Leafhopper Migration

https://aeroecology.shinyapps.io/Birds_Bugs_and_Phenology/

Setting up the model for Lesson 1 Extend

- **Show/hide Data**
  - Have students toggle on the "Show State Abbreviations" button.
  - They can ignore the temperature data for now, so they should leave the temperature colors and numbers toggled off (this is the default setting already).
- **Select states for first arrival plot**
  - This shows students what day of the year leafhoppers were found in a state for every year there is data available. They can select more than one from the list.
- **Display data for individual states or means**
  - "Show States" is the default and most straightforward graph to interpret. It will create a line for arrival date (see previous section) for each state selected.
  - "Show Means" will show the average day leafhoppers were found across all the states students have selected. It is a little less obvious to interpret but will show overall trends of arrival over time across the entire range students have selected.
- **Recommended data ranges**

Change in one state over time			Change across states over time	
States w/ most data	Year range		Years w/ most data	# of states
WI	1951-2012		1988	14
IL	1952-2012		1991-1992	14
MN	1952-2011		1990	13
MD	1955-2012		1954	12
PA	1955-2012		1985	9
MI	1953-2004		2010-2011	6
OH	1952-1997			
OK	1952-1997			
MO	1952-1995			

Troubleshooting tips for using the model

- If the model is refreshing slowly for students, have them work in groups of 2-3 per device to reduce the strain on the program.
- After moving a slider, wait until the map(s) update before making other changes to the variables.
- Avoid the play button (small triangle at the right end of the Day of Year sliders) if you have a large class and/or the model is refreshing slowly.