

## Lesson C2–5

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# Creating Wildlife Habitat

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**Unit C.** Animal Wildlife Management

**Problem Area 2.** Wildlife Biology and Ecosystems

**Lesson 5.** Creating Wildlife Habitat

### **New Mexico Content Standard:**

**Pathway Strand:** Natural Resources and Environmental Systems

**Standard:** III: Apply scientific principles to natural resource management activities.

**Benchmark:** III-C: Examine natural cycles and related phenomena to describe ecological concepts and principles.

**Performance Standard:** 1. Describe the hydrologic cycle. 2. Describe the nitrogen cycle. 3. Describe succession. 4. Describe population dynamics. 5. Describe primary and secondary producers. 6. Identify potential pollution sources. 7. Define watershed boundaries. 8. Describe the influence of weather and climatic factors.

**Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

1. Explain how habitat growth is classified.
2. Describe the relationships of wildlife populations to habitat.
3. Identify earth changes that impact habitat.
4. Discuss the role of climate and weather in habitat production.
5. Explain the production of plants as food sources.

**List of Resources.** The following resources may be useful in teaching this lesson:

**Recommended Resources.** One of the following resources should be selected to accompany the lesson:

Porter, Lynn, Jasper S. Lee, Diana L. Turner, and J. Malcolm Hillan. *Environmental Science and Technology*, 2<sup>nd</sup> Ed. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2003.

Stutzenbaker, Charles D., Brenda J. Scheil, Michael K. Swan, Jasper S. Lee, and Jeri Mattics Omernik. *Wildlife Management: Science and Technology*, 2<sup>nd</sup> Ed. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2003.

**Other Resources.** The following resources will be useful to students and teachers:

Camp, William G. and Thomas B. Daugherty. *Managing Our Natural Resources*. New York: Delmar Publishers, 1995.

Daugherty, Thomas B. *AgriScience Laserdiscs Series, Forestry and Natural Resources*. New York: Delmar Publishers, 1997.

Lee, Jasper S. *Natural Resources and Environmental Technology*. Danville, Illinois: Interstate Publishers, Inc., 2000.

## List of Equipment, Tools, Supplies, and Facilities

Writing surface  
Overhead projector  
Transparencies from attached masters  
Copies of student lab sheets  
Examples of foods found in local areas

**Terms.** The following terms are presented in this lesson (shown in bold italics):

atmosphere  
birth rate  
browse  
climate  
climax stage  
crust  
cyclical changes  
death rate  
diurnal species  
dormancy  
equinox  
forb

habitat community  
herbage  
hibernation  
mast  
nocturnal species  
perennial  
population  
revolution  
rotation  
troposphere  
vertical stratification  
weather

**Interest Approach.** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. Two alternative approaches are included here. Use either or both, as appropriate.

**Alternative One: Biotic Pyramid**

*Show TM: C2–5A of the biotic pyramid to the class. Have students identify the organisms and their eating habits. Ask them different questions about the pyramid. As they answer, have them describe the function of each level. Move from the interest approach into the objectives and anticipated problems for the lesson.*

**Alternative Two: Wildlife Food**

*Show examples of wild berries, nuts, seeds, etc., found in the local area. Ask students to identify what they are and suggest wildlife that would eat them. Ask students to discuss how to promote greater production of these foods. Move into the objectives and content of the lesson.*

## Summary of Content and Teaching Strategies

**Objective I:** Explain how habitat growth is classified.

**Anticipated Problem:** How is habitat growth classified?

- I. Habitat growth is usually specific when it comes to a development sequence.
  - A. Habitat layers influence the physical environment and diversity of the wildlife species that are found.
    1. The physical nature of an area is often organized into layers or strata, known as **vertical stratification**.
    2. Simple wildlife communities, such as an open grassy field, have little vertical stratification. There are usually two layers: ground and herbaceous.

