

Table Rocks Curriculum

Food Web Freeze Tag

Objective: Students will identify *predator/prey* relationships by playing a game of tag. Students will discover how *organisms* interact with their environment and will create a *food chain* and a *food web*.

Benchmarks Targeted: 2 and 3 (Grades 4-8)

Oregon Standards:

Subject Area: Life Science

Common Curriculum Goals: Organisms: Understand the characteristics, structure and function of organisms.

Benchmark 2: Group or classify organisms based on a variety of characteristics.

Common Curriculum Goals: Diversity/Interdependence: Understand the relationships among living things and between living things and their environment. Describe and analyze diversity of species, natural selection and adaptations.

Benchmark 2: Use drawings or models to represent a series of food chains for specific habitats. Describe how adaptations help a species survive.

Benchmark 3: Identify and describe the factors that influence or change the balance of populations in their environment. Identify populations of organisms within an ecosystem by the function that they serve.

Subject Area: Scientific Inquiry

Common Curriculum Goals: Forming the Question/Hypothesis: Formulate and express scientific questions or hypothesis to be investigated.

Benchmark 2: Make observations. Based on these observations, ask questions or form hypotheses based on those observations, which can be explored through scientific investigation.

Benchmark 3: Based on observations and scientific concepts, ask questions or form hypotheses that can be explored through scientific investigations.

Common Curriculum Goals: Collecting and Presenting Data: Conduct procedures to collect, organize, and display scientific data.

Benchmark 2: Collect, organize, and summarize data from investigations.

Benchmark 3: Collect, organize, and display sufficient data to support analysis.

Subject Area: The Arts

Common Curriculum Goals: Create, Present and Perform. Apply ideas, techniques and processes in the arts.

Benchmark 2: Use experiences, imagination, observation, essential elements and organizational principles to achieve a desired effect when creating, presenting and/or performing works of art.

Benchmark 3: Select and combine essential elements and organizational principles to achieve a desired effect when creating, presenting and/or performing works of art.

Length of Lesson: 25-45 min (outdoors), optional artistic extension 30-60 min

Materials:

- ✓ Food tokens (can be cardboard, plastic lids, or discs); 3 per student
- ✓ Gym vest or T-shirts to mark **predators**
- ✓ 4-5 hula hoops or string to mark “camouflage” or “cover” spots
- ✓ Large play area such as a soccer field or other open grassy area
- ✓ Pencil and paper to record results
- ✓ Art supplies (for extension only)

Key Vocabulary: *carnivore, consumer, decomposer, ecosystem, food chain, food web, herbivore, omnivore, organism, predator, prey, producer, scavenger*

Background:

The Table Rocks are home to numerous plant and animal species and all of these species are connected. All **organisms** (in general) require food, water, shelter, a home, and space in order to survive. This relationship among **organisms** can be demonstrated using a **food chain** and/or a **food web**.

Explain to your students that all people (and animals) need energy in order to run, jump, and play games. Ask them where they think they get energy from. It’s in the food we eat! Just like us, all living things require energy in order to live and grow. This energy flow can be demonstrated using a **food chain**. As you move up the **food chain**, the energy flow is decreased and likewise the lower you go on the chain the more energy is available. A **food chain** shows how each living thing gets its food. Each link in the chain shows who eats what (or who). This is a good place to introduce the concepts of **predator** and **prey** and their role in any environment. A **predator** is an animal that eats other animals. **Prey** is an animal that is eaten by another animal. Ask students if they think all living **organisms** eat the same thing. Explain to them that all **food chains** begin with the sun. Plants use energy from the sun (photosynthesis) to produce chlorophyll—it’s what makes plants green! Plants are called **producers** because they use energy from the sun to make food. Animals cannot make their own food and therefore must rely on plants and/or animals for food. Animals are called **consumers** and can be divided into four types based on the foods they consume.

- Animals that only eat plants are called **herbivores** or primary **consumers**.
(western tent caterpillar, black-tailed deer, dusky-footed woodrat.)
 - Animals that eat other animals are called **carnivores** or secondary **consumers**.
(mountain lion, western fence lizard, Western Meadowlark.)
 - Animals that eat both plant and animals are called **omnivores** and are also secondary **consumers**.
(coyote, raccoon, ringtail.)
 - Animals that feed on decaying/dead matter are called **decomposers** and **scavengers**.
(Turkey Vulture, skunk, bear.)
- Please Note: Some animals like the bear or the skunk can be both **omnivores** and **scavengers**.

