

# Environmental Science —

## Life As a Chipmunk

**Project Areas:**  
Environmental  
Science  
Forestry & Wildlife

**Skill Level:** Beginner  
-Intermediate

**Learner Outcomes:**  
-Define predator,  
prey  
-Understand a  
simple food chain  
-Understand how  
energy flows  
through an  
ecosystem

**TN Science  
Curriculum  
Standard GLEs:**

S2.  
Interdependence  
0607.2.1-3

**Life Skills:**  
Observing,  
Reasoning,  
Communicating

**Tags:** Food chain,  
food web,  
producer,  
consumer, predator  
-prey

**Time Needed:**  
Set up: 2 minutes  
In class: 30 minutes  
(adjustable, see  
notes)

**Materials:**  
-Small items that  
can be used as  
“food”: dried  
beans, seeds, toys,  
pieces of paper. If  
playing outside, be  
sure items are  
biodegradable.  
-A bag for each  
student to collect  
food in.

**In this game, students will learn about food webs and predator-prey population dynamics. Students will play chipmunks or hawks and attempt to collect enough food to survive and/or reproduce under various scenarios.**

### Set Up

You will need something to use as food (e.g., beans, sunflower seeds) and some space to run around in (outdoors makes clean up easier!). For later rounds of the game, you will need to designate a “safe zone.” This could be a tree, a marking on the ground, a hula hoop, etc.

*Notes:*

- The number of pieces of food (Table 1) can be adjusted up or down depending on time and space constraints. Use more food for bigger groups or if you have more time.
- The time for each round can be adjusted depending on time constraints.
- The student handout is optional. It contains some math problems based on this game.

### Introducing the Topic

Make sure your students understand:

**Food web** or **food chain:** The flow of energy from producer (plants) to primary and secondary consumers

**Predator:** Animal that eats other animals for food

**Prey:** Animal being eaten by predator for food

Table 1. Suggested numbers.

	Survive	Reproduce
<b>Chipmunk</b>	30 acorns	60 acorns
<b>Hawk</b>	5 chipmunks	10 chipmunks
<b>Human</b>	40 acorns	80 acorns

### The Game

Give each student a bag for collecting food and explain that they are chipmunks and need to collect 30 pieces of food (“acorns”) in order to survive until the next season. If they do not collect this amount in the time allotted, they will not survive. The game will be played in several timed rounds. At the start of each round, scatter food around the playing area.

**Season 1: BOUNTY** — Throw an excess amount of food so that all students can collect enough to survive. Explain that this was a bountiful season and many acorns grew.

*At the end of the round ask your students:*

**Was it easy or difficult to find food?** Answer: Easy

**Season 2: FAMINE** — Put out slightly less food so some of the students may not be able to collect enough. Explain that there was a hurricane or harsh winter and not enough acorns grew.

*At the end of the round ask your students:*

**How much of the chipmunk population survived?** Answer: (variable — likely some but not all)

**Was it easier or harder to find food compared to the first season?** Answer: Harder

**Season 3: POPULATION REBOUND** — Put out a bounty of food. The game continues with the smaller chipmunk population, but tell students that if they can collect 60 pieces, then they can reproduce. They can choose a friend to bring back into the game. Explain that animals need food and energy not only to survive, but also to produce offspring.

*At the end of the round ask your students:*

**How many chipmunks survived?** Answer: (variable — likely most or all)

**How many chipmunks reproduced?** Answer: (variable — likely some)

**What happened to the chipmunk population?** Answer: Rebounded, returned to original size

**Was it easier or harder to find food compared to last season?** Answer: Easier because the population was smaller.



**Season 4: PREDATOR** — Select one student to be a hawk. **Explain:** The hawk is a predator that feeds on chipmunks. The hawk must catch five chipmunks for food. Those caught by the hawk will be out. The hawk may reproduce (bring in another) if it can catch 10 chipmunks. Chipmunks must still find their 30 pieces of food and may bring another in if they can get 60. Designate a “safe zone” representing a den. Chipmunks can hide from the hawk in the safe zone as long as they want; however, they will have to venture out in order to collect enough food to survive.

