Name_____ Course/Section_____

Date_____ Professor/TA_____

Activity 54.1 What do you need to consider when analyzing communities of organisms?

Understanding problems in community ecology most often requires the integration of a number of ecological principles.

For questions 1 to 5, analyze the situations described. Then explain which of the following ecological principles could be active in each particular situation.

Ecological principles:

coevolution	character displacement
realized niche	top–down vs. bottom–up controls
fundamental niche	trophic structure or trophic levels
tolerance	keystone species
competitive exclusion	competition
resource partitioning	disturbance

1. A small clan of hyenas killed an antelope. While they were feeding on the carcass, two female lions approached, growled at the hyenas, and chased them away from the carcass.

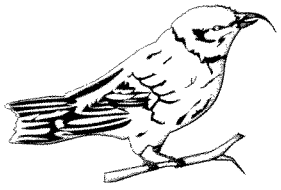
2. Two species of closely related swallows live in England. The black swallow lives in coniferous forests, and the yellow swallow lives in deciduous forests. In Ireland, where the black swallow has never been introduced, only the yellow swallow is present and it lives in both coniferous and deciduous forests.

3. In a woodland community, three species of rodents coexist: voles, field mice, and shrews. All three species eat seeds and nuts. Each species has a preference for seeds of the most appropriate sizes for their teeth and mouths; however, all three species compete for the same kinds of nuts. An owl species also lives in this woodland community. The owl preys on all three rodent species. During one particular year, a parasite that causes pneumonia in birds is introduced into the community. This parasite dramatically reduces the owl population, which remains low for several years as a result. Following the initial reduction in the owl population, there is a dramatic increase in the population of field mice and a dramatic decrease in the populations of both voles and shrews.

Name_____ Course/Section_____

4. In 1962, five mute swans escaped from captivity and began a breeding population in Chesapeake Bay. Today, there are over 4,000 mute swans living in the bay. Each year they eat approximately 10.5 million pounds of aquatic grasses. These grasses provide habitat for waterfowl and crustaceans, improve water quality, decrease erosion, and increase dissolved oxygen concentrations in the bay. The swans are also aggressively territorial, and have been known to trample nests of other birds (e.g., least terns and black skimmers) and drive native birds such as tundra swans and black ducks from feeding and roosting areas.

5. Known as the "Hawaiian woodpecker," the ʻakiapolaʻau (aki-a-pul-a-ow) is found only in montane mesic old-growth koa/ohi' forests, and only on the Big Island (Hawaii). It has a distinctive beak that is like a multipie-use tool.

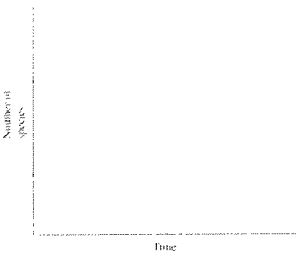


The short straight lower mandible is used to peck holes in the wood and the long curved upper mandible is used to probe for insects and larvae. Males have larger beaks than females and feed on the trunks of trees. Females feed higher on branches and twigs. ʻAkiapolaʻau are thought to have the lowest reproduction rate for a small bird—only one chick per year, which is cared for by the parents for 6 months or more. The decline in their numbers appears to correspond with the introduction of rats, cats, and logging on the island.

6. A researcher collected data on an experiment she conducted on two desert islands. The islands were of similar size, climate, and species composition and richness, and were the same distance from the mainland. Originally, the same species of snake was present on both islands (A and B). In her experiment, the researcher removed the snake species from island A. For comparison, the snake species was NOT removed from island B. She then recorded the number of animal species on each island over a period of 24 months. Her data are presented in the table below.

a. Graph the data.

	# Species	
Time (months)	**A**	**B**
1	36	36
2	38	37
3	35	34
4	33	35
5	31	36
6	32	38
7	29	40
8	29	36
9	26	38
10	24	39
11	20	36
12	18	37
13	18	35
14	13	34
15	11	36
16	10	38
17	9	40
18	10	38
19	10	36
20	8	38
21	9	39
22	10	36
23	9	37
24	8	35



b. Construct a hypothesis that explains the difference between the numbers of species present on island A versus island B over the 24-month period.

c. Propose an experimental design to test your hypothesis. Explain the reasoning behind your design.

d. What would you expect to find as a result of your experiment? Describe your expected results and draw them on the graph below.