Decomposers and *scavengers* are one of the most important parts of the *food chain*. They speed up the decomposition process and return nutrients back to the soil. It can then be absorbed by plants, and the cycle starts anew. Many of the most important *decomposers* in our forest are not animals; different types of fungi and bacteria also play this important role. Imagine how our world would look (or smell) without this important link in the chain! The Turkey Vulture is a major *scavenger* in the Table Rocks *environment*. They breakdown decaying material and add important nutrients back into the system and allow vegetation to thrive. When vegetation is abundant, more plant food is available for animals to use (*herbivores*), which in turn leads to healthier animal populations that are able to reproduce more efficiently. Consequently, there are more *prey* animals available for *predators* to eat.

You may find it helpful to demonstrate a simple *food chain* on the board or overhead projector showing the major links. Examples:

Sun → miner’s lettuce → black-tailed deer → mountain lion → fly larvae

Sun → buckbrush → western tent caterpillar → Western Meadowlark → coyote
→ Turkey Vulture

Ask students where they fit into a *food chain*.

Note: Refer to the list at the end of this lesson for more examples.

A network of many *food chains* is called a *food web*. In any *food web*, energy is lost each time one *organism* consumes another. For this reason, there have to be several more plants than plant-eaters. There are more *producers* than *consumers*, and more *herbivores* than *carnivores*. Most animals eat a variety of foods (just like people), and there are many different types of plants and animals in the Table Rocks environment resulting in a complex *food web*.

Procedure: (Adapted from “Quick Frozen Critters” an activity by Project WILD)

Preparation:

Review background information with students and discuss the concepts of *predator*, *prey*, and *scavengers*. Explain that by playing a game of freeze tag they will gain a better understanding of this relationship and how it affects the animals of Table Rocks. This activity will also show how a *food chain/food web* works. Using the following list, divide students into groups based on roles they will be playing.

Note: *Producers* are not used as an active role for this activity, but are represented by the food tokens that the *herbivores* collect.

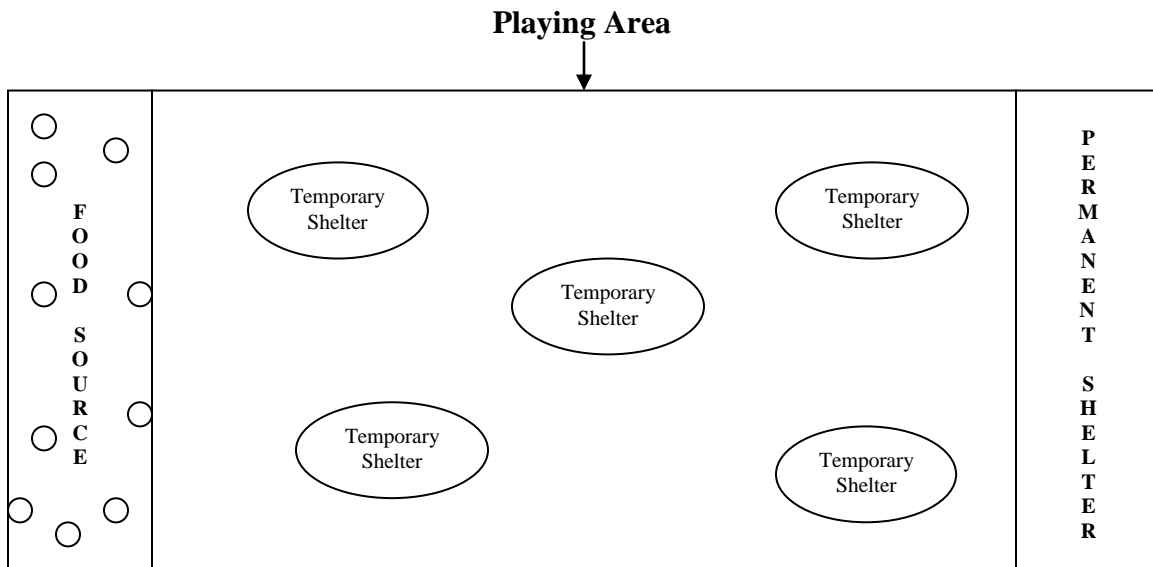
Prey	Predator/prey	Predator	Scavenger
Ground Squirrel	Gopher Snake	Red-tailed Hawk	Turkey Vulture
18	6	2	4