3. More complex communities are found in the forested areas. There can be up to six layers: ground, herbaceous, low shrub, low tree and high shrub, lower canopy, and upper canopy.
  4. The growth of native species is supported by water and soil to form these layers.
- B. Habitat stages are based on growth succession.
1. There are often many years required from progression through the habitat stages.
  2. The stages of plant succession occur with different vegetation types: Stage 1— bare ground; Stage 2— annual forbs and/or grasses; Stage 3— perennial forbs and grasses; Stage 4— shrubs; Stage 5— young trees and woodland; Stage 6— mature trees (climax stage.)
  3. Grasses and annual forbs provide only a few inches or feet of vertical strata. A **forb** is a low-growing broadleaf plant.
  4. Within the final stage the vegetation tends to be stable and remain present for along time. This is known as the **climax stage**.
  5. Disturbance can be caused by natural factors or human activity. Common natural factors may include hurricanes or tornadoes, floods, avalanches, disease outbreaks, or naturally occurring fires.
- C. Plants, animals, and other organisms interact in the environment to form a habitat community.
1. A **habitat community** is all the living things in an area.
  2. Pattern can be related to the presence of wildlife. Pattern is the distribution of all factors in a community.
  3. Structure can be related to the presence of wildlife. Structure is the physical makeup of the area.
  4. Size can be related to the presence of wildlife. Size is measured in acres and relates to the needs of species.
  5. Layers can be related to the presence of wildlife. Layers are the heights of plants in a forest.

*Have students read “Habitat Growth” from Chapter 7 of Wildlife Management: Science and Technology, 2<sup>nd</sup> Ed. or other similar text. Let each student chose a different wildlife animal. Have them be responsible for researching its habitat requirements, such as food, cover, etc. The students should verify which habitat stages the wildlife animal uses for certain life processes. Use TM: C2–5B to show students the six stages of plant succession.*

**Objective 2:** Describe the relationships of wildlife populations to habitat.

**Anticipated Problem:** What are the relationships of wildlife populations compared to habitat?

- II. Habitat provides important affects on wildlife populations.
  - A. The number of organisms in an area is often referred to as a **population**. It could also refer to the combined number of all species or to the number of one species.

1. Population density is influenced by the number of new organisms added to the population and by the number that leave.
  2. Birth rate is an important factor in population density. **Birth rate** is the number of young produced per unit of population over a given time. This is often given as the number of births per thousand.
  3. The **death rate** is the number of deaths per thousand population each year.
  4. Both the birth rate and the death rate form a population curve. It shows populations declining due to lack of food, hunting, disease, and other conditions. The surviving animals are those that breed and start the cycle again.
- B. Population response is different in all types of habitats.
1. In some habitats, a small population may undergo a large, rapid increase. This increase will continue until the upper limits are reached.
  2. Some populations will decline due to starvation, disease, or other means.
  3. Some population densities reach the maximum carrying capacity of the habitat. This is the population level the habitat can support.

*Have students read "Population Density" in Chapter 7 of Wildlife Management: Science and Technology, 2<sup>nd</sup> Ed. or other similar text. Use TM: C2–5C as an example of a wildlife population curve. Have students research populations of a local species on the Internet. Have them record the numbers and develop their own wildlife population curve similar to the example on TM: C2–5C.*

**Objective 3:** Identify earth changes that impact habitat.

**Anticipated Problem:** What are some earth changes that impact wildlife habitat?

- III. The earth changes in many ways. Sometimes changes can be predicted, while some cannot be predicted. Either way, wildlife has to find ways to adapt to whatever types of changes occur.
- A. Some changes occur on a regular basis and follow a predictable pattern. These are called **cyclical changes**.
1. Cyclical changes involve the movement of Earth and the solar system on a regular basis.
  2. **Rotation** is the turning of Earth on an imaginary axis. This creates day and night for us on a 24 hour basis. When an area of the earth is facing the sun there is day; when an area of the earth is facing away there is night.
  3. Many wildlife organisms adjust to their survival depending on the earth's rotations. **Nocturnal species** are species that are most active at night, but rest during the day. Some examples of nocturnal species are bats, owls, and raccoons. **Diurnal species** are species that are active during the day and rest at night. Some examples of diurnal species are squirrels, turkeys, and cardinals.
  4. Wildlife plants need both light and dark. The light is needed for plants to carry out photosynthesis. Darkness is needed for plants to rest.

