4-H Wildlife Project—Intermediate Unit Book 1

The Wildlife Ecologist

PENNSTATE

College of Agricultural Sciences
Cooperative Extension

CONTENTS

INTRODUCTION

This 4-H wildlife project is designed to help you become familiar with the natural world around you, whether it's in your backyard, schoolyard, neighborhood park, or in a rural area. The book is divided into four chapters. Chapter 1 introduces you to the practice of nature journaling, a skill you will use throughout the book. Chapter 2 introduces the concept of habitat and how habitat suitability affects the animals you will find in an area. Chapter 3 covers wildlife populations, the natural processes that affect them, and how wildlife ecologists study populations. Chapter 4 describes how wildlife species and populations fit together into wildlife communities.

This book provides an opportunity to study wildlife ecology and wildlife management. To become a true wildlife ecologist, however, you will need to go beyond simply learning facts and information. Most wildlife ecologists have an understanding and respect, maybe even a love, for wildlife and their habitats. This feeling for the outdoors will take root and grow if you spend time with nature, observing the seasons, watching wild animals, and thinking about how wild systems work. You can learn *facts* about the outdoors from a book, but you can only really *understand* the outdoors by spending time in it. So go outdoors and begin to learn how the wild world works—it will be a lesson that stays with you for life!

Chapter 1

Nature Journaling

"Nature journaling" is the act of recording your observations about nature in a notebook. A nature journal can serve many purposes. It may be a simple nature diary in which you record the events of an outing so that you can remember them later. It may be a field notebook where you keep lists of species seen, plants identified, and bird calls heard in the field. Or it can be a creative space where you use drawings, poems, songs, or other artwork to capture your feelings while spending time outdoors. This 4-H project book uses many nature journaling exercises to help you gain a feeling for the wildlife and wild places around you.

Most wildlife biologists and wildlife artists keep journals. Some famous journal writers are Charles Darwin, notable for his theory of evolution and natural selection; John James Audubon, famous ornithologist and wildlife artist; John Muir, father of our national parks; Rachel Carson, author who warned the world about the dangers of pesticides; and Aldo Leopold, the father of wildlife management.

One of Pennsylvania's best-known wildlife artists, Ned Smith, was an avid nature journalist. Ned made it a point to walk in the fields and forests around his home nearly every day, recording the wild sights and sounds he observed. Ned's love of journaling was accompanied by a love of sketching, so his journals included both written descriptions of what he saw and detailed sketches. Eventually, Ned's love of nature led to a career in wildlife illustration and outdoor writing. Later in his life, he began painting Pennsylvania wildlife and wild scenes. Today, his paintings are the most sought after of all Pennsylvania wildlife artists. There is no telling where the practice of nature journaling may lead you!

> ". . . to stop rushing around, to sit quietly on the grass, to switch off the world and come back to the earth, to allow the eye to see a willow, a bush, a cloud, a leaf . . . I have learned that what I have not drawn I have never really seen."
> —*Frederick Franck*

HOW TO BEGIN

People keep nature journals for different reasons. Some make detailed sketches and close observations of nature as a way of studying plants and animals. Others write poetry or paint pictures of things they see in the wild that inspire their creativity. There is no right or wrong way to keep a nature journal—whichever way you decide to keep yours is the right way for you.

The tools you need for nature journaling are very simple. First, decide what type of book you will use for your journal. Some people use a three-ring binder or notebook so that pages can be added or rearranged as their journal changes. With a three-ring binder, you can grab any piece of paper and go outside to write or draw as the mood strikes you. Later, you can punch three holes in the paper and add it to your journal. Other people prefer to keep a journal with bound pages, such as a composition book, spiral notebook, or artists' sketchbook. The choice is yours.

After you decide on the book you will use, the only other tools needed for nature journaling are a few pens and pencils. If you plan to draw or paint in your journal, you may also want to get a basic set of colored pencils, markers, or paints. It is often best to keep all of your journaling supplies in one place so that you can grab them and go outside quickly when the mood strikes you. Keeping everything together in a canvas tote bag, book bag, or backpack makes it easy to run outside and journal any time you want.

If you get in the habit of nature journaling now, it may become an activity you'll enjoy doing all of your life. Many people find it interesting to look back at journals they kept in their childhood to see how things have changed over time. Journals can serve as reminders of trips and times that you otherwise might forget. It is also fun to see how your writing and drawings change as you get older!

THE RULES

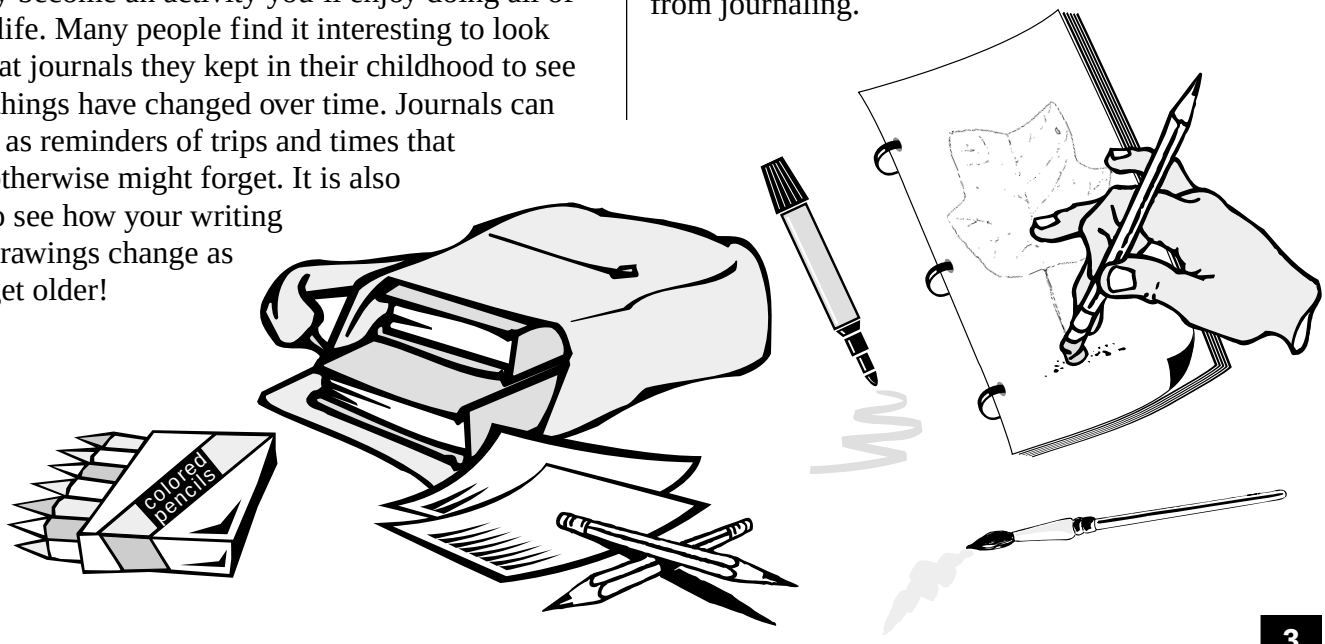
The "rules" for nature journaling are simple.

- **Never say that you can't.**

You may think you are not good enough at drawing or writing to keep a journal. But the beauty of a nature journal is that it is whatever you make it. Your journal time should be relaxing. Do not push yourself to be perfect. If you are not artistic, you can use words to describe what you see and use magazine pictures or photographs to illustrate. If you would prefer to draw or paint, you can fill your journal with images and use just a few words to add detail. Your journal may be very scientific, where you record wind and weather conditions and identify every species you see . . . or it may be very artistic, where you draw and sketch leaves, flowers, and bugs, having no idea what species they are. Many journals will be somewhere between these two extremes. The important thing to remember is that everyone *can* keep some type of journal.

- **Give your journal honest effort.**

Journaling gets easier the more you do it. In this book there will be certain activities requiring you to write in your journal. Your journal will be much more meaningful if you write in it more often than the book requires. At first, journaling may seem hard and you may not know what to write. As you do it more often, journaling will become easier and be more enjoyable. Eventually, you may look forward to journal time! The more you put into it, the more you will get back from journaling.



• Write without distraction.
Journal time will be more meaningful if you allow your brain to slow down and think while you write. For this reason, do not try to journal while watching TV, listening to the radio, or watching a soccer game in the park. Instead, go to a comfortable spot (either outdoors or indoors near a window) where you will not be interrupted for awhile. You should allow at least 15 minutes of quiet time for journaling.

• Write freely.
No one will see your journal except your teacher or 4-H leader. If anyone else wants to see it, they should ask your permission. You may want your journal to be a private place to record your thoughts on what you see around you and how you are feeling. Or you may want to show your journal to others. The choice is yours—but never write or draw with an audience in mind. That leads to a loss of creativity and a frustrating drive for perfection.

• Balance images.
Try to include both writing and pictures with each entry. If you get frustrated when you draw, you can cut out pictures in magazines to illustrate what you are writing about. You may use a glue stick to paste leaves, seeds, or papers into your journal. You may use your journal like a scrapbook of your project, including admission tickets from club outings, wildlife fact sheets, or photographs. You can cover journal pages with contact paper or clear adhesive to keep them together.

• Entries should be a minimum of two pages.
At first, that will seem too long. Later, you will probably pass the two-page mark with each entry. Two pages gives your brain time to slow down and fully absorb everything you are seeing, smelling, and hearing. (Two pages can be the front sides of two sheets of paper, or the front and back of one sheet.)

GETTING STARTED

Here is how to start your nature journal:

1. Select your journaling spot.
Find a quiet place that is comfortable and safe for journaling. This may be a shady spot in a yard, a quiet corner of your schoolyard, or a comfortable spot in a local park. It can even be on a porch or balcony. An indoor journaling spot near a window can also be used, though outdoor spots work better because they put you in direct touch with the natural world around you. In this book, we will often refer to your journaling place as your "solo spot." You may want to go to this spot each time you journal, or you may want to seek out new journaling spots on different days.

2. Make a heading for the page.
On the first three lines, fill in the date, location, and weather. On another line, fill in the activity number, focus, or purpose of the activity (if you are journaling on your own, you can fill in "My Own Time" on this line). Now you are ready to begin your journal entry.

