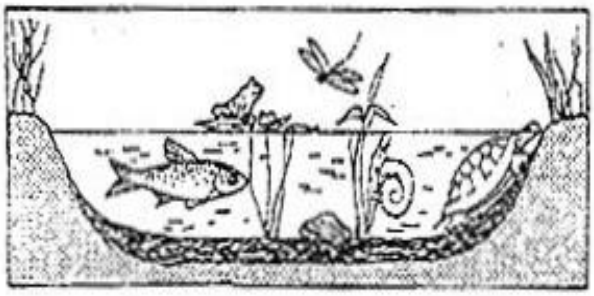
POPULATION ECOLOGY WORKSHEET

Succession, a series of environmental changes a, occurs in all ecosystems. The stages that any ecosystem passes through are predictable. In this activity, you will place the stages of succession of two ecosystems into sequence. You will also describe changes in an ecosystem and make predictions about changes that will take place from one stage of succession to another.

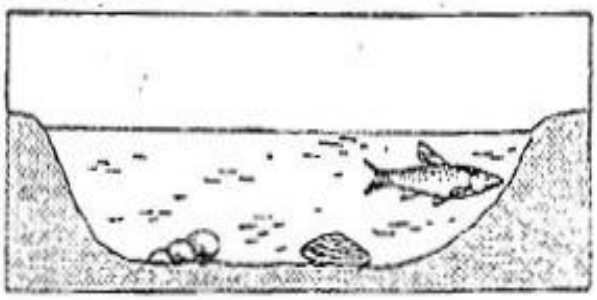
The evolution of a body of water from a lake to a marsh can last for thousands of years. The process cannot be observed directly. Instead, a method can be used to find the links of stages and then to put them together to develop a complete story.

The water level of Lake Michigan was once 18 meters higher than it is today. As the water level fell, land was exposed. Many small lakes or ponds were left behind where there were depressions in the land. Below are illustrations and descriptions of four ponds as they exist today. Use the illustrations and descriptions to answer the questions about the ponds.

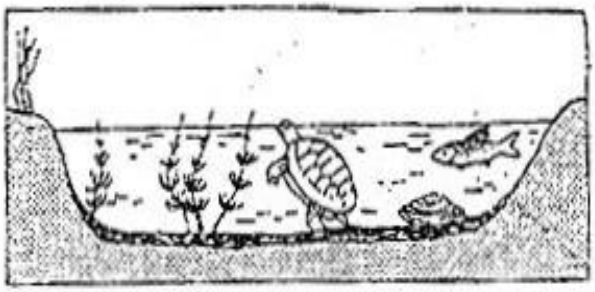
Pond A



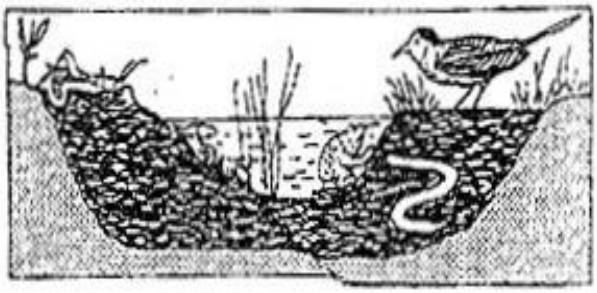
Pond B



Pond C



Pond D



Pond A:

Cattails, bulrushes, and water lilies grow in the pond. These plants have their roots in the bottom of the pond, but they can reach above the surface of the water. This pond is an ideal habitat for the animals that must climb to the surface for oxygen. Aquatic insect larvae are abundant. They serve as food for larger insects, which in turn are food for crayfish, frogs, salamanders, and turtles.

Pond B:

Plankton growth is rich enough to support animals that entered when the pond was connected to the lake. Fish make nests on the sandy bottom. Mussels crawl over the bottom.

Pond C:

Decayed bodies of plants and animals form a layer of humus over the bottom of the pond. Chara, branching green algae, covers the humus. Fish that build nests on the bare bottom have been replaced by those that lay their eggs on the Chara.

Pond D:

The pond is so filled with vegetation that there are no longer any large areas of open water. Instead, the pond is filled with grasses. The water dries up during the summer months.

