Manipulate and Create a Balanced Sonoran Desert Ecosystem:

1. Go to "My Documents" and open the "Sonoran Desert" folder. Click on the simulation file to open it.

2. Notice that the screen displays 5 blue species population slider tools that enable the user to determine how many individuals to use in any particular simulation run. Sliding the pink knob sets the simulation to that particular number.

3. Once these species numbers are pre-selected, the "Setup" button activates the simulation screen to show those populations.

4. The "normal speed" slider should be **set to no more than a third** of the distance to the right.

5. Click on "Start/Stop" to initiate the simulation.

6. Graphs are plotted with the data keyed to the 3 boxes in the middle of the screen and track the changes in the population numbers as the species interact with one another. This community is in balance if all 5 species remain extant. If a species population falls to zero, the species' populations are not balanced with one another.

7. Follow the directions below in order to develop an understanding of how each species is interdependent on the others to maintain the balance required for coexistence.

Exploring the Simulation's Species' Relationships:

1. Set your ironwood slider **to 3** and your antelope ground squirrel (rat) slider **to 40**. The other species should remain at zero. Hit **OK** and then **Start** to begin the simulation. Study the bottom plot showing the population changes for the squirrel. What is the maximum population density supported?_____ Explain why the densities between the ironwood trees and squirrels show this pattern of change.

2. Change the ironwood density **to 8** while keeping the squirrel density at **40.** What is the maximum _____ and minimum_____ density of the squirrels now? How does this change in tree density affect the squirrel populations? Explain.

3. Now, **add 2 hawks** to the simulation without changing the other settings. What is the maximum _____ and minimum _____ squirrel population density? What happens to the squirrel population as the simulation continues to run? Explain.

4. How has the relationship between the population densities of ironwood pods to squirrels been altered? Explain.

5. Next, **add 5 saguaro** (cacti) to the simulation and **remove all of the hawks**. Is the saguaro a food resource for these squirrels?_____ What is the effect to the squirrel population as compared to their density in question 2? Explain.

6. In this step, **add 8 doves** to the simulation. What is the affect to the squirrel population density now? Explain why.

7. What relationship do the **squirrels** have with the doves? Explain.

8. What relationship do the **doves** have with the squirrels? Is it the same relationship as asked in question 7? Explain.

9. **Add** 2 hawks back into the simulation. What is the resulting change to both the squirrel and dove populations?

10. How do the population densities between these three species in question 9 affect one another?

11. Summarize how a balance is maintained through the interaction of these 5 species.

12. Identify 3 weaknesses with this simulation and explain each.