3. Begin your journal entry.
Beginning an entry is often the hardest part of journaling. At the end of this chapter are some easy *Journal Time!* activities to help you begin your nature journal. You can use these quick and easy activities any time you journal to get your brain "unstuck" and begin writing and observing.

SAMPLE JOURNAL PAGE

Remember that a journal's purpose is to record your nature observations and make ecological facts and information more real and meaningful for you. There is no right or wrong way to make a journal entry. The following are examples of one person's journal pages; your pages may be very different.

SCIENTIFIC SAMPLE:

Date: 3 october, 2002

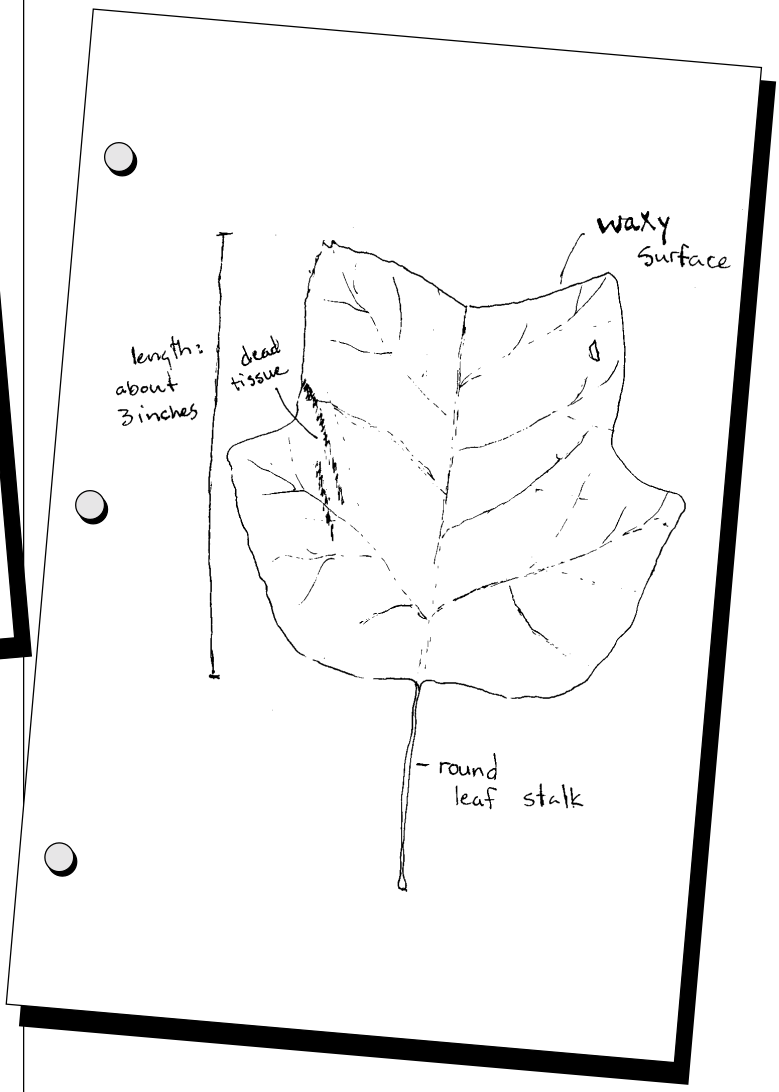
Location: Tussey Ridge

Weather: Partly Sunny 52°F

Activity #: 1

Purpose: leaf tracing for improving my observation skills

ARTISTIC SAMPLE:



Journal Time!

Activity 1—Leaf Trace

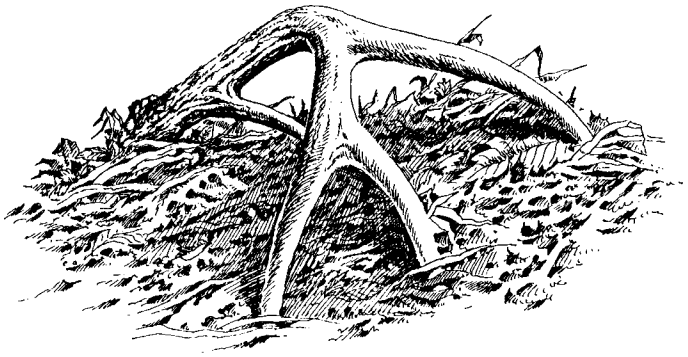
Pick up a leaf and trace it on the page. Add notes about how it feels, what color it is, what plant you think it came from. Draw in the veins and any spots or tears in it. What caused the tears? Have insects been feeding on it? Are there any bugs crawling on it? By concentrating on one small object, you will slow your brain down and trigger your observation skills.

Activity 2—The Daily Double

Open your journal to two blank sheets of paper. Label the right-hand page, "Observations." Label the left-hand page, "Thoughts." On the right-hand sheet, record in detail everything you see, hear, or smell: birds flying by, leaves shaking in the wind, wind whooshing through the trees, bugs crawling on the ground, the smell of flowers or moss or dry grass, the colors of flowers, the texture of tree bark—as many details as you can observe. On the left-hand sheet, list the thoughts you have as you write: where have you seen these birds or bugs before? Does this place remind you of any other place? Do the smells remind you of other places? What does the tree bark feel like? Is it rough or smooth? Completing the "Observations" page helps trigger your observation skills, while the "Thoughts" page helps you relate what you are seeing to your own life.

Activity 3—Looking at Levels

Draw or describe three things on the ground, such as a stick, a leaf, and an acorn. Then draw or describe three things at eye level, like a flower, a bush, or interesting tree bark. Then draw three things above your head, such as the structure of a tree branch, the pattern of leaves in a tree, and a squirrel nest or bird nest. Are there any relationships between the things you are observing at different levels? Does the acorn on the ground come from the oak tree over your head that holds a squirrel nest? Look for relationships and describe them.



DEER ANTLER

WILDLIFE CAREER:
Wildlife Artist or Outdoor Writer

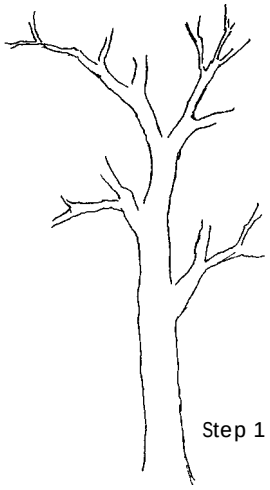
Wildlife artists and outdoor writers share their love of the outdoors through sketches, paintings, or stories. Before beginning to paint or write, these people study wildlife species and their habitats to learn how natural systems work.

Some wildlife artists and writers work for outdoor magazines writing and illustrating articles. Others may work on their own, selling their paintings and stories to collectors or publishers. Still others write and paint as a pastime, and they do not attempt to make money at it.

Colleges and universities offer courses in writing, journalism, and literature. Such courses are useful for outdoor writers. Some wildlife artists attend art school to learn the details of painting and drawing.

Often no special degree is required to be a wildlife artist or outdoor writer—just a deep love of the outdoors, skill in writing or painting, and a desire to share your love of the outdoors with others.

PROGRESSION OF JOURNAL SKETCH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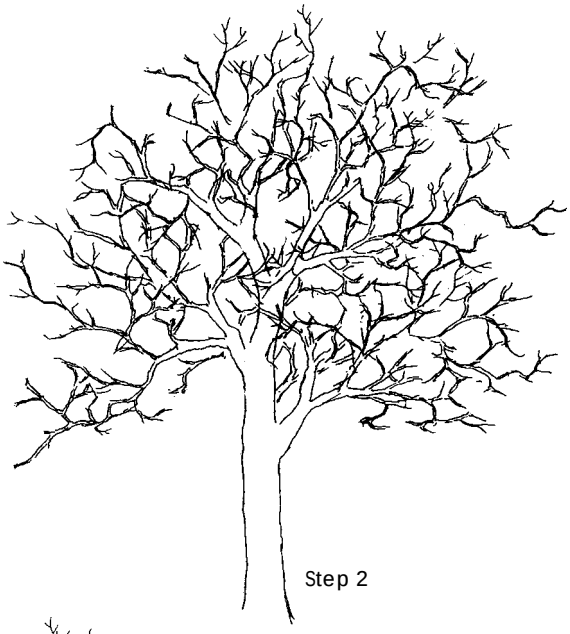
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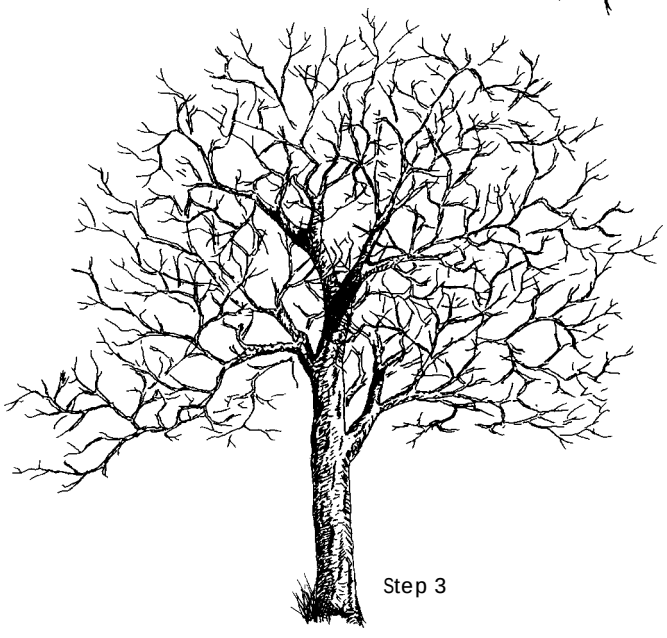
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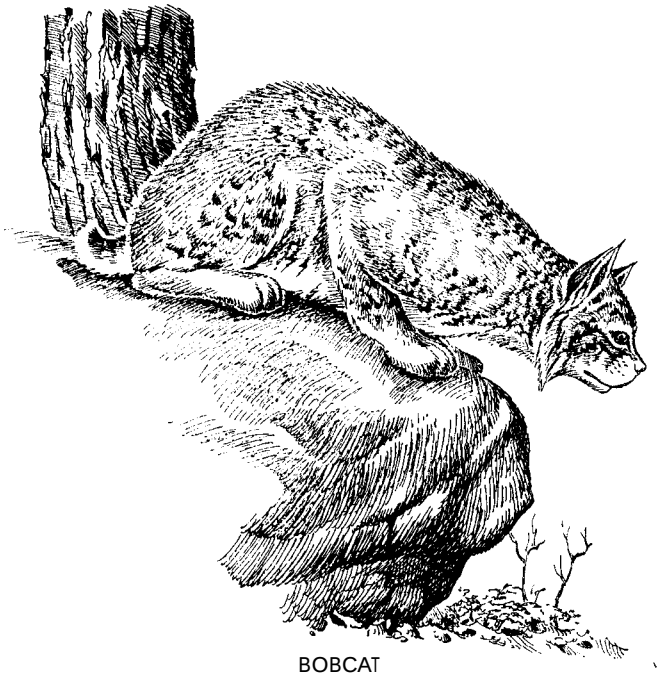
Chapter 2

WILDLIFE HABITAT



BOBCAT

The area that provides an animal with adequate food, water, shelter, and space is that animal's habitat.