- B. Another type of cyclical change results in seasons. This is the revolution of Earth.
1. A **revolution** is the time it takes Earth to move around the Sun. This creates one year for us— 365.24 days.
  2. The seasons we experience on Earth are dependent on the position of Earth during the revolution. The angle at which Earth is tilted toward or away from the Sun creates cool and warm seasons.
  3. Each fall and spring the Sun is directly over the equator. This is called the **equinox**. During the equinox, night and day are exactly the same number of hours.
  4. The seasons strongly influence many types of wildlife animals. Some animals store food to get ready for the winter, such as squirrels and chipmunks. Some animals hibernate, such as bears, snakes, and some turtles. **Hibernation** is the rest a variety of animals get that lasts all winter long.
- C. Some changes are unpredictable, such as when materials change.
1. Solid materials can often be pushed about by mother nature. The kind and amount of solid materials in the earth's crust influence wildlife. The **crust** is the surface of the earth, such as fields, mountains, swamps, and rivers.
  2. Some changes take a long time, while others may occur suddenly, such as volcanic action or earthquakes.
  3. Animals depend on the top of the crust. This determines what kinds of plants will grow, where water will travel, and what animals can survive in those conditions.

*Have students read “Earth Changes That Impact Wildlife” in Chapter 6 of Wildlife Management: Science and Technology, 2<sup>nd</sup> Ed. Use TM: C2–5D to show students how Earth’s revolution influences our seasons. Have students choose a local wildlife animal and tell of its special needs (i.e. Is it nocturnal? Diurnal? Does it hibernate?) Use materials for students to illustrate the special needs of their wildlife animal.*

**Objective 4:** Discuss the role of climate and weather in habitat production.

**Anticipated Problem:** What is the role of climate and weather in habitat production?

- IV. Everything is affected by climate and weather. This includes wildlife species and their ability to adapt to climate extremes.
- A. The **atmosphere** is the air that surrounds Earth and is made of five layers.
1. Like humans, wildlife species only survive in the troposphere. The **troposphere** is the layer of the atmosphere that is closest to Earth. It is approximately 10 miles from the earth’s surface.
  2. Air is a mixture of gases, the majority being nitrogen (78 %) and oxygen (21%). This is primarily air, water vapor, and various particulate. Some pollution can alter the composition of the air such as smoke and chemical fumes.
  3. Above the troposphere is the ozone layer which protects the earth from the Sun’s ultraviolet radiation.

- B. **Climate** is governed by the weather.
1. **Weather** is the current condition in the atmosphere. This includes moisture, wind, temperature, and atmospheric pressure.
  2. Depending on the weather fronts, different kinds of conditions can accompany the troposphere such as rain, snow, sleet, temperature change, and hazardous storms.
  3. All wildlife organisms are affected by the weather. If there are sudden changes in the weather, such as extreme temperatures, animals can suffer the consequences.
- C. **Climate** is the weather that is generally present in a location.
1. Oftentimes, average measurements of temperature, precipitation, and other traits of the weather are used to describe climate.
  2. In most cases temperature controls the climate. Polar climates are cold year round, temperate climates are moderate, and tropical climates are warm year round.
  3. Native wildlife species are accustomed to the climate in which they live. Sometimes efforts to bring in non-native species to a particular place fail because people do not consider the climate needed by the wildlife.

