Name _____ Class _____ Date _____

Investigating Terrestrial Succession

An ecology class studied succession from a meadow through a shrub area to a mixed woodlot. They measured temperature, relative humidity, light intensity, evaporation rate, and wind velocity at representative sites in each vegetational area. The results are shown in Table 1. The covers of the dominant plant species were calculated. Soil analysis included measurement of soil acidity, estimates of soil litter, and calculations of the number of earthworms per square meter. Spider species were counted and collected in each area and observations of different bird species were recorded. The purpose of the field trip was to observe differences in three stages of the terrestrial succession and to investigate how the interactions of physical factors, plant species, and animals in each habitat created three different environments.

Table 1

		Meadow	Woodlot Margin	Mixed Woodlot
Temperature	**maximum**	30°C	27°C	24°C
	minimum	10°C	12°C	15°C
Relative Humidity		70%	75%	90%
Evaporation Rate		50 mL/day	42 mL/day	15 mL/day
Wind Velocity		10 mph	5 mph	0 mph
Light (percentage of open field)		100%	30%	4%
Soil Litter		250 g/m^2	370 g/m^2	700 g/m^2
Soil pH		6.9	6.8	6.0 (coniferous) 6.6 (deciduous)
Earthworms		100/m^2	130/m^2	25/m^2 (coniferous) 220/m^2 (deciduous)
Spiders		8 web builders 10 nonweb builders	18 web builders 26 nonweb builders	62 web builders 110 nonweb builders
Bird Species		14	28	32
Plant Species and Cover		grass: 76–100% clover: 51–75% goldenrod: 6–25% dandelion: 6–25%	grass: 76–100% blackberry: 26–51% hawthorn: 26–51% goldenrod: 6–25% oak seedling: 6–25% cherry: 6–25%	grass: 26–50% oak: 26–50% white pine: 26–50% fern: 6–25% maple: 51–75%

Questions

1. Examine the data for the physical variables in each stage of the succession. Which environment has the greatest range of temperature, of light, and of evaporation rate? Why? Compare the tolerance of animal species living in the meadow and in the forest.

2. Account for the changes in wind speed and relative humidity along the line.

3. Which environment seems most suitable for earthworm populations? Which factor do you feel has the greatest influence in determining where the earthworms live: light, evaporation rate, or temperature? Justify your decision. Explain from the data provided on soil acidity why you might believe earthworms are sensitive to pH changes. Which type of soil can an earthworm not tolerate: acidic or basic? Why is the coniferous area acidic?

4. Where would you expect to find the thickest soil litter? In general, what effect will a thick litter layer have on soil moisture, soil temperature, and the number of soil animals?

5. In which stage of the succession would you expect to find the shade-tolerant mosses and ferns? What three physical variables provided in your data would encourage their presence in one particular area?

6. Why would you expect to find a greater diversity of birds in the forest? Name three bird species that you would find only in a meadow and three that you would find only in a woodlot. Give reasons for your selections in each case.

7. How do the vegetation type and diversity seem to influence the distribution of spider species? Is there any relationship between the number of niches in a habitat and the diversity of species found in that habitat? Explain your answer using the information on plant species in each area and the diversity of birds and insects.