*At the end of the round ask your students:*

**How many chipmunks survived/reproduced?** Answer: (variable — likely some)

**Did the hawk survive/reproduce?** Answer: (variable — likely yes)

**Was it easier or harder for chipmunks to find food compared to last season?** Answer: Harder because they had to avoid a predator, but a bit easier because the population was smaller so there was less competition.

**What happened to the chipmunk population?** Answer: Became smaller due to predation.

**Season 5: PREDATOR POPULATION BOOM** — In the fifth round, students who did not survive the last round now become hawks. (There may be lots of hawks!) There will probably not be enough chipmunks for the hawks to survive, so you can discuss how both populations depend on the other for survival.

*At the end of the round ask your students:*

**How many chipmunks survived/reproduced?** Answer: (variable — likely few or none)

**How many hawks survived/reproduced?** Answer: (variable — likely some, but not all)

**Was it easier or harder for chipmunks to find food compared to last season?** Answer: Harder because they had to avoid more predators.

**Was it easier or harder for hawks to find food compared to last season?** Answer: Harder because they had to compete with the other hawks.

**What happened to the hawk population?** Answer: Became smaller due to lack of prey.

**Generalize and Apply: What determines the size of the chipmunk population?** Answer: Both food resources (acorns, “bottom up” pressure) and predation (“top down” pressure).

**Season 6: HUMANS** — The sixth round introduces a human. The human requires 40 pieces of food and can pick up the food or tag a chipmunk or hawk and take their food from them. If the human gets 80 it can bring in another human. Discuss how humans can impact the food web.

*At the end of the round ask your students:*

**How many chipmunks survived/reproduced?** Answer: [variable — likely few or none]

**How many hawks survived/reproduced?** Answer: [variable — less than last time]

**Was it easier or harder for the chipmunks to find food compared to last season?** Answer: Harder because they had to avoid both predators and humans.

**Was it easier or harder for hawks to find food compared to last season?** Answer: Harder because they had to compete with humans for chipmunks and they had to avoid the humans.

**What happened to the hawk population?** Answer: Got smaller due to lack of prey.

**Generalize and Apply: What are some ways humans can impact food webs?** Possible answers: habitat destruction, over hunting/fishing, game restocking, introducing exotic species, introducing new diseases, etc.

### Solve This! Answers for Student Handout:

A chipmunk needs 25 acorns to survive and 50 to reproduce, and a hawk needs 5 chipmunks to survive and 10 chipmunks to reproduce.

1. In a year with average rainfall, 1,000 acorns are produced. What is the average population size of chipmunks during an average rainfall year?  $= 1,000 / 25 = 40$
2. One year, only 500 acorns are produced. What will be the size of the chipmunk population at the end of the year?  $= 500 / 25 = 20$
3. There are two hawks in the area. In order for them to survive and reproduce, how many chipmunks will they need to eat?  $= 2 \times 10 = 20$  How many acorns are required?  $= 20 \times 25 = 500$

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15-0197 6/15

Programs in agriculture and natural resources, 4-H youth development, family and consumer sciences, and resource development. University of Tennessee Institute of Agriculture, U.S. Department of Agriculture and county governments cooperating. UT Extension provides equal opportunities in programs and employment.

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The 4-H Name & Emblem is protected under 18 USC 707.

# Environmental Science —

## Life As a Chipmunk

Life as a chipmunk isn't always easy. Can you survive? Here's an example of a **food chain**. A **food web** or **food chain** describes who eats what in a community.



<http://www.sheppardsoftware.com/content/animals/kidscorner/games/foodchaingame.htm>

### Words to Explore

- Food Chain
- Primary Producer
- Consumer
- Predator
- Prey

### Did you know?

The scientific name for chipmunks is *Tamias*, from the Greek word for "dispenser" or "steward," because of their habit of collecting and storing food.

All energy comes from the sun.



Acorns grow on oak trees, which use the sun's energy to grow. This is called **photosynthesis**. The oak tree is a **primary producer**.



Chipmunks eat the acorns. This makes the chipmunk a **primary consumer**. It is consuming (or eating) the acorns.



The hawk feeds on the chipmunk and is a **secondary consumer**. It is also known as the top of the food chain because nothing will eat the hawk.

### Solve This!

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