Divide students into the four groups listed above and tell them they will be acting as if they were that animal. Once animals are assigned, ask students where their animal fits

into the *food chain* (*consumer, herbivore, or scavenger*). Discuss who eats who (or what) in this *food web*. Make sure *predator, prey, and scavenger* roles are clear. If you have fewer than 30 students in your class, remove one Red-tailed Hawk or a few gopher snakes. In the wild there are always more *prey* animals than *predators*. Likewise, if you have more than 30 students assign more ground squirrels.

Set up play area, designating one end as the “food source” and the other end as the “permanent shelter.” Place hula hoops (or string) randomly between the food source and permanent shelter areas. The hula hoops are considered temporary shelters where *prey* animals are safe from *predators*.

Place three food tokens in the food source area for each *prey* animal.



To begin, make sure *predators* (i.e., hawks & gopher snakes) are clearly visible using gym vest or any other bright identifier. You may want to have a different color for hawks and gopher snakes as gopher snakes are *prey* for hawks too! *Predators* and *scavengers* may be anywhere in the play area between the food source and the permanent shelter. Both the “food source” and the “permanent shelter” zones are safe zones where *prey* cannot be tagged by a *predator*. *Prey* may be tagged as long as they are moving (not frozen). Use a signal of your choosing (or a whistle) to begin each round. *Prey* (ground squirrels) start from the permanent shelter area and must cross the play area to obtain one food token (*producer*) and take it back to the permanent shelter. Make sure students know they can only collect one token at a time. *Prey* requires three food tokens in order to survive in their *habitat*. This can be a dangerous journey and *prey* need to be aware of *predators*.

Prey has three ways to protect themselves from *predators*.

- 1) They may “freeze” any time a *predator* is near and thus cannot be harmed (students may blink but no other movement or talking is allowed).

- 2) **Prey** may warn other **prey** that a **predator** is near. The **predators** may feel this is “cheating” but it is a real method used by animals in the wild.
- 3) **Prey** may protect themselves by stopping inside the designated temporary shelters (students must have at least one foot inside the hula hoops or string). Here they are safe from **predators**.

The object of the game is to collect a least three tokens in a given time period. By doing this, the **prey** will have obtained enough food to survive and will be able to reproduce in their environment. For added emphasis, you may allow one **prey** animal to return to the game after another **prey** animal (one still in the game) collects three tokens. This shows that the **prey** animal collected enough food to reproduce.

Explain to **prey** that they can stay “frozen” as long as they want, but if they have not collected enough tokens at the end of the time period they will starve to death. **Predators** must tag more than one **prey** in order to survive. When **prey** are tagged they must sit down on the field. At this point the Turkey Vultures can tag the seated **prey** and the **prey** can then go to the sideline and wait. Just like in real life, Turkey Vultures act as nature’s janitors, cleaning up our environment. This illustrates the important role Turkey Vultures play in the Table Rocks **ecosystem** as a “recycler” of valuable nutrients.

Note: Establish a ground rule that this is a game of tag and tackling is not allowed (Students may want to mock how real **predators** in the wild behave).

After five to seven minutes (or until food tokens run out) stop the game and see who has survived. Captured **prey** on the sideline may get restless if the game lasts much longer. Play a few rounds and let different students play the roll of **prey**, **predator**, and **scavenger** animals.

Scientific Inquiry:

Grades 4-5: Have students form a hypothesis on the outcome of the game. Will there be a lot of **prey** or **predator** animals left? Have them write down their theories on a piece of paper or the blackboard. Choose one or two students to record the data during the game, taking turns after each round. Discuss with students what they observed as the game was played. Was it different than their hypothesis? Record info on the board and discuss data with students.

Grades 6-8: Have students form a hypothesis on how many **prey** and **predators** will survive the game. You can also have students tally how many food tokens were collected per animal. Have one or two students tally data, taking turns throughout the activity. Once data is collected and the game is over, have students interpret the data (possibly by creating a chart or graph of results) to determine if their hypothesis was right or wrong, and why. Once this is done ask students to determine if there were any possible sources of error.