*Have students read “The Atmosphere: Climate and Weather” from Chapter 6 in Wildlife Management: Science and Technology, 2<sup>nd</sup> Ed. Afterwards have them research what makes up the atmosphere. Pair the students up into groups of two or three. Assign each group an element. Have that group prepare a project on their element to present to the class.*

**Objective 5:** Explain the production of plants as food sources.

**Anticipated Problem:** How does the production of plants serve as food sources for wildlife?

- V. Wildlife animals must have food. Many animals must find different types of plants for food in their diet. Three common types of plant food material are browse, herbage, and mast.
- A. **Browse** is the tender growth of shrubs and trees.
1. Most animals that eat browse enjoy the small trees with leaves, shoots, and stems near the ground.
  2. Most shrubs have easily accessible growth with many branches low to the ground. This makes it easy for wildlife to eat it.
  3. Many ruminants gorge on browse because their several compartments make the best use of browse. Deer are particularly known for eating browse.
  4. Some browse grow as perennials. A **perennial** browse plant lives for several years. Some stay green all year round; others are green only in the warm seasons of the year.
  5. During the winter, much browse goes dormant. **Dormancy** is a time when the plant is not growing. Sometimes animals may eat the twigs, bark, or small limbs.
- B. **Herbage** is the succulent non-woody leaves and stems of herbaceous plants.
1. These plants are small to medium in height and do not grow woody stems.

2. Common types of herbs include grasses, vines, and weeds. Ruminant digestive systems usually make the best use of herbage. This is because the lower quality grasses are converted to higher quality food materials by the action of bacteria in the digestive system.
- C. **Mast** is the fruits and nuts of trees and shrubs eaten by animal wildlife.
1. Common nuts include acorns and hickory nuts.
  2. Common fruits include wild plums, pokeweed berries, and blackberries.
  3. The nutrient materials are more concentrated in mast. Usually monogastric animals are more likely to eat mast. These animals may include rabbits, squirrels, and birds. However, deer also like to eat mast!

*Have students read “Plant Food Sources” in Chapter 15 in Wildlife Management: Science and Technology, 2<sup>nd</sup> Ed. or other similar publication. Use TM: C2–5E as an outline of plant food sources. List on the writing surface the wildlife animals that eat each type of food source.*

**Review/Summary.** Focus the review and summary of the lesson on the student learning objectives. Have student explain the content associated with each objective. Use wildlife habitat materials for students to use in demonstrating their knowledge of the objectives. Use student responses as the basis for reteaching. Questions at the end of the chapter in the textbooks and in the activity manuals may be used in the review/summary process.

**Application.** Application can involve the following student activity:

LS: C2–5A—Determine Successional Stages

**Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is attached.

## **Answers to Sample Test:**

### **Part One: Matching**

1=c, 2=g, 3=d, 4=h, 5=j, 6=b, 7=i, 8=f, 9=a, 10=e

### **Part Two: Completion**

1. Diurnal species
2. revolution
3. Nocturnal species
4. vertical stratification
5. climax stage

**Part Three: Short Answer**

1. The six habitat growth stages are: Stage 1: bare ground; Stage 2: annual forbs and/or grasses; Stage 3: perennial forbs and grasses; Stage 4: shrubs; Stage 5: young trees and woodland; Stage 6: mature trees (climax stage.)
2. Rotation is the turning of Earth on an imaginary axis. This creates day and night for us on a 24 hour basis. When an area of the earth is facing the sun there is day; when an area of the earth is facing away there is night.

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# Test

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## Lesson C2–5: Creating Wildlife Habitat

### Part One: Matching

*Instructions.* Match the term with the correct response. Write the letter of the term by the definition.

- |                |               |            |
|----------------|---------------|------------|
| a. hibernation | e. birth rate | i. weather |
| b. equinox     | f. death rate | j. climate |
| c. atmosphere  | g. population |            |
| d. troposphere | h. forb       |            |

- \_\_\_\_\_ 1. The air that surrounds the earth that is made of 5 layers.
- \_\_\_\_\_ 2. The term used to describe the number of organisms in an area.
- \_\_\_\_\_ 3. The layer of the atmosphere that is closest to Earth.
- \_\_\_\_\_ 4. A low-growing broadleaf plant.
- \_\_\_\_\_ 5. The weather that is generally present in a location.
- \_\_\_\_\_ 6. The result when the Sun is directly over the equator; happens each fall and spring.
- \_\_\_\_\_ 7. The current conditions of the atmosphere.
- \_\_\_\_\_ 8. The number of deaths per thousand population each year.
- \_\_\_\_\_ 9. The rest that some animals get that lasts all winter long.
- \_\_\_\_\_ 10. The number of young produced per unit of population over a given time.

### Part Two: Completion

*Instructions.* Provide the word or words to complete the following statements.

1. \_\_\_\_\_ are species that are active during the day and rest at night.
2. A \_\_\_\_\_ is the time it takes Earth to move around the Sun.
3. \_\_\_\_\_ are species that are most active at night, but rest during the day.
4. The physical nature of an area is often organized into layers or strata, known as \_\_\_\_\_.
5. The final stage in habitat growth is known as the \_\_\_\_\_.

