4.4: Computer Model for Seasons and Disturbances Worksheet

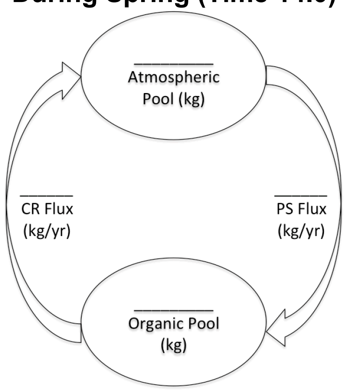
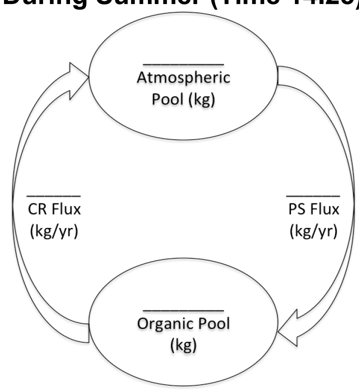
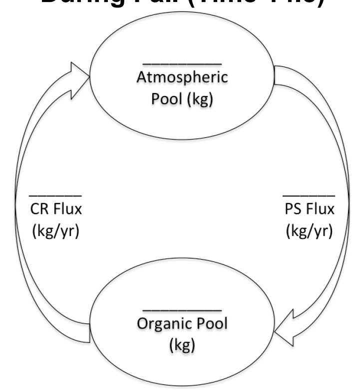
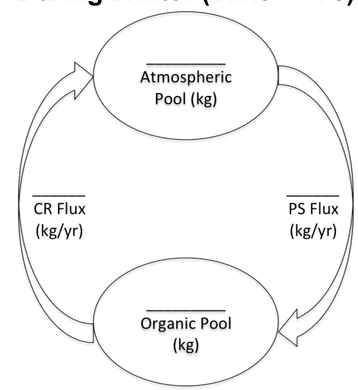
See the directions in *4.4: Computer Model for Seasons and Disturbances Handout* to complete this worksheet.

A. Investigate how seasons affect pools and fluxes

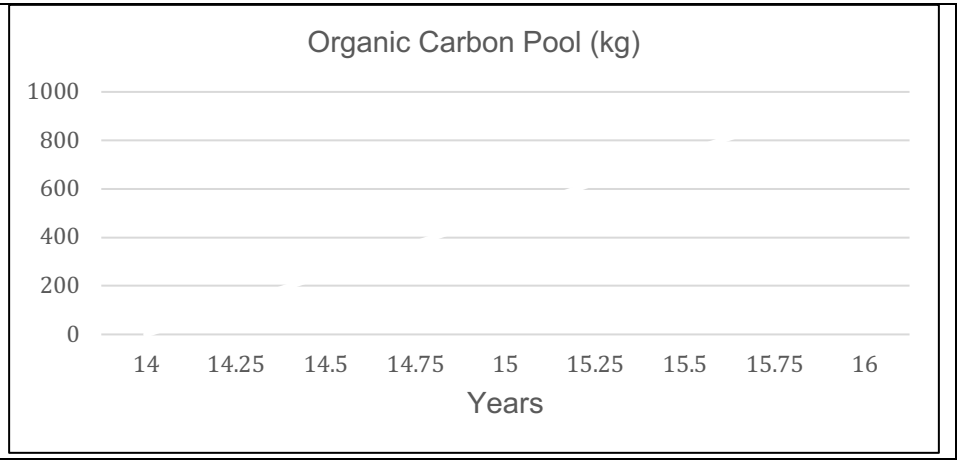
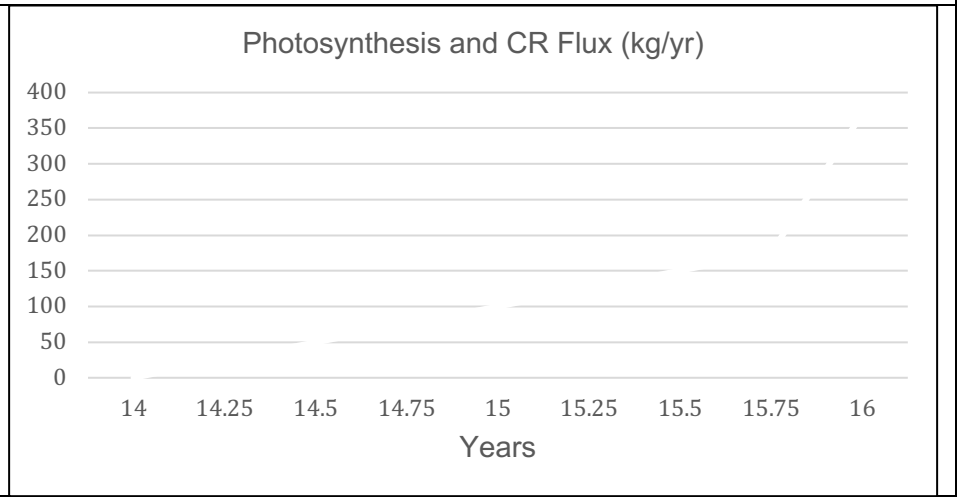
1. *Model 3 without seasonal variation.* Follow the directions in Steps 1-6 of the handout to complete the table below.

