GLISA Climatology Update Goals

Broad Themes

- ### Redesign for the Web
  We need to redesign the station, division and state climatologies with top priority for web use and interface. Documents can be redesigned or edited for presentation in printed documents after that.

- ### Add Discussions and Comparisons of Changes
  We need to add discussions around key changes in climate and context for how these changes compare to the rest of the region. While we present summary tables of the current climate and show time-series of the changes over the period of record, we do not discuss these changes in the narrative. This information will help us create the critical contextual link between local and regional climatologies as well as discuss variability across the region.

  Reference tables or ranked lists of key parameters need to be made at each scale (state, division, station), so that the changes seen can be easily compared. These ranked lists should be publically viewable and linked to from the climatology page. Students and staff can use this as the official table for writing or automatically generating narratives about each station.

Projects:

1. Develop State Summaries

We need to develop a suite of state climatology documents. For engagement and visibility, this is a top priority. We have many of the key elements already, but the state summaries should be considered an introduction for many sectors and should include more than analysis of historical climate:

- National Climate Assessment State Maps
- Discussion of natural and developed features, vulnerabilities
- Discussion of key climate impacts already observed and projected
- Infographics of key trends in climate variables
- Plots of changes in temperature and precipitation
- Links to state climate offices

2. Expand Served Divisions to Cover All Great Lakes States:

- Expand the regional climatologies we offer to include all of the eight Great Lakes states. Initially we can expand on the current template.
- Narratives of key changes, vulnerabilities and significant elements of each area can be added as available.

- Ranked tables comparing rates of change in key variables should be linked to from the Division page.
- Update figures and overall presentation

3. Station Climatologies

- Add discussions around key changes in climate and context for how these changes compare to the rest of the region.
- Develop other climate outputs that are relevant for application
- Reference tables or ranked lists of key parameters need to be made, so that the changes seen can be easily compared at each location, region, or state.
- Update figures and overall presentation

Data Use for Applied Climate Projects

We have daily temperature and precipitation outputs from over 220 quality-controlled stations that pass our coverage criteria in the eight Great Lakes states. For efficiency, the most up-to-date version of the QCed station data will be available for students to use as they see fit. As students work from this common starting point to develop new, relevant outputs from the GLISA QCed data, we can incorporate their analyses back into the climatologies.

The daily station data outputs include maximum and minimum temperature and total precipitation. Many metrics are calculated from those basic parameters for monthly, seasonal, and annual time periods that the students could also use.

The divisional and state data has no additional quality-controls, but will be similarly available at the monthly scale.

We are also working on formatting additional data resources, such as air quality and weather-related damages that may be of interest in student projects. The format of these datasets varies greatly and we'll need to consider them separately.

Potential Student Projects:

- ***Incorporate other data sets*** to describe natural features, soil-type, species distribution, terrain, and geography near each station or within each region. For example, finding a systematic way to classify soil type and land cover and describe this in each climatology would be useful. Incorporating descriptions of vulnerable species or ecosystems would also encourage engagement from natural systems sectors. Each of these would likely require GIS analysis.
- ***We should convert current data acquisition, formatting, quality-control, and plotting programs to Python from IDL.*** This will require knowledge of both programming languages. These programs are more likely to survive and be sustained in Python than IDL. Once the programs are converted, however, GLISA staff will have less expertise to share on programming development. As a first step, writing additional data processing routines, should as freeze-thaw, degree-day, or

similar analyses in Python will demonstrate how Python can read and plot the available data before we decide to switch the core programs to a new script language.

- *Writing the state, divisional, and local narratives* can be done with the guidance of GLISA staff. We can provide an example to the students to get them started.
- *Acquire and format additional climate datasets* that can inform the climatological summaries. We have many such datasets on our wish list.
- *Design and refine web interface and content presentation* for the three categories, state, divisional, and local. We have a basic interface for selecting states and divisions already designed.