Adaptations:

- Have students walk only, or assign different locomotive forms to each animal.

- Play the activity for three or four rounds, recording the number of tagged persons. For the next round, have captured students become **predator** animals and have **predators** that didn't collect enough food become **prey** animals. This leads to the concept of dynamic balance as **prey** and **predator** populations fluctuate in response to each other.

Extensions:

- Have students research an animal of the Table Rocks including their **habitat**, diet, and **predator/prey** relationships.
- Have students write a story about the daily activity of their animal.
- Have students build a mobile of a **food web** for an animal at the Table Rocks using pictures from magazines or drawings. Encourage them to include as many aspects of the web as possible. It could be further expanded to include an entire 'family' of animals such as the male, female, and offspring.
- Using the list provided, have students create a **food web** for the Table Rocks. Challenge students to make it as complex as possible.

Discussion Questions:

Name one **predator** and one **prey** animal that lives on the Table Rocks. Make a **food chain** showing the relationship among **organisms**. Make sure arrows point in the direction of energy flow.

- Sun → poison oak → Wild Turkey → coyote
- Sun → buckbrush → Western tent caterpillars → Western fence lizard → gopher snake → Red-tailed Hawk

Why do you think there are more prey animals in an ecosystem than predators?

*In general, predator species tend to have fewer young than prey animals. As you move up the chain, the amount of energy transfer is reduced, meaning those at the top of the **food chain** have a harder time acquiring food and use more energy in doing so. Animals lower on the **food chain** (i.e. primary **consumers**) don't have to use as much energy to find their food.*

What would happen if one organism or animal was removed from the food web?

*All organisms in an ecosystem are connected. Removing just one aspect of the **food web** would result in an unbalanced ecosystem. For example, if mountain lions were removed from the Table Rocks, there would be an increase in the black-tailed deer population. Without a natural control of the population it would most likely result in overgrazing by deer and depletion of resources for themselves as well as other animals in that **habitat**. Eventually the population would starve. They could also try to relocate, which in some places, may not be possible.*

Where do humans fit into the *food web*?

*In general, humans are considered “the top of the **food chain**.” Humans have the luxury of having our food sources readily available from grocery stores and markets. Humans are **omnivores** or **herbivores**.*

Can an animal be both a *predator* and a *prey* animal?

*Yes! The **food chain** has many levels and it is possible for an animal to fit into two levels at once. For example, the gopher snake in this activity is a **predator** to the ground squirrel and it is also a **prey** animal for the Red-tailed Hawk.*

Can an animal be both a *consumer* and a *scavenger*?

*Yes! Animals like black bears and raccoons often scavenge other animal’s leftovers as well as hunt and kill **prey** for themselves. Animals that fit into both categories benefit by having more food resources available.*

References:

Charles, Dr. Cheryl, ed. Project Wild: K-12 Activity Guide. 2nd ed. Western Regional Environmental Education Council, Inc, 1995.

Table Rocks Environmental Education. 2007. USDI BLM. 7 December 2007
<<http://www.blm.gov/or/resources/recreation/tablerock/index.php>>.

Producers	Consumers	Decomposers/Scavengers
<ul style="list-style-type: none"> •Dwarf-wooly Meadowfoam •Fritillaria •Oregon Grape •Western Columbine •Miner’s Lettuce •Wild Onion •Penstemon •Ookow •Purple-eyed Grass •Arrow-leaf Balsamroot • California Poppy • Goldfields •Monkey-flower •Rabbitbrush •Oregon White Oak •California Black Oak •Buck Brush •Manzanita •Madrone •Deerbrush •Madrone •Manzanita •Ponderosa Pine •Mountain Mahogany 	<ul style="list-style-type: none"> •Pacific Tree Frog •Gall Wasp •Western Tent Caterpillar •Coyote •Western Rattle Snake •Mountain Lion •Ringtail •Raccoon •Western Fence Lizard •Alligator Lizard •Gopher Snake •Western Skink •Acorn Woodpecker •Western Meadowlark •Blue-grey Gnatcatcher •Dusky-footed Woodrat •Black-tailed Deer •California Ground Squirrel •Black-tailed Jackrabbit • Bobcat 	<ul style="list-style-type: none"> •Turkey Vulture •Coyote •Bacteria •Black Bear •Raccoon •skunk •fly larvae •fungus •fox