	Year 14.0	Year 16.0
Photosynthesis flux		
Cellular respiration flux		
Organic matter pool		

2. *Model 3 with seasonal variation*. Use results from the three-turtle model (Handout questions 7 to 8) to report pool sizes, flux rates, and net fluxes (by filling in blanks) in the table below and then think about explanations for the seasonal patterns that you find.

During Spring (Time 14.0)	**During Summer (Time 14.25)**	**During Fall (Time 14.5)**	**During Winter (Time 14.75)**
			
How much carbon moves into or from the organic carbon pool during the spring? _____kg (Hint: Flux rate is in units of kg/yr. What would the movement be for 1 season?)	How much carbon moves into or from the organic carbon pool during the summer? _____kg	How much carbon moves into or from the organic carbon pool during the fall? _____kg (Hint: Use negative numbers to show when the movement out of the pool is larger than the movement in.)	How much carbon moves into or from the organic carbon pool during the winter? _____kg
During spring, the size of the organic carbon pool: ___increases ___decreases Explain what you think is happening that causes the organic pool to change size this way over the spring:	During summer, the size of the organic carbon pool: ___increases ___decreases Explain what you think is happening that causes the organic pool to change size this way over the summer:	During fall, the size of the organic carbon pool: ___increases ___decreases Explain what you think is happening that causes the organic pool to change size this way over the fall:	During winter, the size of the organic carbon pool: ___increases ___decreases Explain what you think is happening that causes the organic pool to change size this way over the winter:

3. Follow the directions in Steps 9-12 to complete the graphs below

Use this graph to record the size of the Organic Carbon Pool at the beginning of each season. Connect your dots to make one line.	
Use this graph to record the Photosynthesis and Cellular Respiration Fluxes during each season. Connect the dots to make two lines: • The photosynthesis line will go sharply up and down each year • The CR line will vary less each year	

B. Patterns in how seasons affect pools and fluxes

1. Compare your data for data for the same model without seasons (Step 7) and with seasons (Step 11). Circle your choices for the questions below:
   - Which variable is affected most by seasons?
     Organic Matter Pool *Photosynthesis Flux* *Cellular Respiration Flux*
   - What has the largest effect on the size of the Organic Matter Pool during Years 14-16?
     Seasons *Photosynthesis Limit*

2. Why does the organic carbon pool size go down during the winter? (Think about the balance of fluxes during the winter.)

C. Investigate how disturbances affect pools and fluxes

4. Report the results of your investigation of press disturbances below.
   a. What settings did you investigate?

   b. What patterns did you notice in how press disturbances affect ecosystems?

5. Report the results of your investigation of pulse disturbances below.

a. What settings did you investigate?

b. What patterns did you notice in how pulse disturbances affect ecosystems?

D. Types of disturbances in real ecosystems

6. List some of your ideas about different types of disturbances that affect the ecosystems around you, including natural ecosystems and ecosystems such as farms and gardens that are managed by humans.

a. Press disturbances:

b. Pulse disturbances: