RWSC 2331 Spring 2022 Thermal Ecology Project Instructions

Introduction: Over the course of the past three weeks, we have been discussing in lab the concepts of pyric-herbivory and patch burning as means for managing grasslands. Patch-burning is an ecological process that influences many aspects of the ecosystems that it occurs in, including forage availability, preventing woody encroachment, and promoting nutrient cycling. In this project, we sought to understand how patch-burning may influence thermal options for organisms in grasslands. Thermal microclimates are critical for maintaining energy balances during periods of extreme heat or extreme cold. Through your data collection efforts, we will explore the relationship between micro-habitat vegetation structure, vegetation community type, burning history, and how all these metrics can structure thermal conditions for organisms in grasslands.

Instructions:

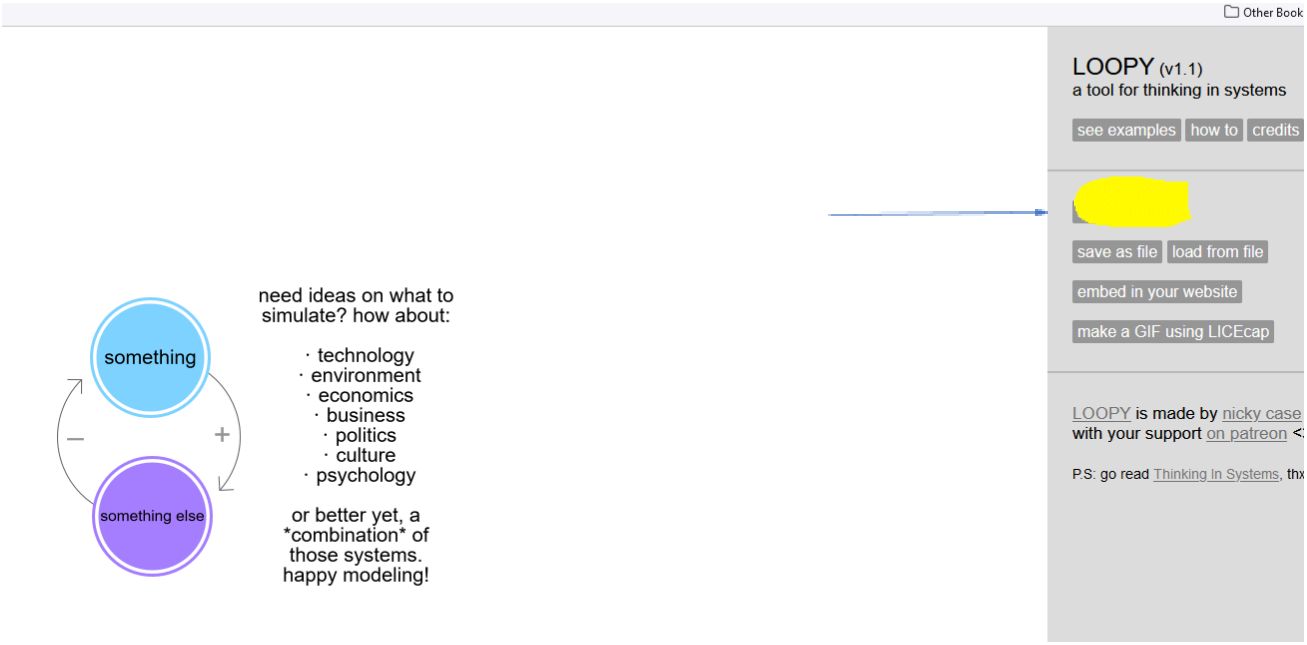
- Within the "Lab Assignments" section of our course's blackboard area, navigate to the "Final Lab Project – Thermal Ecology" folder.
- Within that folder, you will find two files to complete this assignment: 1) a PowerPoint containing figures that summarize the thermal patterns that we measured over the course of three full days and 2) an Excel spreadsheet with all of your vegetation data and two thermal variables (Temperature max and Temperature variance [i.e., how variable that location was for temperature]).
- Once you download the Excel spreadsheet, you will need to conduct a correlation analysis between the vegetation metrics and the temperature max variable to explore how vegetation influenced the maximum temperature experienced at each iButton station.
    - To do your correlation analysis, you will need enable the DataAnalysis Pack in Excel.
        - Once Excel is open, go to: File -> Options -> Add-ins -> Select the Analysis Toolpack in the menu -> at the bottom, where it says Manage: Excel Add-ins, click on "Go" -> select the checkmark by the Analysis ToolPack -> hit "Ok".
        - These steps should enable the Analysis Toolpack in your Excel.

    - Navigate to the Data Analysis options under the "Data" tab in Excel.
        - On the far right of that tab should be Data Analysis.
    - Click Data Analysis and select "Correlation"
    - Highlight the appropriate columns to correlate all of your vegetation metrics to temperature maximum (hint: remember to select "Labels in First Row" if you selected the column title as well.
- Once you have your Correlation analysis results, provide a list in Microsoft Word of the relationships that you determined were important based on correlation coefficient values of either ≤-.50 or ≥0.5. Tell me with each relationship how that vegetation metric influence the patterns of maximum temperature (i.e., positive, negative, strong, weak relationship).
- Within the Word Document, provide a copy of the Correlation output table so that I can see what the results of your correlation analysis were.
- Once you have described your important relationships, we will build a visual mechanistic model through the Loopy Algorithm.
- Go to Loopy: https://ncase.me/loopy/
- Navigate down the page where you can create your own model:



- Start with a fresh screen and begin to build your model.
- Your model should reflect the significant positive and negative interactions that exist between vegetation metrics and temperature, as well as how vegetation metrics influence the other vegetation metrics (i.e., what is the relationship with bare ground and vegetation height for instance).
- Be sure to include all possible combinations that were significant based on your correlation analysis so that they are represented in your model.

- Once you have completed your mechanistic model, save it as a link and include the link in your Word document that you will submit to me via Blackboard.
- Also include an image of your model and put this in the Word document (you can use the "Print Screen" key on your keyboard).



- **Finally, within the Word document you will submit to me, provide a written paragraph answering the following questions:**
- **Does management influence the thermal options for organisms? Explain why you answered the first question the way you did.**
- **Based on the patterns we saw from this experiment, how do you think patch-burning influences the thermal options for organisms?**
- **Why do you think the patterns we saw from this experiment are important when it comes to wildlife regulating their temperatures?**
- **Finally, do you think that habitat management, and in particular patch-burning, is an important tool for helping wildlife cope with increasing temperatures under climate change scenarios? Why?**