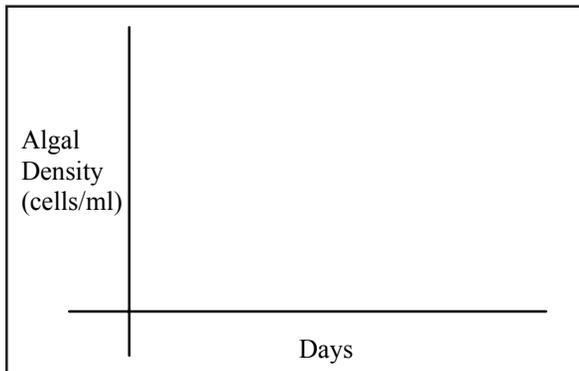


MODELING WATERSHED MANAGEMENT SCENARIO I

—Population Growth in Tuscaloosa

Name _____ Date _____

1. Tuscaloosa expects significant population growth in the next decade. You know that more people mean more sewage, and that more sewage means more phosphorus discharged into Lake Tuscaloosa. What do you predict will happen to **Algal Density** in the lake as the population of Tuscaloosa increases? Why? Explain.
2. First use the STELLA model to run a simulation using the initial Watershed Factor values. To run the model, press the “Run” button. Then record the approximate Algal Density values as they appear on your graph. Draw a sketch of what happens to **Algal Density** over time. “Day 0” refers to the day in the spring when the ice covering Lake Tuscaloosa melts and algae living in the lake can begin photosynthesizing and multiplying in earnest.



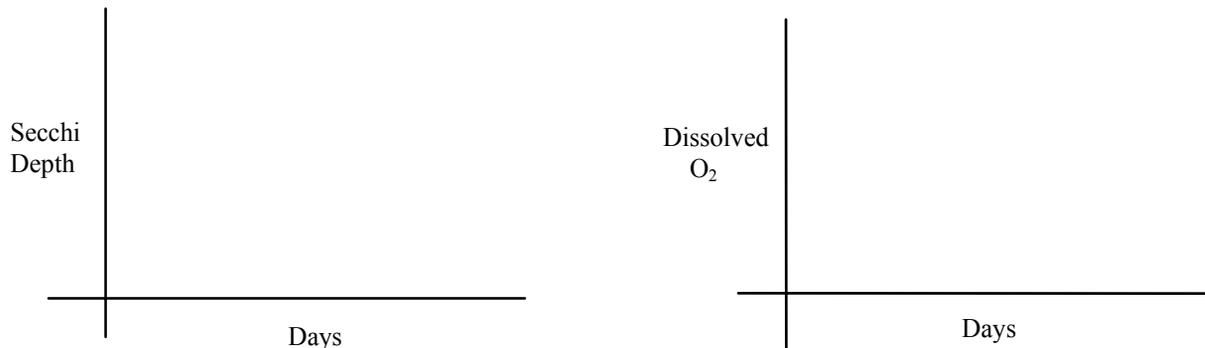
Day	Algal Density (cells/mL)
0	
30	
60	
90	
120	

3. Run the model three more times, using population values of 40,000, 60,000, and 100,000. To change the population value, either slide the “population served” control bar to the appropriate number or click on the slide bar’s number window, type in a new value, and press “Enter”. For each population value, record the day on which the Algal Density reaches 50 cells/mL.
4. As **Algal Density** increases, what changes do you think you might observe in Lake Tuscaloosa’s appearance? Why?

Population	Day Algal Density Reaches 50 Cells/mL
10,000	
40,000	
70,000	
100,000	

SECTION 2. PROTOCOLS

5. Set the human **Population** to 70,000 and run the model again. As **Algal Density** increases, what happens to **Secchi Depth** and **Dissolved Oxygen on Bottom**? Draw a sketch of each and label the minimum and maximum values with units.



6. As a lake becomes less clear, the Secchi Depth decreases. Recall that a Secchi Depth of less than 2 m indicates a eutrophic lake, while a Secchi Depth of more than 5 m indicates an oligotrophic lake (between 2 m and 5 m Secchi Depths, lakes are known as “mesotrophic”). Based on the Secchi Depth line, as the population in Tuscville increases, does the lake become more or less eutrophic?

7. What could be done to the treatment plant to offset the increased level of phosphorus from more sewage? Explain.