Questions:

1) Write the letters of the ponds in order from the youngest, to the oldest.

2) Black bass and bluegill make their nests on sandy bottoms. In which pond would you find them?

3) What will happen to the black bass and blue gill as the floor of the ponds fills with organic debris?

4) Golden shiner and mud minnows lay their eggs on Chara (green algae). In which pond would you find them?

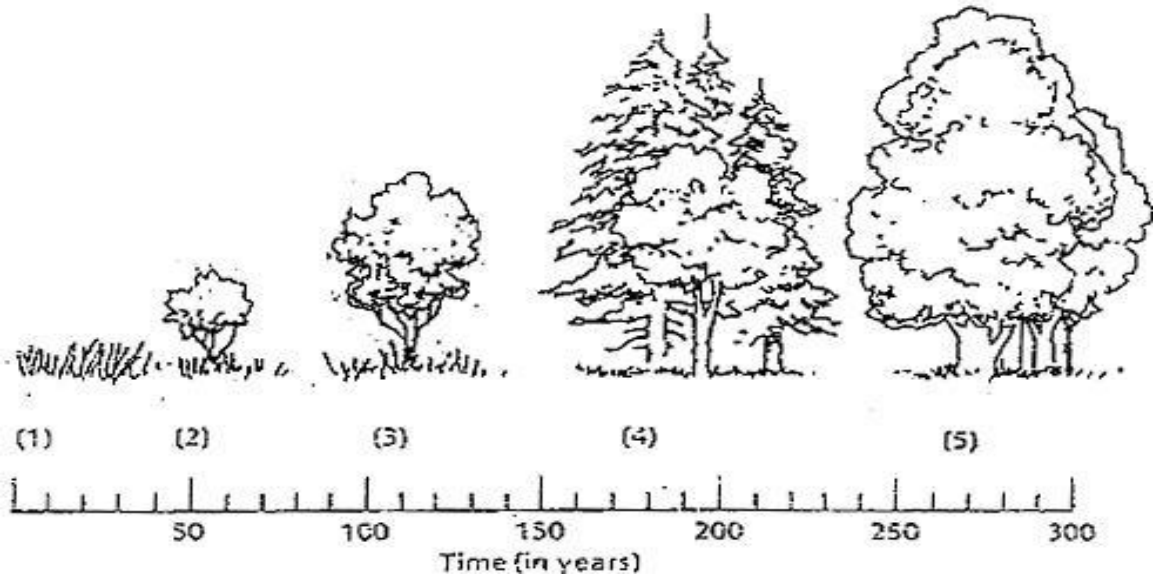
5) Some amphibians and crayfish can withstand periods of dryness by burying themselves in mud. In which pond(s) would they survive?

6) Dragonfly nymphs spend their early stages clinging to submerged plants. Then, they climb to the surface, shed their skins, and fly away as dragonflies. Which pond is best suited for dragonflies?

7) In which pond will gill breathing snails be replaced by lung breathing snails that climb to the surface to breathe?

8) Some mussels require a sandy bottom in order to maintain an upright position. In which pond will they die out?

9) The climax community in the area of Arkansas is an oak-hickory forest. After the ponds are filled in, the area will undergo another series of stages of succession. This is illustrated below. Briefly explain what is happening in the diagram.



1.

2.

3.

4.

5.

10) For each of the words below, describe the <u>difference</u> between the two terms.

A) Mutualism/parasitism

B) Parasitism/predator-prey

C) Interspecific Competition/Intraspecific competition

D) Exponential growth/logistic growth

11) Write the vocabulary term next to the definition

A) A close relationship between two or more individuals of different species that live in close contact with one another.

B) Type of symbiosis in which one individual benefits while the other is harmed.

C) Occurs when one organism captures and eats another organism.

D) Type of symbiosis in which both individuals benefit.

E) Occurs when two organisms fight for the same limited organisms.

F) Type of symbiosis in which one individual benefits while the other individual neither benefits nor is harmed.

12) Next to each situation described below, write whether it is an example of interspecific competition or intraspecific competition.

A) Two squirrels race up a tree to reach a hidden pile of nuts.

B) A hyena chases off a vulture to feast on an antelope carcass.

