS within the user-defined analysis area.

3- **Silhouette Analysis**

The silhouette value is a measure of how similar an object is to its own cluster (cohesion) compared to other clusters (separation). The silhouette ranges from −1 to +1, where a high value indicates that the object is well matched to its own cluster and poorly matched to neighboring clusters. If most objects have a high value, then the clustering configuration is appropriate. If many points have a low or negative value, then the clustering configuration may have too many or too few clusters.

As users change the month range and number of groups the Silhouette Analysis graphs will automatically update.

The Principal Components values for each station are used to determine the Silhouette Score (Image 6).

Dimensionality Reduction
• The graphical location of each dot shows how different the data from each station is in relation to the other stations.
• Stations are grouped together based on their proximity to other stations on this plot.

Silhouette Plots

- The Silhouette Score represents the value of each grouping. The higher the silhouette score the more valuable the grouping.
- If the Silhouette Scores becomes negative the user may have broken the stations into more groups than the data can support.
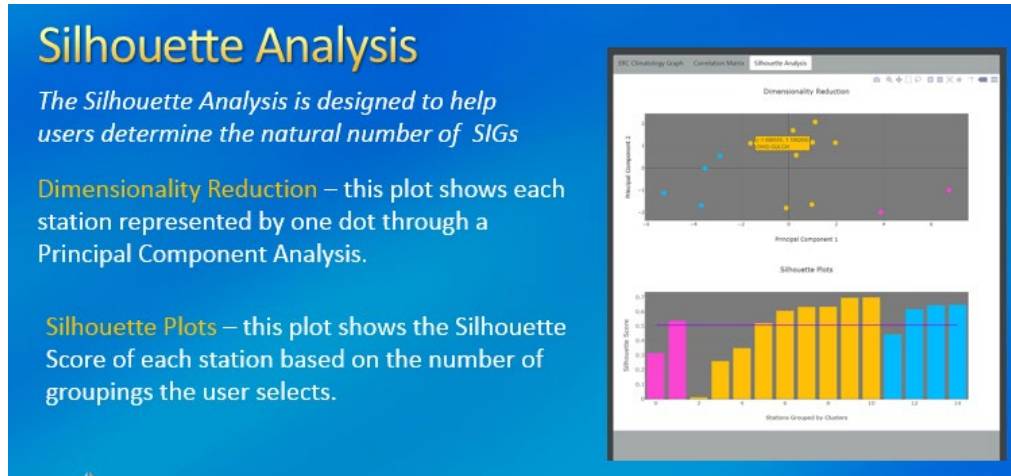

Image 6. Silhouette Analysis charts depicting Dimensionality Reduction points in the upper graph and the Silhouette Plots are depicted in the lower graph.