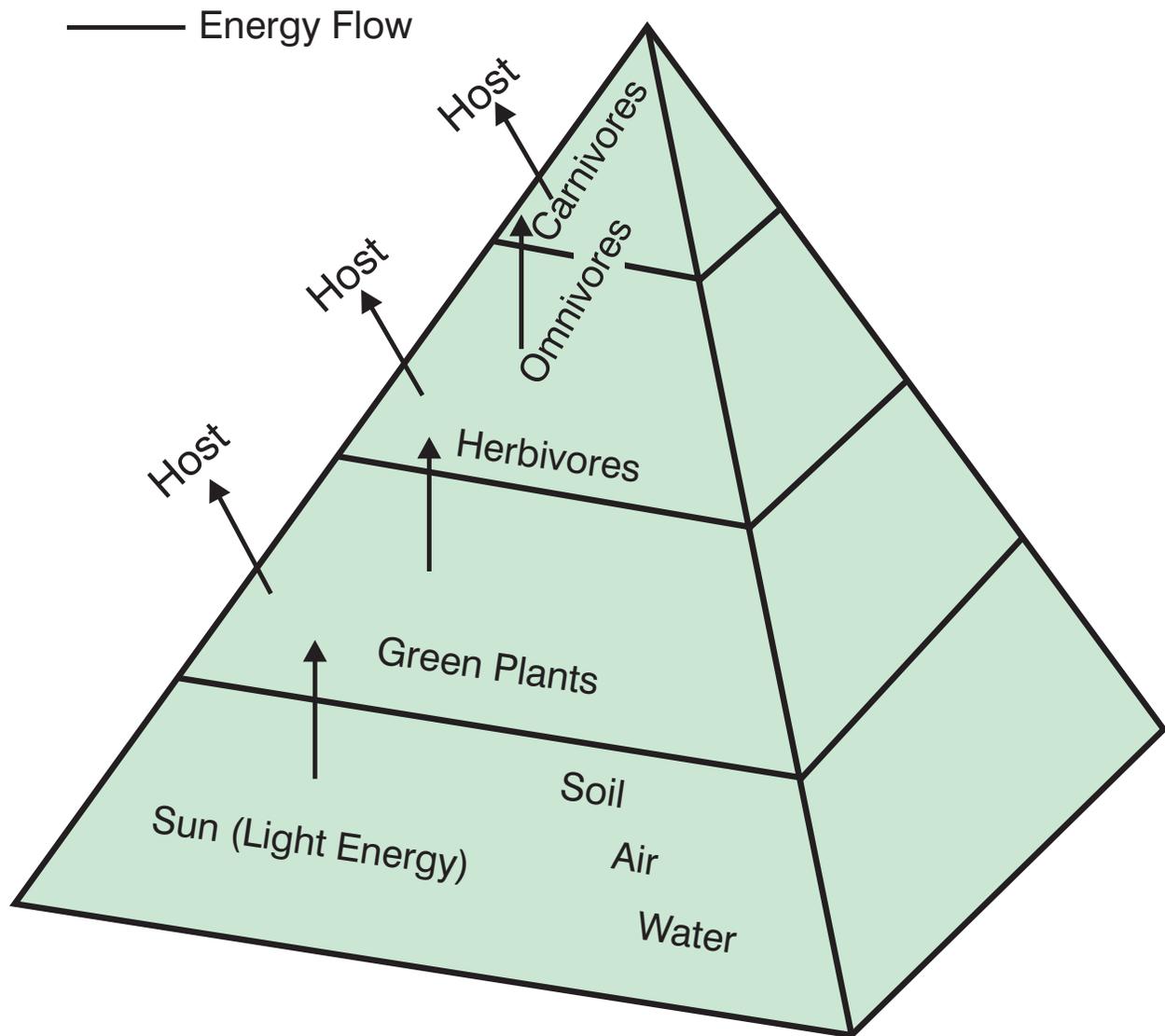
**Part Three: Short Answer**

*Instructions.* Provide information to answer the following questions.

1. What are the six habitat growth stages?

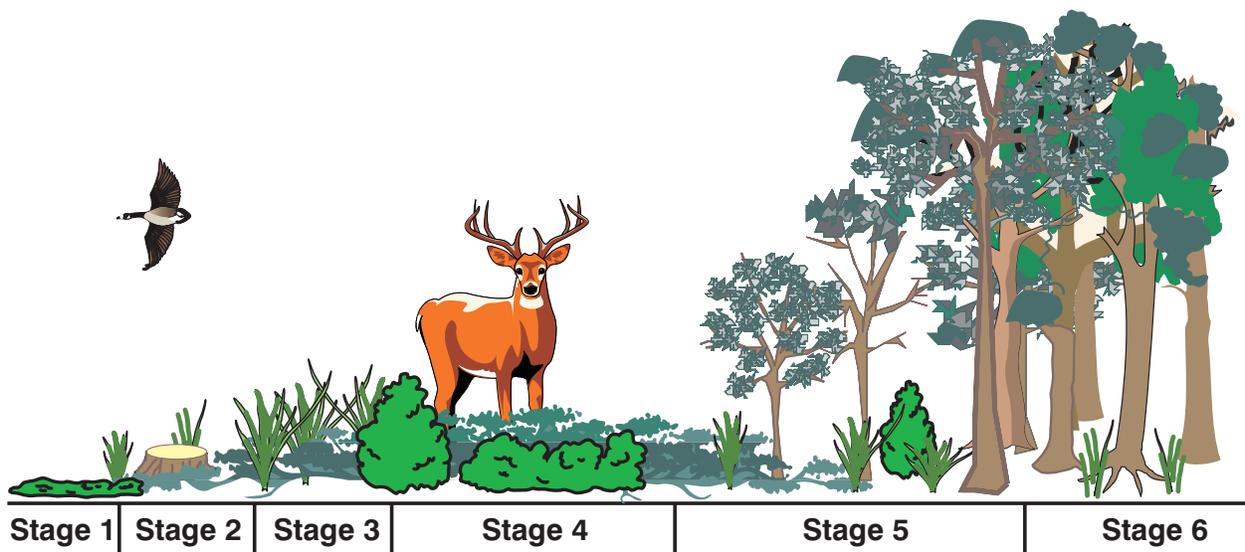
2. Explain the rotation of the earth.

# THE BIOTIC PYRAMID



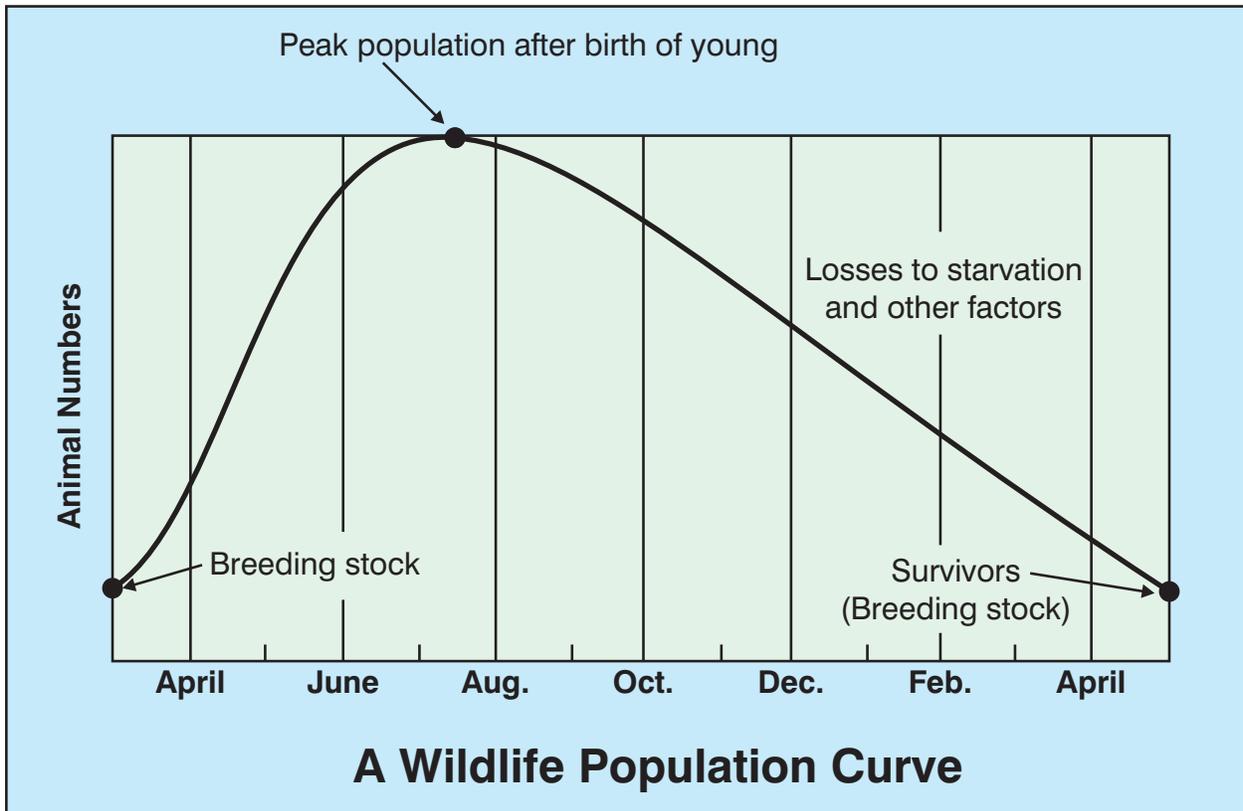
(Courtesy, Interstate Publishers, Inc.)