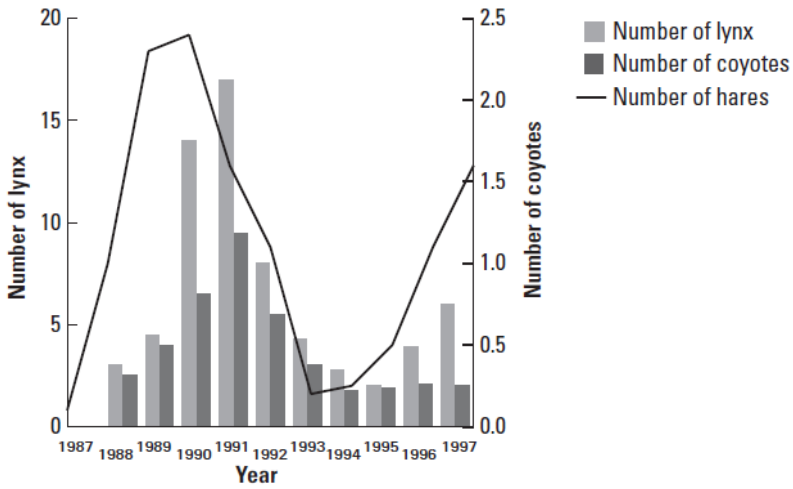
C) Different species of shrubs and grasses on the forest floor compete for sunlight.

D) Brown bears hunting for fish on a river's edge fight over space.

E) Make big horn sheep butt heads violently in competition for mates.

13) Combination graphs show two or more sets of data on the same graph. Scientists have been tracking the population numbers of snowshoe hares, lynx, and coyotes in northern Canada over many years. In this region, lynx and coyote are the primary predators of the snowshoe hare. The graph below shows the population numbers for all 3 animals over a 10 year period.

GRAPH 1. LYNX, COYOTE, AND HARE POPULATIONS



A) As the population of snowshoe hares increases, what happens to the coyote and lynx populations?

B) Scientists have observed that the population of hares follows a pattern that occurs in an eight-year cycle. Over this time period, the population peaks and then crashes. Predict how snowshoe hare, lynx and coyote populations will change by extending the graph for the years 1998-2003. Extend the graph shown above.

Answer in complete sentences:

14) In competitive exclusion, who is competing and who gets excluded?

15) What does equivalent mean in math? How does that meaning relate to ecological equivalents?

Matching: Match each of the following terms to the correct statement. These are words that we may not have learned in class, but use your critical thinking and process of elimination to figure out the matching answers.

16) _____ Obligatory mutualism
17) _____ Community
18) _____ Realized Niche
19) _____ Symbiosis
20) _____ Fundamental Niche
21) _____ Facultative Mutualism
22) _____ Commensalism
23) _____ Interspecific Competition

A) In interaction between two species that is helpful, but not essential.
B) Close associations between two species during part or all of their life cycle
C) The niche that would occur in the absence of competition
D) The populations of all species in a given habitat
E) When one species wins or loses with respect to some resource
F) An interaction that helps one species but does not affect the second species
G) A niche that is the result of constraining factors
H) Each species must have access to the other in order to complete a life cycle

Choice: Choose the most appropriate term for each evolution adaptation described.

A) Mimicry B) Camouflage C) Chemical defense D) Moment-of-truth defenses

2) _____ A blending of body form, color, or behavior to the environment
3) _____ Leaves that contain dangerous or hard-to-digest repellents
4) _____ protection by pretending to be a dangerous organism.
5) _____ Predators learn to avoid oragnims that use this defense
6) _____ The use of one final trick to repel and attacker.

Matching: Match each for the following terms to the appropriate statement.

7) _____ Resource partitioning
8) _____ Interference competition
9) _____ Competitive exclusion
10) _____ Co evolution
11) _____ Exploitative competition
12) _____ Predators

A) Species have equal access to a resource, but one is better at using it
B) A subdividing of resources that allows two species to coexist.
C) Two species change over time due to close ecological interactions
D) Consumers that obtain energy and nutrients from living organisms.
E) One species restricts access of another species to a resource
F) When populations of two species coexist, the growth rate of both is suppressed