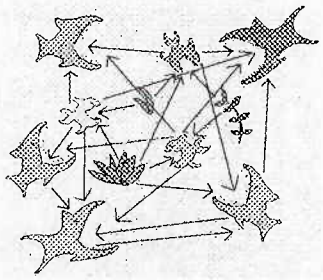
ECOLOGY

1. **DESCRIPTION**: Students will answer questions involving content knowledge and process skills in the area of ecology and adaptations in featured North American biomes.

   A TEAM OF UP TO: 2 **APPROXIMATE TIME**: 50 Minutes



2. **EVENT PARAMETERS:** Students may bring a non-programmable calculator. **Each team may bring one 8.5" x 11" two-sided page of notes that contain information in any form from any source.** References and training resources are available on the Official Science Olympiad Web Page at http://www.soinc.org.

3. **THE COMPETITION:**
   a. The event will emphasize these process skills as they apply to ecology: defining variables; analyzing data from graphs and tables; presenting data in graphs and tables; forming hypotheses; making calculations and predictions.
   b. All questions **will** deal with the following ecological principles: Energy flow through food webs and trophic pyramids including quantitative analysis of data; nutrient cycling, community interactions; population dynamics including density dependent/independent limiting factors, carrying capacity, doubling time, exponential/logistical growth and how to calculate population growth; extinction, selection and migration; human impact upon ecosystems (climate change, invasive species, acid rain, erosion, pollution). In addition, students should be familiar with the pros and cons of using alternative energy and its effect on the environment. If stations are used, students must spend the same amount of time at each station. **Division C: State and Nationals only:** life history strategies (e.g., age structure, survival curves, life tables, R and K strategies).
   c. Approximately 50% of the questions should specifically address grassland ecology and **taiga** ecology. The remainder of the questions will cover general ecological principles. In each subsequent year, one biome will remain and one replaced by the next biome on the list: freshwater lakes and streams, marine (including estuaries), forests, deserts, grasslands, taiga, tundra.

4. **SAMPLE QUESTIONS:**

   Division B:
   a. From the description of community interactions, create a food web. Then predict what would happen to the food web if the primary producers were greatly reduced in number by a disease.
   b. Given a description of the interaction between two species, identify the type of community interaction.
   c. Provide three reasons why a grassland is easier to sustain over a number of years than a suburban lawn.
   d. Compare a grassland with a **taiga**. What kinds of adaptations may be common in both environments? How are the organisms in each environment adapted for the rates of nutrient recycling that you would expect to find?

   Division C:
   e. Given a complex food web, create a trophic pyramid and determine the amount of energy in each level when given a quantity of energy entering the producer level.
   f. Students are given a graph depicting the changes in two interacting populations of different species in a habitat. Predict which population is the predator and which is the prey. Give reasons for your choices.
   g. Determine the population growth rate for an area given r (rate of increase) and N (number of individuals).
   h. Students are given three age structures and asked to determine which population has the highest birth rate, death rate, doubling time, and mean age.

5. **SCORING:** Questions will be assigned point values. Students will be ranked from highest to lowest score. Ties will be broken by pre-determined tiebreaker questions.