Name _____

Phenological trends and climate change in Minnesota

Pre-Homework

Go to the MN Phenological Network website (https://mnpn.usanpn.org/home) and read the short introductory and history statements ("Home" and "About" pages), plus check out the "Meet the species" page and peruse the superstars.

1. What is phenology?

2. When did the MN Phenological Network get its start?

3. Where does the data in the data base come from?

Check out the "Meet the species" page and peruse Minnesota's seven superstar species. "Read more" about several of these species.

4. The page for each species lists information about phenophases that can be observed. What are phenophases?

5. What are two of the seven superstar species (a) and what phenophases (e.g. falling leaves or ripe fruit) are associated with these species (b and c)?

Species:	1a. _____	2a. _____
Phenophase:	1b. _____	2b. _____
	1c. _____	2c. _____

Open the provided data sheet ("MNPN master data sheet 2018") in Excel or in Google sheets (G Sheets). **Look** at the data and see if you can determine how it is initially presented (e.g. what is listed earlier in the spreadsheet compared to later). Check out what information is in each column of data. Additionally, **note** how many different entries (rows) are in the spreadsheet. It would take a long time to simply scroll through and find information you want, so you will have to sort the data into a form that will be more useful.

Select *all* the data ("Control/Command" + "A"). If you are using Excel, choose the "**Sort and Filter**" tab in the "Data" tool bar. Click on the "Custom sort" dropdown option. If you are using G Sheets, choose the "Data" tab, then "Sort Range," and "Data has header." How might we want to group the data so we can find information about a particular group of organisms?

Sort first by Lifeform, then "Add Level" or "Add another sort column" and sort by Group, then by Species (scientific name), then by Species (common name; there may be multiple organisms with the same Latin species name, but different genus), then by event. **Note**: as you add filter levels, be sure to add them sequentially (to the bottom) or it will drastically change how the data is sorted.

Save your sorted Excel file or Google Sheet to your drive as we will use this data in class.

6. Locate three different species (a), each species from a different "group" (e.g. woody plant, amphibian, bird). What are two possible phenophases ("events") for each organism (b and c)?

   Three Species (common name is fine):
   1a. _____ 2a. _____ 3a. _____

   Two Event/Phenophase for each species:
   1b. _____ 2b. _____ 3b. _____

   1c. _____ 2c. _____ 3c. _____

Open the DNR Minnesota Climate Trends website (https://arcgis.dnr.state.mn.us/ewr/climatetrends/). This tool provides historical observations from specific Minnesota locations.

7. **Find** the average temperature in Duluth in January for the period of 2001-2020. **Enter** Counties as the geographical unit, select St. Louis County, select the climate variable of average temperature for the month of January, and the appropriate date range. **Click** plot data. The data will appear in a plot and a table below the selection area.

   Was there ever a year when the average January temperature did not get above 0^{o}F? (Brrr!) ___
   If yes, which year(s)? _____ (Note: Normally in the sciences we would work in ^{o}C, but the DNR site does not give that option.)

   What was the highest average temperature in January during this 19 y^{e}ar period? _____

   What was the lowest average temperature in January during this 19 year period? _____

Spreadsheet shortcuts
It is easier to handle data in Excel and Google Sheets, if you use a few simple shortcuts.
Control A or Command A= highlight the entire data set (useful for the initial sort activity)
Control C or Command C = copy
Control V or Command V = paste
Control F or Command F = find

Note: If you have Excel on your laptop, you can bring it to use in class. You will want to open the Excel program; it won't work well in the browser format.

The data are used with permission from the Minnesota Phenology Network (MNPH 2020) and MN DNR (2020).