MiSP ECOLOGY/FOOD RELATIONSHIPS — PREDATOR PREY
Teacher Guide, L1 – L3

Introduction

In this unit students will review the ecological food relationships and focus on predator prey relationships and how they affect population size.

This weeklong study should occur after students have learned about ecological levels (i.e., population, community, ecosystem, biome, and biosphere) and after they have reviewed food chains and webs (learned in elementary-level science). Students should also have been introduced to or have reviewed the following vocabulary terms: *producer*, *consumer*, *herbivore*, *omnivore*, *carnivore* (*scavenger*, *predator*, *prey*), and *decomposer*. (See ILST Core Curriculum — Standard 4 Living Environment 5.1d, 5.1e, 6.1a, and 6.1b. Note: The concept of energy pyramids is an optional topic for this unit.)

Standards

ILST Core Curriculum — Major Understandings:
Standard 4 Living Environment 7.1b, 7.2a

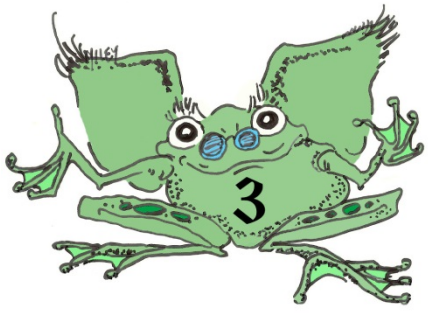
Lesson Objectives: After completing this unit, students will be able to

- Explain the ecological food relationships that exist in ecosystems
- List reasons that a population does not increase indefinitely
- Produce and interpret a graph with predator (wolf) and prey (deer) populations
- Describe how the size of the predator population is affected by the prey population and how the size of the prey population is impacted by the predator population
- Quantify the changes in deer and wolf populations by calculating unit rate of change (L2)
- Calculate the formula for two segments of the wolf population curve and use those formulae to predict wolf populations (L3).

Day 1 — Food Relationships

Discuss/review with the students the various ecological food relationships; see Introduction above.

Students should complete Predator Prey Worksheet #1: Food Relationships. The worksheet should be reviewed or collected to assess the students' understanding of the concepts.



Question of the Day:

Are carnivores such as the wolf, shark, lion, boa constrictor, praying mantis, and hyena good or bad? Very often in U.S. history, people have wanted to wipe out (eliminate the whole population of) a particular predator. The wolf is an example. Why do some people want that to happen?

Day 2 — Population Growth

Students should be reminded that a population is all the members of a species that exists in a particular area at a certain time.

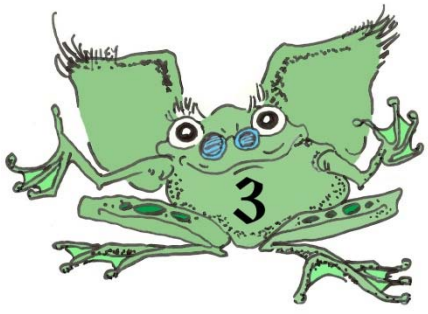
The students will work on Predator Prey Worksheet #2: Population Growth.

A fun way to introduce the concept of unrestricted population growth is to show students a video clip from a very old *Star Trek* television series episode called "Trouble with Tribbles."

http://www.youtube.com/watch?v=8_l5n1kYuzo&feature=related

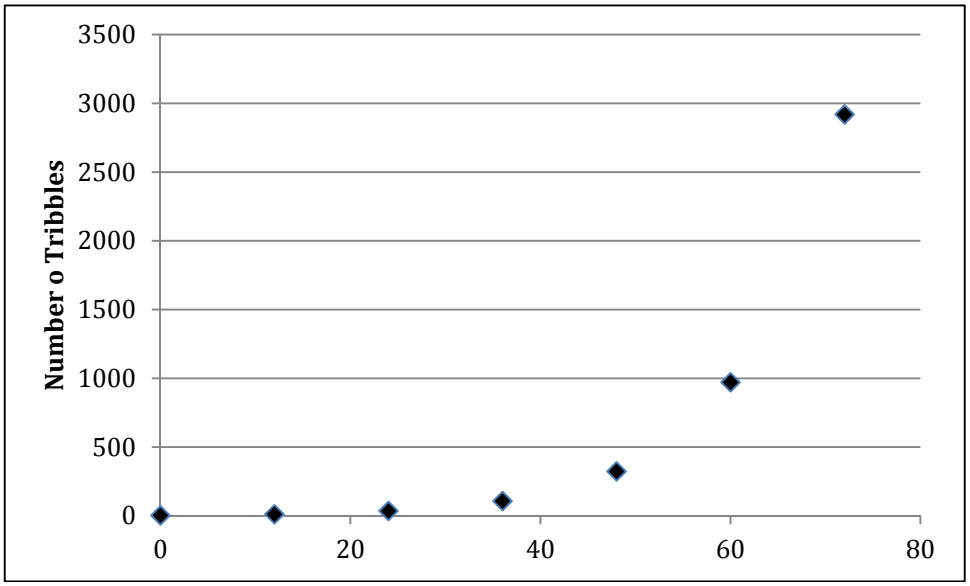
The goal of the lesson is for the students to understand that no population can increase unchecked. Populations are limited by death (due to hunger, accident, disease, and predation). Other limits to population that are more complicated, but that students may mention, are immigration/emigration, mating behaviors and rituals (such as territories and dominance hierarchies, which limit the individuals that may mate), infanticide (e.g., as seen in lions), etc.

In the *Star Trek* episode, a few tribbles are allowed to reproduce, and the growing population of tribbles eventually eats all of the wheat seed that the crew of the *Enterprise* was supposed to protect.



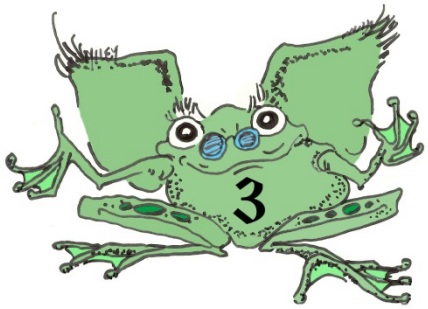
Luckily for the *Enterprise* crew, the wheat had been poisoned, so the crew inadvertently saved their government from the embarrassment of providing a new colony with contaminated wheat.

The class will graph the tribble population data and see how quickly a population that remains unchecked will grow. Students will need some guidance to graph the *y* data with a range of 5 to 3,645 tribbles. The graph works well if you use a *y* scale of one box = 200.
At level 2 the students calculate the unit rate of change in three places within the population growth curve and discuss the change in that measurement. At level 3 the students determine the unit rate of change and the formula for each of three line segments on the tribble growth curve.



Question of the Day:

Leopard frog females may lay as many as 6,000 eggs at a time. If there were 50 mature female frogs in a pond, they could produce 300,000 tadpoles if all of their eggs hatched. The pond would be filled up with frogs in no time if they all lived. What happens to most of them? Why do the frogs produce so many eggs?



Days 3 and 4 — Predator Prey Graph

Overview:

The data and the lesson idea come from www.biologycorner.com. Students will construct a graph of wolf and deer populations as they exist over a period of 10 years.

Procedure Notes:

It will be easier for the students to number the years 0 to 9 rather than graph the data by calendar years. The relationship between the deer population and the wolf population is easily visualized if a scale of one box/200 deer and one box/2 wolves is used.

Levels 2 and 3 — The graphed information is not a straight line, but linear mathematics can be applied to segments of the graphed data that approximate linearity.

Day 5 — Assessment

Administer the appropriate level assessment.