# SIX STAGES OF PLANT SUCCESSION

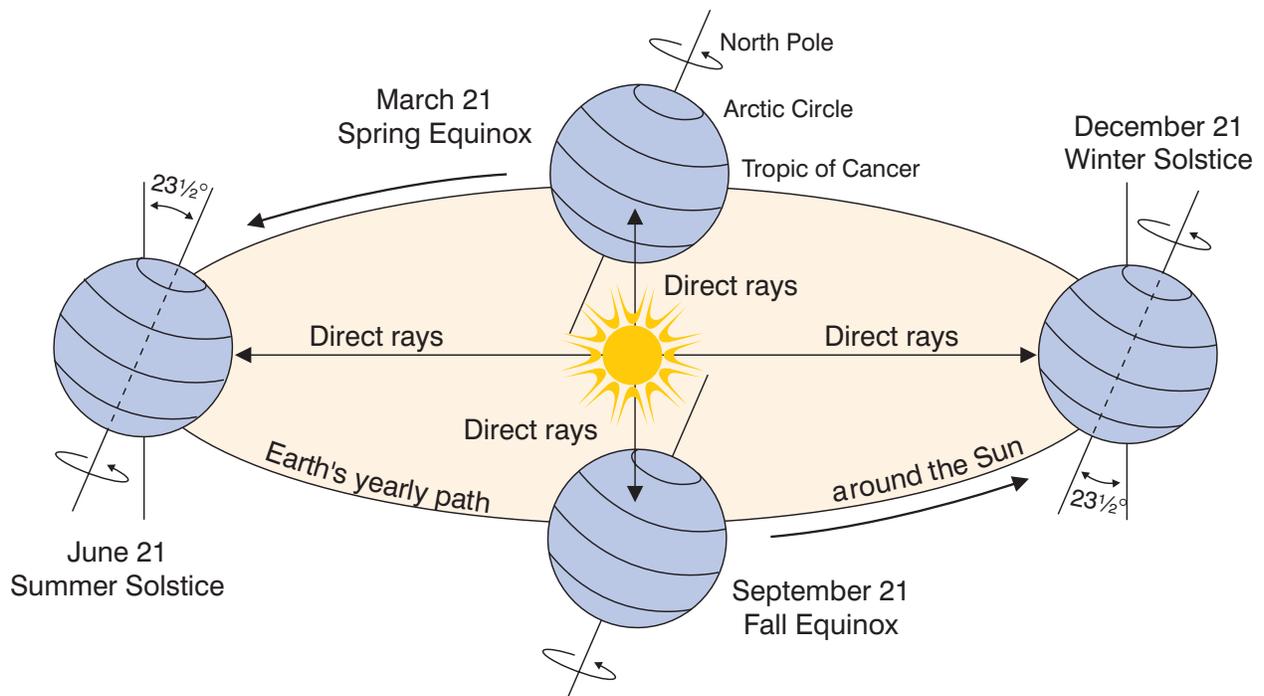


*(Courtesy, Interstate Publishers, Inc.)*

# WILDLIFE POPULATION CURVE



# EARTH'S REVOLUTION INFLUENCES SEASONS



*(Courtesy, Interstate Publishers, Inc.)*

# PLANT FOOD SOURCES

## Browse:

- ◆ tender growth of shrubs and trees
- ◆ perennial plants
- ◆ tender leaves, shoots, and stems

## Herbage:

- ◆ succulent nonwoody leaves and stems of herbaceous plants
- ◆ small to medium in height
- ◆ grasses, vines, weeds

## Mast:

- ◆ fruits and nuts of trees and shrubs
- ◆ hickory nuts, acorns
- ◆ wild plums, blackberries, pokeweed berries

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# Lab Sheet

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## Determine Successional Stages

**Purpose:**

The purpose of this activity is to become familiar with successional stages. (This activity can be carried out by groups of two to four students working together.)

**Objectives:**

1. To study an aerial photograph and distinguish the successional stages of the land.
2. To count the number of stages and make an assessment of the stages.
3. To determine the management practices needed to improve the habitat for a featured species.

**Materials:**

One aerial photograph per group.  
Paper and pen or pencil.  
Knowledge of successional stages.

**Procedure:**

1. Study an aerial photograph of a local tract of land.
2. Relate the physical features to the successional stages studied in the lesson.
3. Count the number of stages and note them on a sheet of paper.
4. Make a group assessment of the stages.
5. Determine the management practices needed to improve the habitat for a selected featured species. Write these down on a sheet of paper.
6. As a group, make a presentation to your class about the area you studied.

**Questions:**

1. How many successional stages did you count in your aerial photograph?
2. What are the management practices your group decided that would improve the habitat for your selected species?