HABITAT: What Animals Need to Live

Wild animals need food, water, and shelter to survive. Food, water, shelter, and space are *habitat requirements.*

Food

Food is essential for all wildlife, and different species eat different kinds of food. Some animals eat only plant parts, such as nuts, berries, grass, twigs, and leaves. These animals are called *herbivores*. Deer and rabbits are examples of herbivores.

Other animals eat only meat, such as live animals or carrion (dead animals). These animals are called *carnivores*. Bobcats and hawks are carnivores. Insectivores, such as bats, shrews, and some birds, are specialized carnivores that eat only insects.

Animals that eat both plants and animals are called *omnivores*. These animals may eat nuts and berries in the morning, bird eggs in the afternoon, and frogs at night. Raccoons and opossums are omnivores. Are you a carnivore, omnivore, or herbivore?

With different animals eating different kinds of foods, the wildlife menu can get pretty complicated. Every day, animals eat plants or other animals to survive, and the whole time they are in danger of being eaten themselves! Every species fits into a *food web* based on what it eats and what eats it.

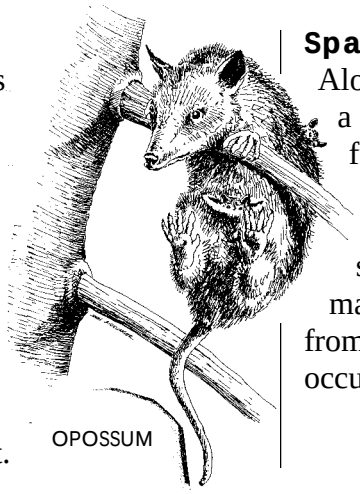
Animals that eat other animals are called *predators*, and the animals they eat are called *prey*. A gray fox is a predator of meadow voles. Meadow voles are prey for gray foxes, barn owls, and red-tailed hawks.

Water

Water is the most important substance on earth. Without it there would be no life. Animals can go without food for weeks, but they cannot go without water for more than a few days. Puddles, springs, streams, and ponds provide drinking water for wildlife. Some animals get all of the water they need from their food.

Shelter

Shelter is any place that provides an animal and its young with protection from the weather and from predators. Wildlife biologists refer to shelter as *cover*. A rabbit hides under a bush when a fox or hawk is nearby. The bush provides the rabbit with cover. Woodchucks take cover in underground burrows. Your cover is your house or apartment.



OPOSSUM

Space

Along with food, water, and cover, animals need a certain amount of space to carry out their life functions. A large animal may need a lot of space, while a small animal needs only a little. Black bears may travel several miles a day in search of food, while a white-footed mouse may spend its entire life just a few hundred feet from where it was born. The space that an animal occupies during its life is that animal's *home range*.

Learning Can Be Fun!

1. Mystery Word

Fill in the blocks with the word or words described by the clues below to reveal the *mystery word.*

a. The area an animal travels through to find its habitat requirements is its _____ _____.

b. Animals that are too crowded do not survive well because each animal needs a certain amount of _____.

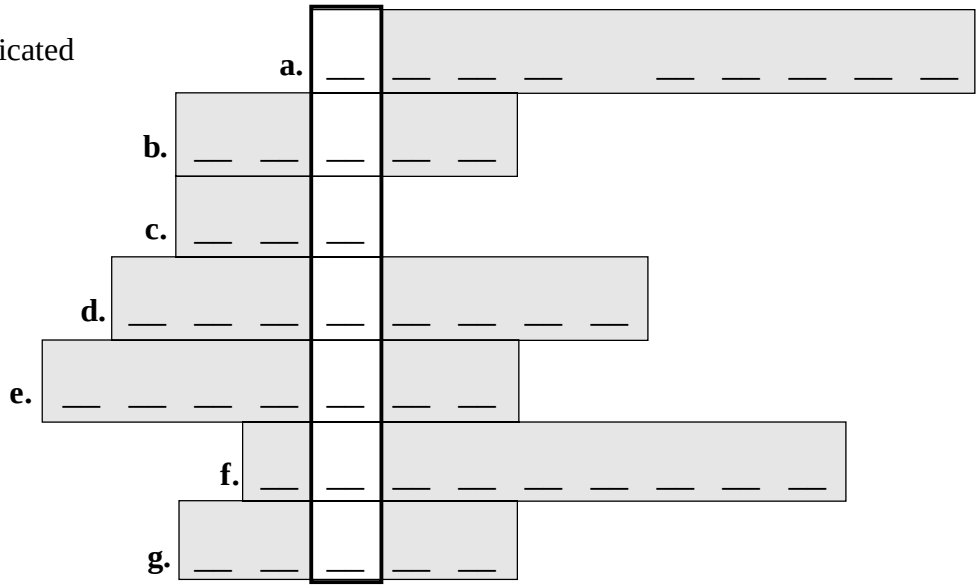
c. Each animal, along with the food it eats and its predators, is part of a complicated food _____.

d. An opossum eats meat, berries, vegetables, and other foods. It is an _____ .

e. Animals need _____ to keep themselves and their offspring protected.

f. An owl eats only meat. It is a _____.

g. The most important substance on earth is clean _____.



Answers: (a.) home range, (b.) space, (c.) web, (d.) omnivore, (e.) shelter, (f.) carnivore, (g.) water

2. Habitat Word Search

A raccoon is having trouble finding all of his habitat requirements within his home range. In the space below, please help him find his food, water, and shelter.

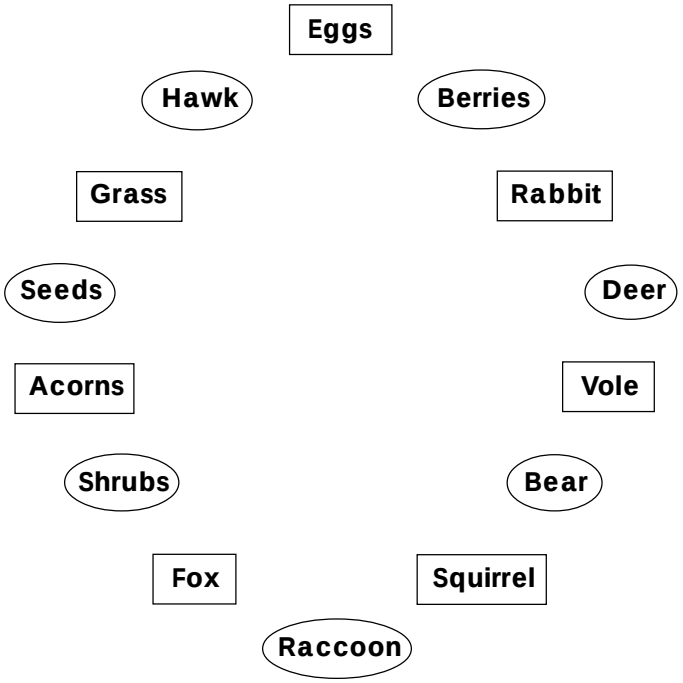
D	B	M	O	P	Y	G	F	C
W	E	T	L	A	N	D	O	B
A	R	N	F	G	U	V	R	I
T	R	A	T	I	E	U	F	R
E	I	M	O	R	S	L	O	D
R	E	L	A	H	E	H	R	E
M	S	E	P	F	G	E	E	G
A	R	I	P	O	N	D	S	G
T	L	O	M	A	E	R	T	S
E	H	S	I	F	Y	A	R	C

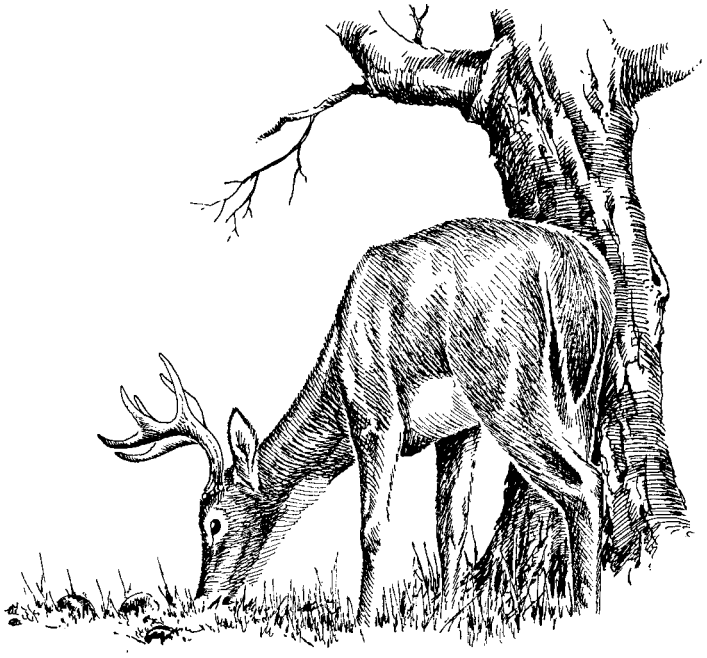
Raccoon habitat requirements:

Berries	**Pond**	**Forest**
Fish	**Stream**	**Den trees**
Bird eggs	**Wetland**	**Brush pile**
Crayfish	**Water**	**Cover**

3. The Web of Life

Draw a line from each animal to each of the items it may eat (see the Appendix for information on what animals eat).





WHITE-TAILED DEER

Journal Time!

Activity 4—Focus on Habitat

PURPOSE: Identify the sources of food, water, and shelter available to wildlife in an area.

Go to your solo spot to search for food items, water sources, and areas of shelter that wildlife could use. (The Appendix at the back of this book lists different resources used by the most common Pennsylvania wildlife species.) Make a map of the area that includes the following items.

• **Cover.** Describe the cover type(s) in the area (grassy, shrubby, young forest, mature forest, farm field) and make a rough sketch of how cover is arranged.

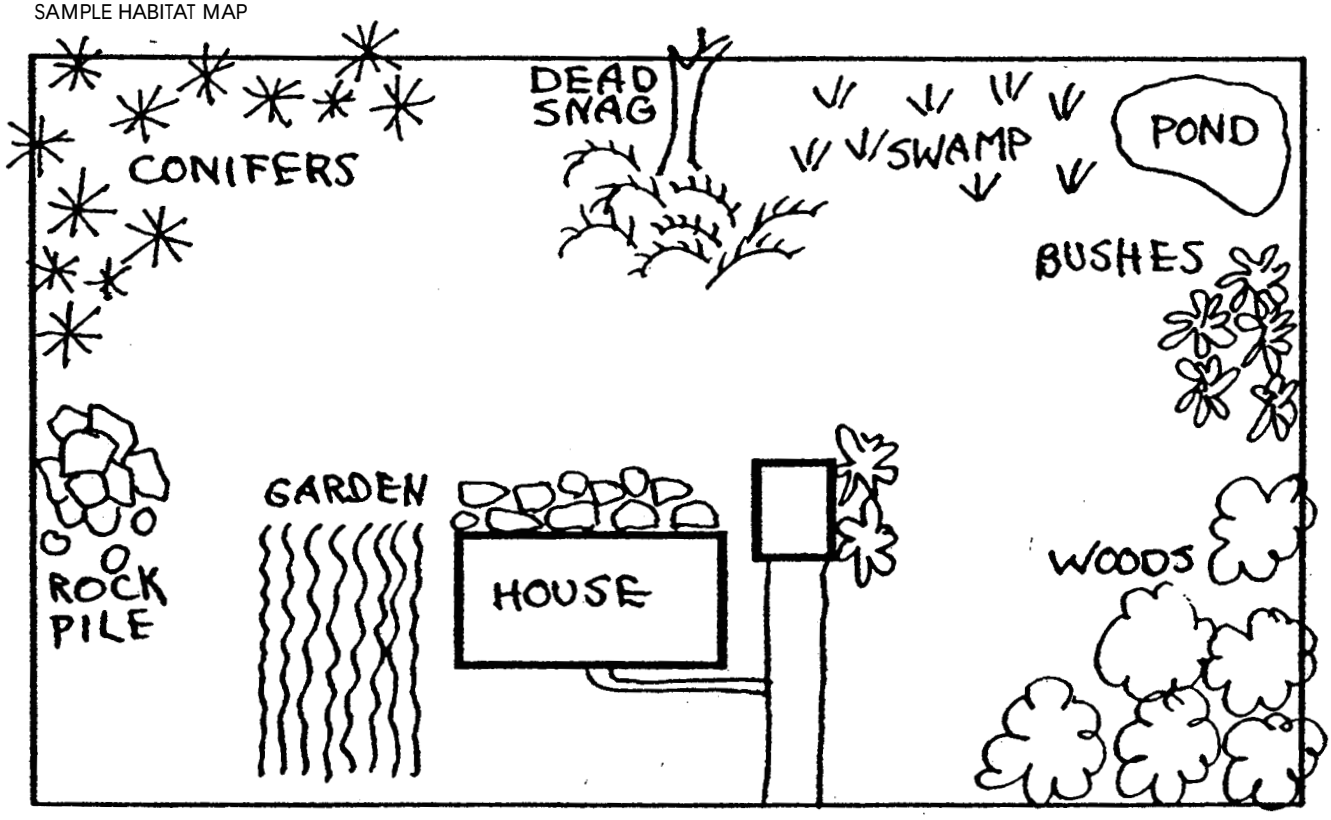
• **Shelter.** Make a note of any places that would provide nesting or resting cover for an animal. Tree holes, rock piles, fallen logs, and brushy thickets could all give shelter to birds and animals (see Appendix). Note their locations on your map.

• **Food.** Do you see any sources of food that animals could use? Mark their location on your map. If you don't know the names of plants and shrubs, draw their leaves on another page and try to identify them later with a field guide. Do you see any nuts or berries, or seed and nectar sources?

• **Water.** Do you see any sources of water? Are there streams, pools, puddles, or wet seep areas that wildlife could use for drinking? Mark them on your map.

• **Wildlife seen.** Do you see any animals or birds in this area? On another page, describe the birds and animals you see, even if you don't know what they are. Do you see any wildlife signs or clues, such as feathers, tracks, bones, or half-eaten nuts or leaves? Sketch wildlife clues on another page in your journal.

SAMPLE HABITAT MAP



HABITAT SUITABILITY: Why Animals Live Where They Do

An animal's habitat is the place where it lives. You can think of it as the animal's address. Within its habitat, an animal can find everything it needs to survive. For example, the forest is ideal habitat for the gray squirrel. The forest provides the squirrel with tall trees for nesting and nuts and buds for eating. The forest also provides the squirrel with pools and streams for drinking and plenty of space to carry out its life functions.

The amount and type of food, water, shelter, and space in an area determines that area's *habitat suitability* for a species. For an animal to live in an area, the right kinds of food, water, and shelter must be present and must be available at the right time of year.

A habitat that is suitable for one species may be unsuitable for another. The forest is excellent habitat for the gray squirrel, but the tall trees of the forest do not make good habitat for muskrats and red-winged blackbirds. These species require open, grassy wetlands for their food and shelter.

In Pennsylvania, the typical stages of plant succession include:

1. bare ground
2. annual forbs (herbaceous plants) and grasses
3. perennial forbs and grasses
4. shrubs
5. young trees (woodland)
6. mature trees (woodland)

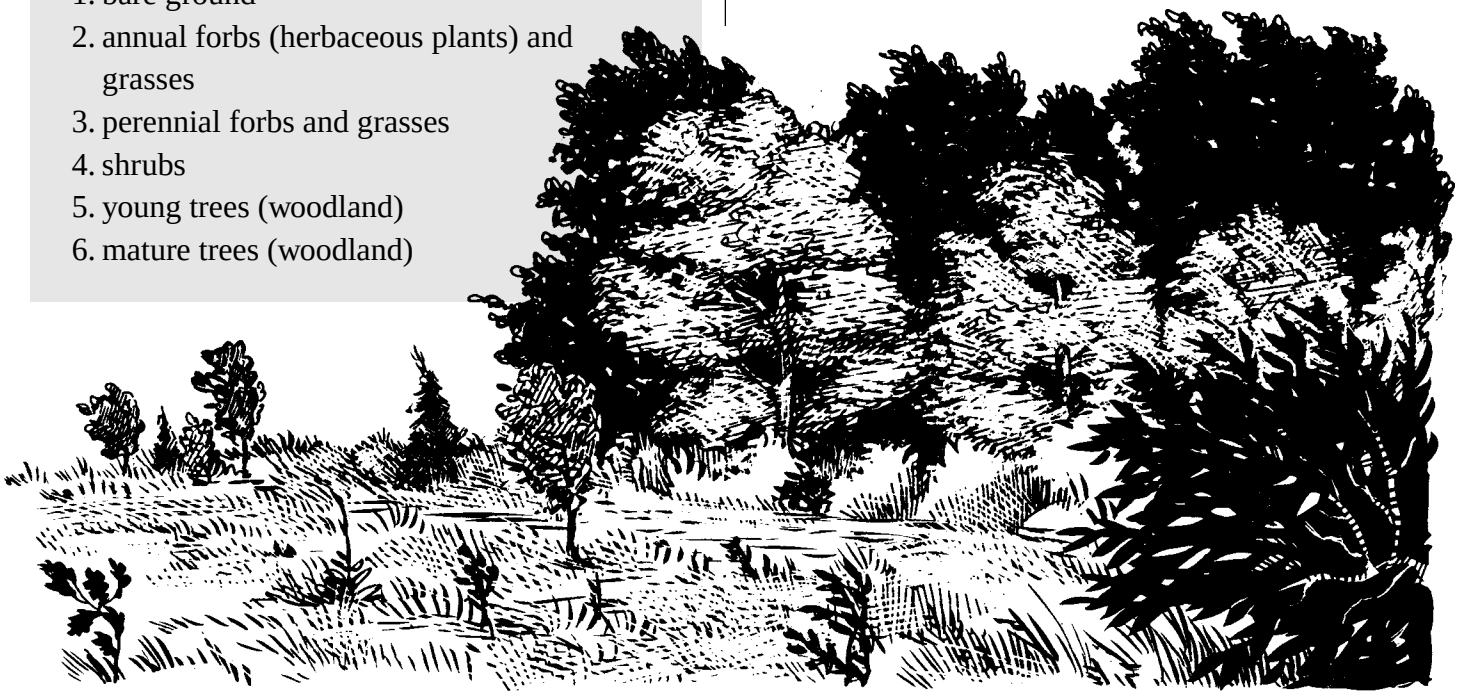
Pennsylvania has many species of wildlife because it has many different habitat types. Habitats in Pennsylvania include young and mature forests, farm fields and meadows, lakes and ponds, streams and rivers, wetlands, brushy areas, cities, urban parks, and residential neighborhoods.

The rest of Chapter 2 describes some of the most important factors that affect habitat suitability. It is important for wildlife ecologists to learn these concepts because once we understand what affects habitat suitability, we can begin to understand how changing a habitat can change the animals found in an area.

Plant Succession

Plant succession is the process that occurs when one plant community replaces another over time. This is one of the most important factors affecting habitat suitability, because plants provide both food and cover for wildlife.

If you quit mowing your lawn, the grass would grow very tall, and eventually small shrubs would start to grow. If you still didn't mow it, tree seedlings would join these small shrubs. Eventually, the tree seedlings would grow into large trees and could shade out the grass and shrubs beneath them.



PLANT SUCCESSION—from old field to forest

A single step in plant succession may take weeks, months, years, or even centuries to be completed. In some areas, soil or climate conditions prevent an area from moving beyond a certain stage. That is why not all habitats end up as mature woodlands.

If the plants in an area are killed or disturbed, succession drops back and starts over again. If the mature trees in a forest are harvested, small plants and shrubs will grow again. After several years, young trees will grow in the opening that the harvest created. Natural disturbances like fires, tornadoes, or disease outbreaks also can cause succession to start again.

Vertical Structure

This concept refers to how plants are layered in an area. To understand layering, just think of how tall plants get. Grasses and forbs (herbaceous plants) usually grow close to the ground and make up the *ground layer*. The next highest level, usually made up of shrubs, is called the *shrub layer*. The tops and branches of mature trees make the tallest layer. This is called the *canopy layer.*

How these different layers are arranged in an area is important for wildlife. Some animals may require a grassy ground layer for food but also need a tree canopy for cover. In general, the more layers in a habitat, the better the area is for wildlife. Although humans often like to see a "clean" forest of tall trees with little underbrush, these park-like settings are not very good for wildlife.

Edge

Edge is the boundary where different types of vegetation meet. Edges attract many wildlife species because various types of food and cover are close together. Edge is not good for all wildlife. Some species need large, continuous areas of grassland for their survival, while others need large, continuous tracts of forest.

VERTICAL STRUCTURE

FACTORS THAT AFFECT HABITAT SUITABILITY

An area's habitat suitability is also influenced by how the habitat is put together. Factors describing how a habitat is put together include the *interspersion* of resources, *fragmentation* of habitats, and *corridors* between habitats.

Interspersion

Wildlife often need more than one type of cover in an area. For example, a rabbit feeds in grassy areas but also needs to have thick shrubs nearby for protection from predators. Wild turkeys feed on the berries of shrubs but roost at night in tall trees. These animals require different successional stages in their habitats.

Mixed plots of different successional stages in an area are called *interspersion*. Interspersion can also be thought of as habitat patchiness.

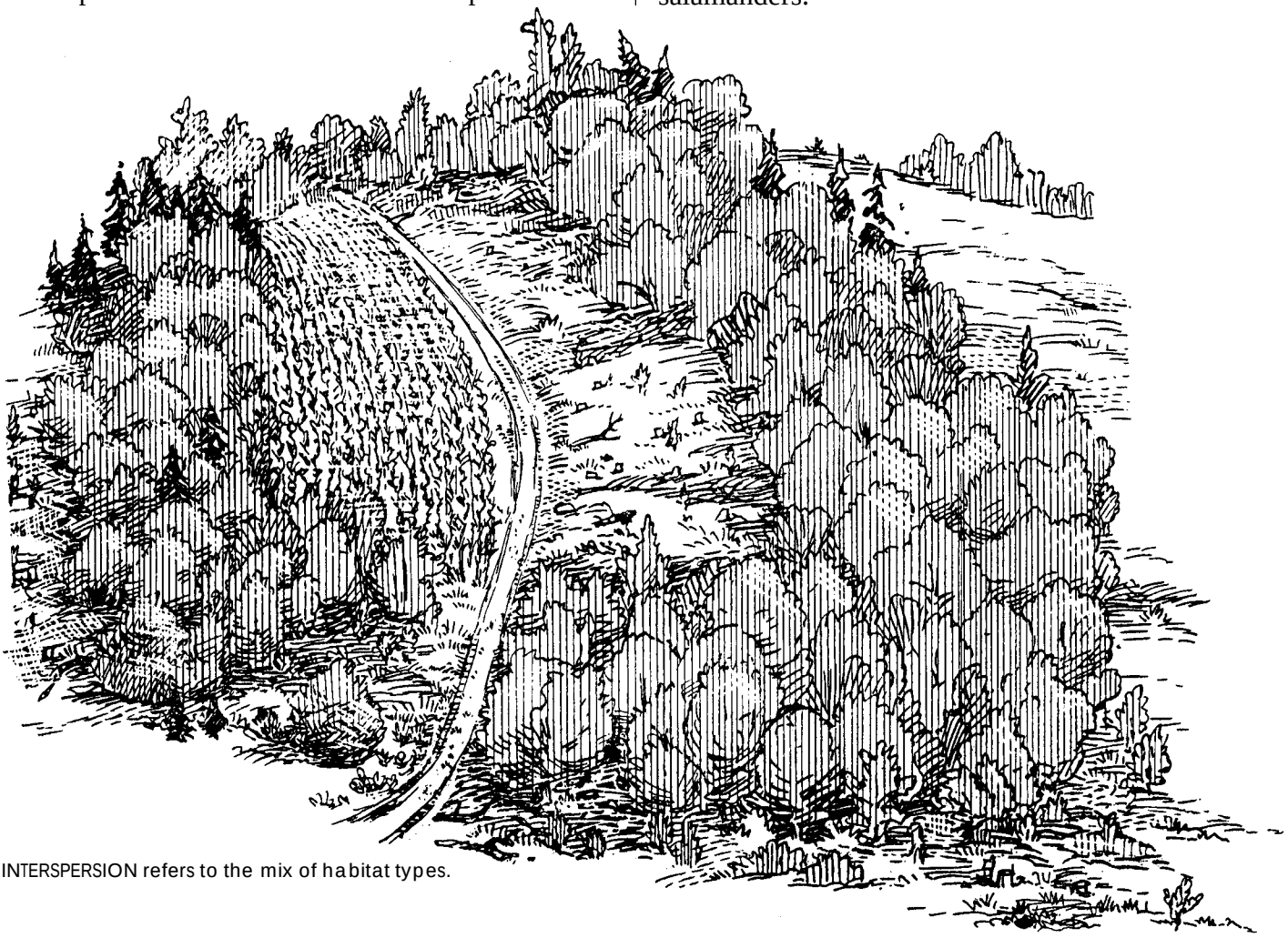
Usually, a habitat with high interspersion supports more species than an area with low interspersion. Remember, though, that some species get all their habitat requirements from one successional stage. Interspersion would lower the habitat suitability of an area for these species.

Fragmentation

When large blocks of natural habitat, such as forest, are broken up by roads, suburban areas, or agricultural areas, that habitat has been *fragmented*. Fragmented habitats often do not provide enough food, water, and cover for species to survive in the area.

Sometimes fragmented habitats become dangerous for wildlife. For example, millions of toads and salamanders die every year in Pennsylvania as they cross roads near their breeding ponds.

As housing developments and roads fragment a forest, habitat quality goes down for many forest-dwelling species. Humans bring domestic cats and dogs into an area, and our garbage attracts raccoons and opossums. In turn, these animals prey upon forest-dwelling wildlife like songbirds and salamanders.



INTERSPERSION refers to the mix of habitat types.

Corridors

Corridors are areas of secure cover that permit animals to travel from one patch of suitable habitat to another. In fragmented habitats, corridors can connect small islands of good habitat with one another, allowing animals to use an area they otherwise could not. Preserving, creating, and maintaining unbroken corridors is very important in wildlife management.

CORRIDORS have many shapes and sizes.

Learning Can Be Fun!

1. Habitat Match

Match the term on the left with the correct description on the right.

_____ **Corridors**	**A.** The way plant communities change over time
_____ **Interspersion**	**B.** Where two or more habitat types come together
_____ **Fragmentation**	**C.** Different types of plants growing to different heights
_____ **Succession**	**D.** The way resources are arranged in a habitat
_____ **Edge**	**E.** When wild areas become divided into smaller and smaller pieces
_____ **Vertical layering**	**F.** Links between habitats

Answers: (F.) Corridors, (D.) Interspersion, (E.) Fragmentation, (A.) Succession, (B.) Edge, (C.) Vertical layering

2. The HABITAT Rap

H is for homes,
You need one to stay dry.

A is for air,
You've got to breathe or die.

B is for bites
Of tasty food and drinks.

I is interspersion,
Mix it up, but leave us links!

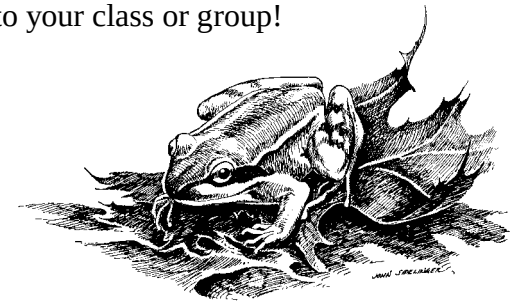
T is for terrestrial,
We spend our lives on land.

A is for aquatic,
We like the water, not the sand.

Put it all
Together. Are you getting all of that?

Animals and people—we all need **HABITAT**!!

Now make up your own song or poem about habitat. Write it in your journal. You could present it to your class or group!



WOOD FROG

Journal Time!

Activity 5—Habitat Suitability

PURPOSE: Recognize that habitat characteristics influence the species found in an area.

1. Select an animal or bird that lives in Pennsylvania. Use a field guide or library book to learn about its habitat requirements. List the animal and its requirements in your journal. (Example: Black bears eat berries, acorns, insects, small mammals, and carrion. They require large forested areas with den sites in caves, tree roots, or rock piles.)

2. Return to your solo spot and assess its habitat suitability for the animal you picked. Can you find any suitable food sources? Shelter? Draw or describe the food and shelter that your animal could use in this area.

3. Is anything lacking? Food? Shelter? Space? How could you improve the area for the species you picked? List ways that you could improve the habitat for this animal.

4. Would this ever be ideal habitat for the animal? Why or why not?

5. What types of animals could live in the area of your solo spot? Use a library book or field guide to investigate habitat requirements of different animals. You can also ask someone who is knowledgeable about wildlife. List a few of the possible species at the end of your journal entry. Keep an eye out for these species when you return to your solo spot next time!

Activity 6—Bird's Eye View

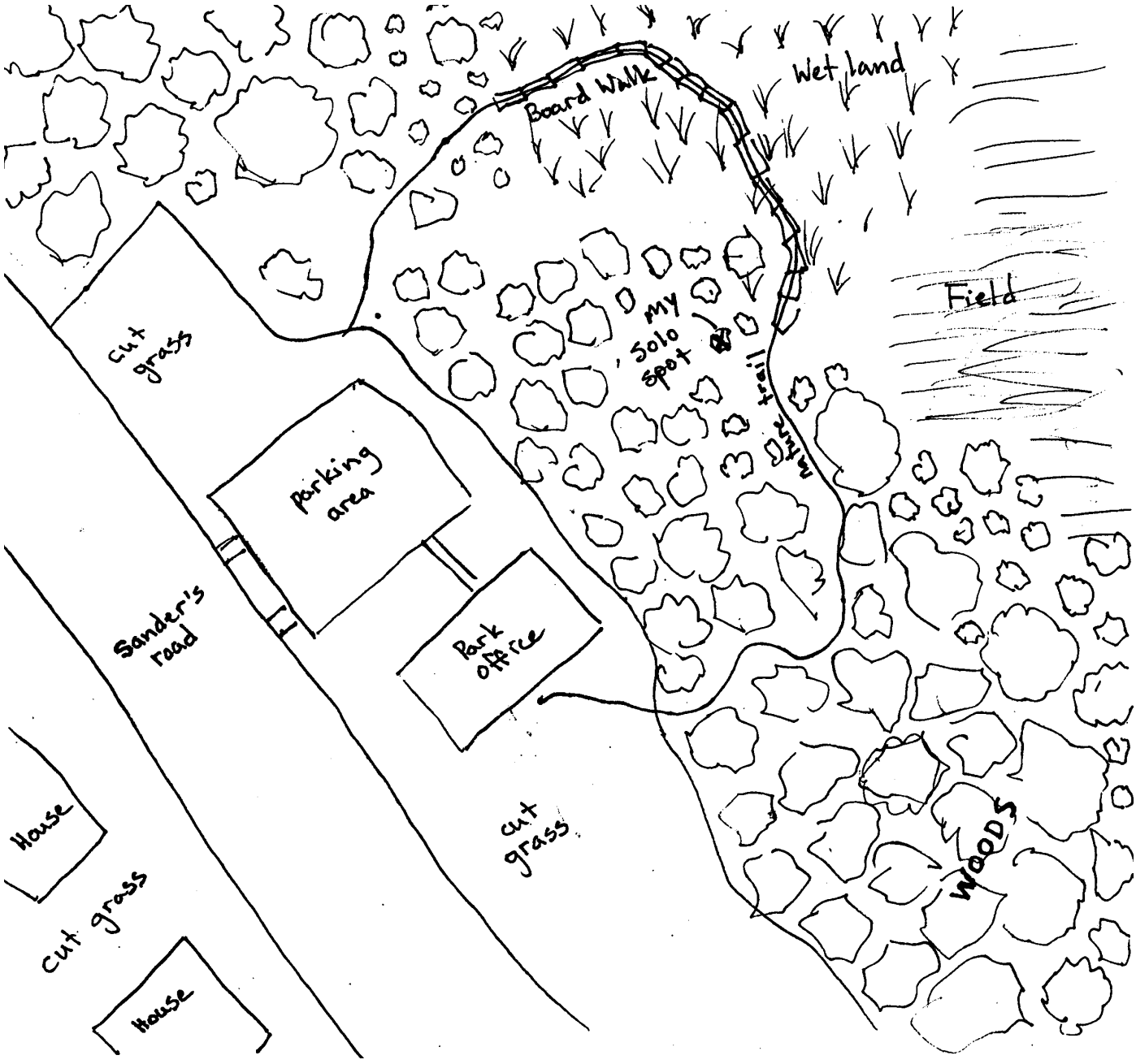
PURPOSE: Identify factors affecting habitat at the landscape level.

1. Go to your solo spot and draw a sketch of it from the ground. Include patches of trees, shrubs, and grasses. Does your solo spot have multiple layers of vegetation? Draw them in and label them. What successional stage best describes your solo spot?

2. Imagine a bird's-eye view of the same area. Draw a map of your site in relation to other features: roads, buildings, mountains, streams, and patches of forest or fields. If possible, use a road map, topographic map, or aerial photo to help you see how your area fits into the larger landscape.

3. Now rank the area in your drawing based on the habitat characteristics discussed in this section. Does the area have high or low interspersion? Are there many or few edges? High or low fragmentation? Are corridors available for wildlife?

BIRD'S EYE VIEW OF LANDSCAPE—example

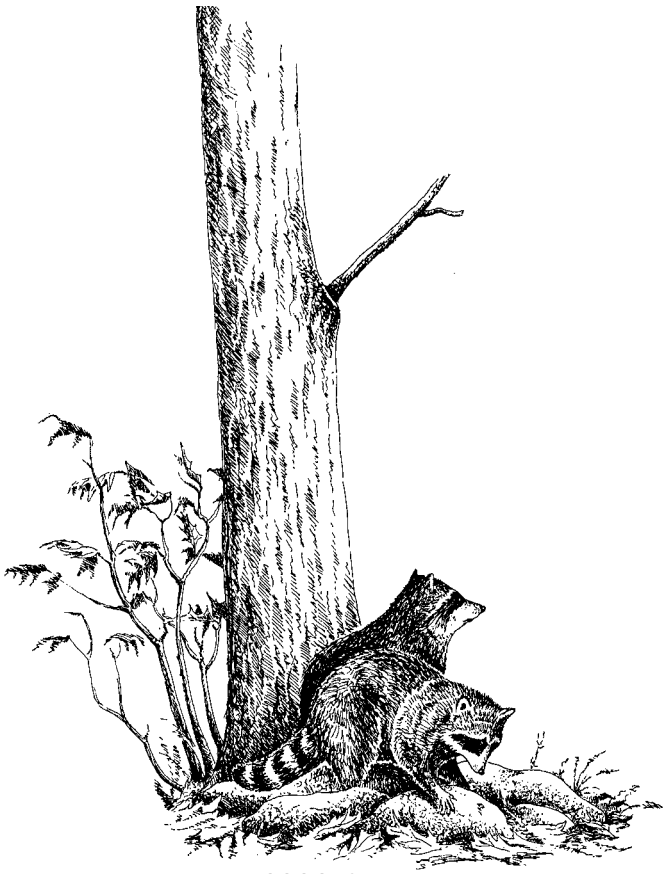


WILDLIFE-HABITAT RELATIONSHIPS

The way an animal uses its habitat is called the animal's *niche*. If you think of habitat as an animal's home address, then think of niche as the animal's job description or role.

Some species occupy a very narrow niche, meaning they have very strict habitat requirements and can only survive under certain habitat conditions. These species are called *habitat specialists*. In Pennsylvania, the hooded warbler is a habitat specialist. These bright yellow and black birds require mature forests with dense undergrowth for their survival. They nest only in small trees or shrubs under the forest canopy. If anything happens to the forest canopy or to the shrubs in the understory, hooded warblers will not nest in the area. They will not live in other types of habitat.

Other species occupy a broad niche, meaning that they are very flexible in their habitat requirements and can live in a variety of habitat conditions. These species are called *habitat generalists*. The raccoon is a good example. Raccoons can live in deep forests where they eat berries, bird eggs, snakes, and young birds. They can also live in agricultural areas where they eat corn and mice. They may live in wetland areas too and eat crayfish and salamanders. And finally, they can be found in urban and suburban areas where they might feed on garbage, birdseed, or dog and cat food.



RACCOONS

AMERICAN WOODCOCK

Usually, habitat specialists pose a greater challenge for wildlife managers than habitat generalists. Populations of most habitat generalists are doing fine because they can thrive even when habitat conditions change quickly. Populations of habitat specialists, on the other hand, often drop quickly once their habitat is fragmented or disturbed.

This difference between habitat specialists and generalists makes it difficult for people to understand that some wildlife populations are in trouble in Pennsylvania. When people see deer in their backyards and house finches, starlings, and chickadees at their bird feeders, they think Pennsylvania's wildlife is healthy and protected. What they do not realize is that they are seeing habitat generalists. Many of Pennsylvania's habitat specialists are in trouble because humans have dramatically changed their habitats. But because people rarely see these species, their problems go unrecognized.

Early and Late Successional Species

Wildlife species that depend on grasslands for their survival are called *early successional* species. Meadow voles, meadowlarks, and ring-necked pheasants are examples of early successional species. Bears, barred owls, and scarlet tanagers are considered *late successional* species because they rely on mature forests for their habitat requirements. Woodcock and snowshoe hares are good examples of *mid-successional* species. Some animals can live in a variety of successional stages.

Learning Can Be Fun!

1. Generalists and Specialists

Use a field guide or library book to learn the habitat requirements of each of the following species. Then label each with a (G) for habitat generalist or (S) for habitat specialist. Each of these animals can be found in Pennsylvania.

_____ Eastern massasauga rattlesnake

_____ Ovenbird

_____ Fisher

_____ White-tailed deer

_____ Opossum

_____ Brook trout

_____ Blue jay

2. Successional Stages

Label the following species as early (E), mid (M), or late (L) successional species, based on the habitat information you find in a field guide or library book.

_____ Eastern cottontail

_____ Fisher

_____ Hooded warbler

_____ Snowshoe hare

_____ Scarlet tanager

_____ Eastern meadowlark

_____ Timber rattlesnake

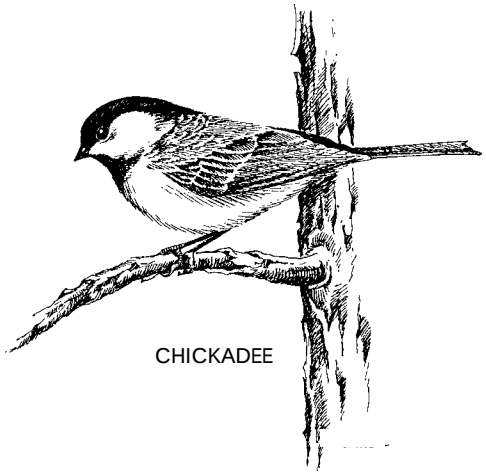
Answers: 1. S, S, S, G, G, S, and G; **2.** E, L, M, E, L, E, L

WILDLIFE CAREER: Habitat Manager

State and federal agencies hire habitat managers to manage public lands for fish and wildlife. Many of the habitat managers employed by state agencies are most concerned with increasing populations of game species such as deer, turkey, trout, and bass.

State and federal forestry agencies, nature conservancies, and corporations or hunting clubs owning large pieces of land also have a need for habitat managers. The landowner's goals determine which species are being managed. For forestry agencies, wildlife considerations are often secondary to tree production. For nature conservancies, habitat management may involve limiting wildlife populations to protect native plants.

Most habitat managers have a degree in Wildlife, Fisheries Science, or Forestry. Studies in horticulture, land management, soil science, and hydrology are also helpful. Many have experience with wildlife beyond their college education, such as being committed hunters, anglers, birdwatchers, or botanists.



CHICKADEE

Chapter 3

WILDLIFE POPULATIONS

Imagine you are a wildlife biologist who works with bobwhite quail, a small game bird that lives in agricultural habitats. You hear from more and more farmers that they don't see as many quail as they used to. Birdwatchers and some hunters are also concerned about quail numbers and are starting to say that the quail hunting season should be closed. At the same time, some hunters don't agree that quail are declining and don't think the season should be changed. As a wildlife biologist, what should you do?

The first thing you need to know is whether quail are actually declining or if it just appears that way to some people. To answer that question, you need to know how many quail there are and how present quail numbers compare with those of past years. In other words, you need to know the quail population in your area.

Population change = (birth + immigration) – (death + emigration)

WHAT IS A WILDLIFE POPULATION?

The number of individuals of a particular species in an area is called a population. Wildlife populations naturally rise and fall at different times of the year. Wildlife populations increase through birth or when new animals move into the area (immigration). Populations decrease through death or when animals leave the area (emigration).

Knowing the factors that cause populations to change, we can use the following formula to estimate how a population will change through the year: population change = (birth + immigration) – (death + emigration).

BLACK BEAR AND CUBS

Wildlife Populations Through the Year

Most wildlife populations show a regular pattern of increase after the breeding season and decline during other times of the year. You can see how this works by graphing a white-tailed deer cycle in the *Learning Can Be Fun* activity entitled, "Deer Population Cycle."

Numbers of animals in a population may vary over the course of a year (as in the case of the white-tailed deer) or many times during a year. Little animals that have litters several times a year (like mice) may go through several population fluctuations in just one year.

WHITE-FOOTED MOUSE

Learning Can Be Fun!

1. How Many Rabbits?

Calculate the rabbits' population change in a grassy meadow from the beginning of the year to the end of the year. The original rabbit population in the meadow is 50 (25 males, 25 females):

a. In May, each of the females gives birth to four kits (young rabbits).

How many rabbits are added to the population? _____

What is the rabbit population now? _____

b. During early summer, predators and disease kill 50 kits and 20 adults.

What is the rabbit population now? _____

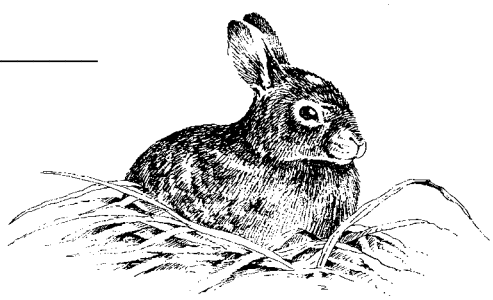
c. An additional 20 rabbits immigrated to the meadow during early summer.

What is the rabbit population now? _____

d. Because of crowded conditions, 25 rabbits left the meadow and emigrated to other fields and fencerows. Now what is the rabbit population? _____

e. Compared to the original rabbit population you started with, the rabbit population in the meadow now is: **higher** **lower**

(circle one)



EASTERN COTTONTAIL

Answers: a. 100, 150, **b.** 80, **c.** 100, **d.** 75, **e.** higher

2. Deer Population Cycle

In this activity, you will see how a deer population changes several times in just one year.

a. In spring, fawns are born and the population increases. This is the season of highest deer population. In the diagram below, place an (X) at the high level above "spring" in Year One.

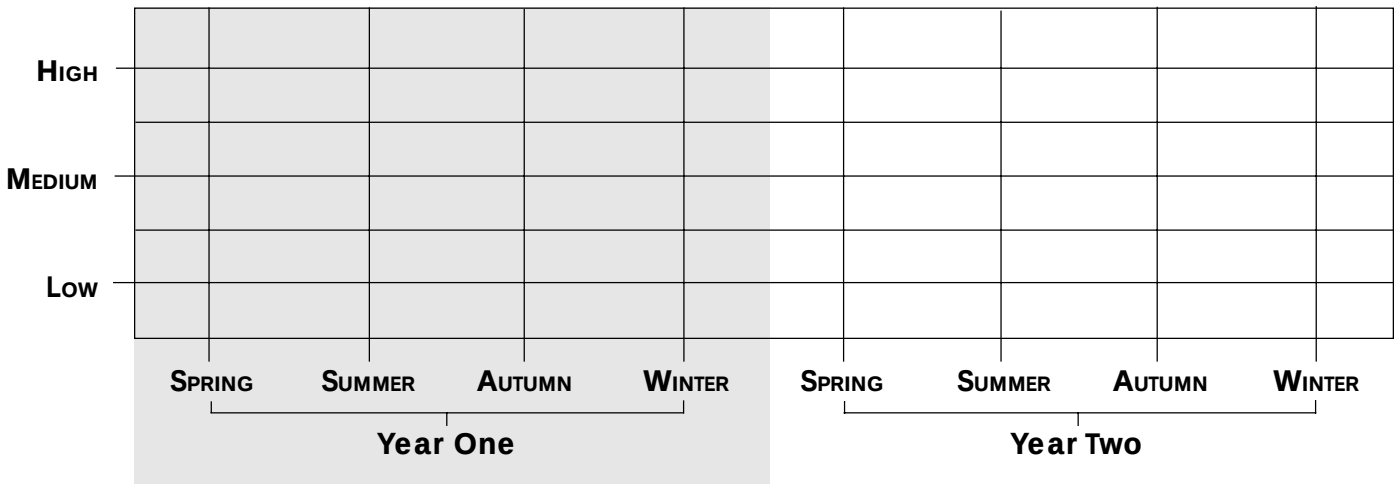
b. In summer, most deer are healthy, but growing fawns are vulnerable to predation. Put an (X) between medium and high population levels for "summer."

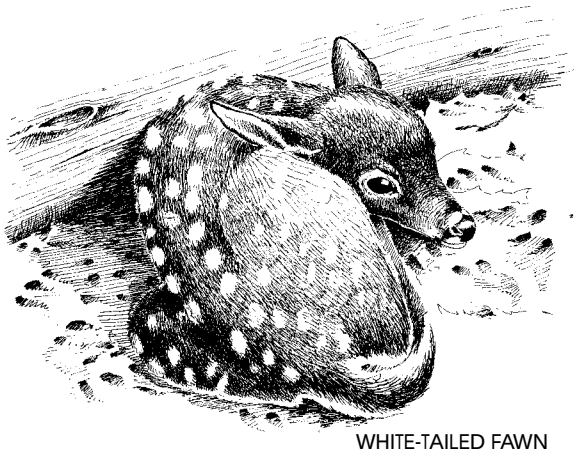
c. In autumn, hunters harvest surplus individuals so that populations will not be too high going into winter. Put an (X) between medium and low above "autumn."

d. During winter, some deer die from disease. In severe winters, deer may die of starvation and disease. Winter is the time when deer populations are at their lowest. Place an (X) at the low level above "winter."

e. Now repeat the above steps for Year Two.

f. Draw a line connecting the X's to plot the yearly change in a deer population.





WHITE-TAILED FAWN

ESTIMATING WILDLIFE POPULATIONS

One way to estimate wildlife populations is to take a census. A *census* is an exact count of *every* animal in an area. It is difficult to conduct a census of wildlife. Wild animals are often difficult to see and will not stand still long enough to be counted once you've found them.

When it is not possible to census animal populations exactly, biologists use a sampling method instead. A *sample* is not an exact count—it is an estimate based on studying just part of the entire population.

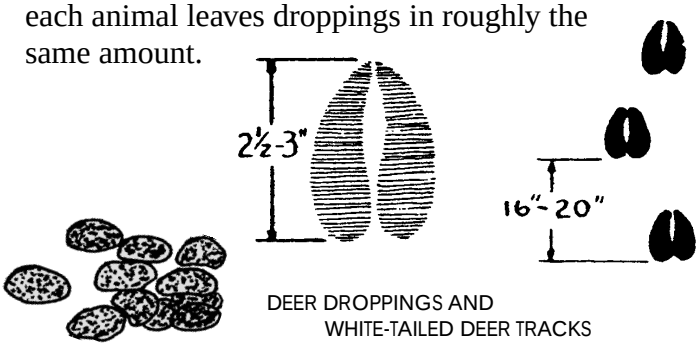
For example, the total population of ducks on a pond can be estimated by counting the ones on half the pond, then doubling that number. Of course, if all of the ducks happen to be resting on just one side of the pond on the day you counted them, then your estimate would be wrong. That is why biologists never rely on just one sample. Many samples are needed to make an accurate estimate of the total population.

Population Index

In some cases, we do not need to know the exact number of animals in an area. A *population index* is a method of telling how abundant animals are by counting *signs* the animals leave instead of counting the animals themselves.

Imagine that you walk around the edge of a farm field and see many deer droppings and deer tracks. You would assume that a lot of deer use this area. Then you visit a city park and see no deer droppings or deer tracks. You would assume that deer do not heavily use this area. You have just conducted a simple population index!

Almost any type of animal sign can be used for a population index, as long as it is something that each animal leaves in roughly the same amount. Counts of animal droppings are often used because each animal leaves droppings in roughly the same amount.

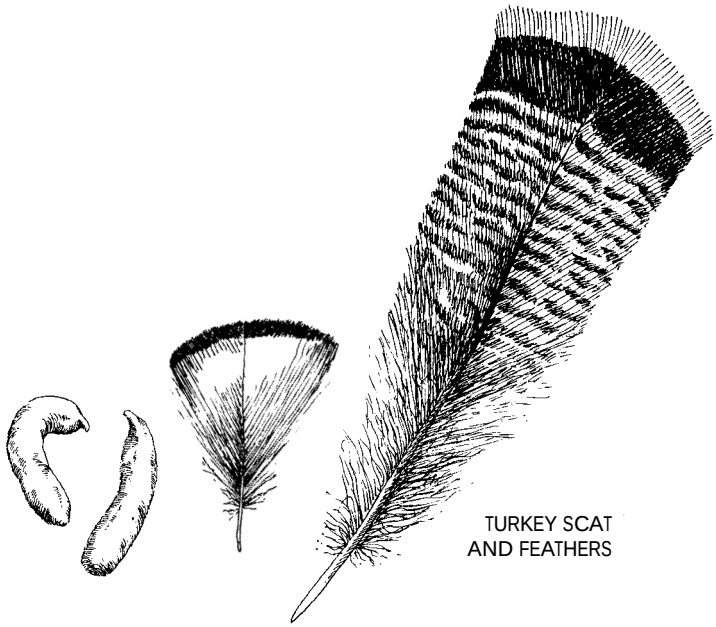


DEER DROPPINGS AND
WHITE-TAILED DEER TRACKS

Monitoring Wildlife Populations

Biologists are often interested in how wildlife populations change over time. For example, a biologist may want to see how badly an endangered bird has been affected after a storm destroyed nesting habitat. Another may want to see if turkey populations increase after timber harvesting that created more forest clearings. Both biologists need to do some population monitoring.

Population monitoring involves using censuses, sampling, or indexes to determine whether wildlife populations have changed over time. Monitoring usually does not result in an estimate of exactly how many animals live in an area; it just tells you whether there are more or fewer than the last time you checked.



TURKEY SCAT
AND FEATHERS

Journal Time!

Activity 7— A Neighborhood Census

PURPOSE: Conduct a census of some animal or plant in your neighborhood.

1. Choose an animal or plant to study. Make sure it is one that you can easily see and count. If it is summer, you could count the number of blooming dandelions in a yard or park. If you observe carefully, you may be able to count the squirrels in your neighborhood. You could count people in your building or neighborhood. You could even census rocks in an area.

2. Choose a study area. Make sure the size of the area fits the thing you are studying. You wouldn't want to count every dandelion or rock in your whole neighborhood!

3. Make careful observations and tally every individual of the species or object you have chosen to census.

4. In your journal, record your findings:

Object studied: _____

Size of study area: _____

Number counted: _____

Do you feel certain that you observed and counted each one in your study area? _____

Why? _____

_____

_____

_____

_____

Activity 8— Birds At Your Feeder

PURPOSE: Observe birds at a feeder to see how their numbers change over time.

1. If you do not have a bird feeder, find a feeder in your neighborhood that you can visit regularly and often. Make sure you get permission from the owner and from your parents.

2. Observe the feeder for 15 minutes. Count the number of times birds visit the feeder. (Don't worry about counting the same bird more than once—just count the total number of times the feeder is visited.)

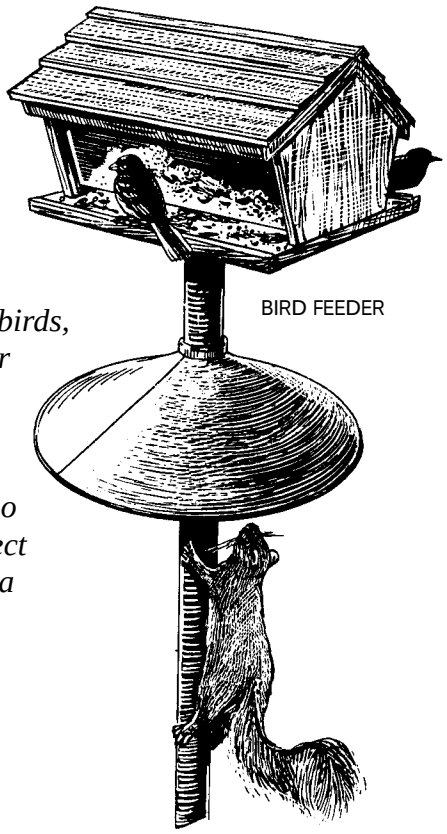
3. Enter your tally in your journal as "number of trips." Write down a brief description of the weather. Is it cold, snowing, raining, windy, very hot?

4. Observe the feeder and count bird visits at least once a week for five weeks. Try to observe the feeder at about the same time of day for each visit. Enter your tally and weather conditions in your journal each time.

5. Now graph your tallies to show how bird visits changed from week to week. On the bottom axis, label the weeks 1, 2, 3, 4, and 5. Label the vertical axis "bird visits." Plot your bird visits for each week.

6. Below the graph, write an explanation of why you think the number of bird visits changed from week to week. Do you think weather affected the birds? Did the breeding season start or end? Did humans or pets scare birds away?

NOTE: If no bird feeder is available, you can do the same study by counting the number of flowers in bloom for a certain species. For example, you can count the number of dandelions blooming in a yard or local park. *Follow the same instructions as for birds, but do not count for just 15 minutes—try to count all of the flowers at each visit. If there are too many to count, select a small sample area and count the flowers in that area only.*



BIRD FEEDER

TOOLS OF THE WILDLIFE RESEARCHER

Wildlife biologists use many different tools to conduct wildlife research. Each is important in collecting information about the animal being studied.

- **Radio-telemetry**
  A transmitter, placed on an animal's body, sends out radio signals. The biologist carries a radio receiver in order to hear the radio signals even without seeing the animal. This tool is useful when you want to know how the animal moves around in its habitat.
- **Marking and banding**
  Biologists can mark animals with numbered ear tags, leg bands, or wing bands, and then release the animals. If the animal is found later, the biologist knows how long it took the animal to move a certain distance. This practice is useful for working with animals like migrating birds that travel far distances.
- **Trapper-hunter-birdwatcher surveys**
  Biologists ask people who watch and hunt animals to keep track of how many they have seen or harvested. This is useful because it provides more information than one biologist could gather working alone.

WILDLIFE CAREER: Wildlife Research

Wildlife and fisheries researchers design and carry out studies that answer questions about the welfare of wildlife populations. Researchers may work with game animals and sport fish, some work with nongame species like songbirds and salamanders, and some work with endangered species.

- **Wildlife technician**—Technicians usually work directly in the field with wildlife. They conduct the studies that wildlife biologists design and provide data to the supervising biologist. Technicians usually have an associate's degree or bachelor's degree in Wildlife and Fisheries Science.
- **Wildlife biologist**—Biologists design experiments to answer questions about the species they are studying and supervise field personnel. Biologists usually have a master's degree in Wildlife and Fisheries Science.
- **Wildlife ecologist**—Many wildlife ecologists teach courses in wildlife science at the university level. They also help their students design wildlife studies as part of their wildlife degree. Wildlife ecologists are often interested in answering questions that have never been studied. They usually have a Ph.D. in Wildlife and Fisheries Science or Ecology.

Chapter 4

Water plays an important role in all wildlife communities.

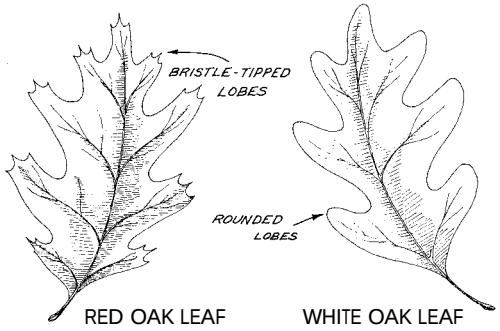
WILDLIFE COMMUNITIES

A single wild animal or wild species does not live alone in a habitat. Every area is home to many kinds of species with different habitat requirements. A *wildlife community* is a group of different species that live in the same area. Each species may use resources within the area in very different ways, but they still live side by side in a community.

For example, a grassland community is made up of early successional plants and the early successional animals that rely on them for food and shelter. Grasses and herbs make up the foundation of such a community. So do plant-eating insects such as grasshoppers, aphids, and caterpillars—and grass-eating animals such as meadow voles, rabbits, and woodchucks. Seed eaters, like goldfinches, bobwhite quail, ring-necked pheasants, indigo buntings, and white-footed mice, might also be part of this community.

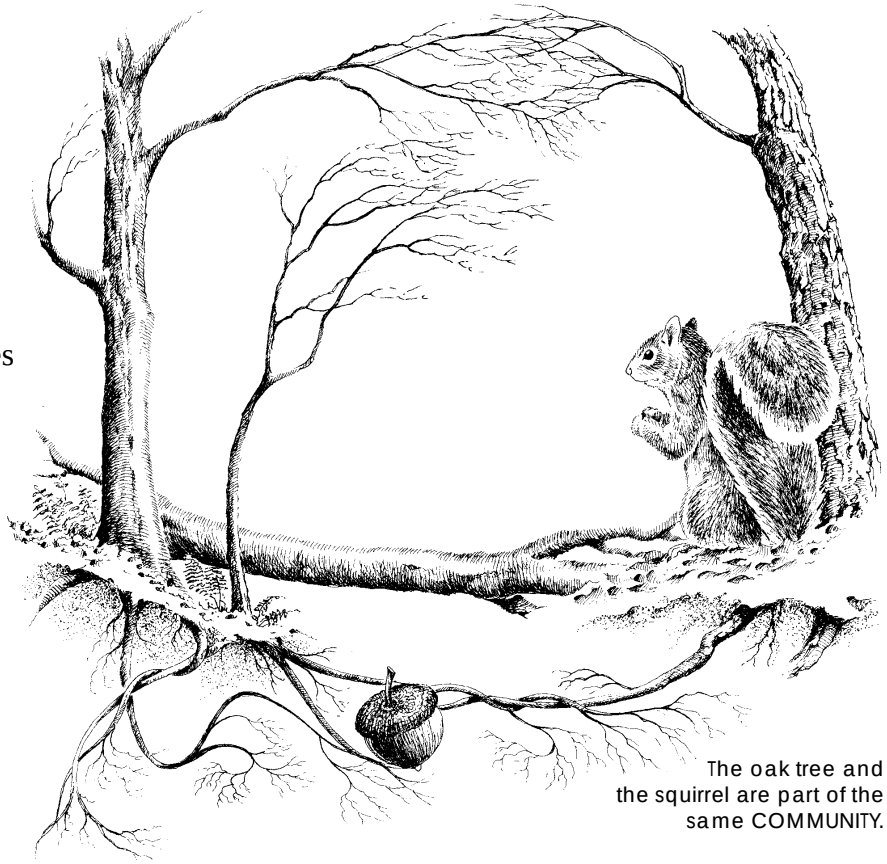
Along with animals that eat early successional plants, there are animals that eat the plant eaters! These might include grasshopper sparrows that feed on grasshoppers and other insects, black rat snakes that feed on white-footed mice, and barn owls, kestrels, and red foxes that feed on meadow voles and mice. This complicated community of animals relies on grasslands for its survival, so all these animals may be classed as an early-successional community.

Late-successional communities rely on mature forests for their survival. Oak, beech, hickory, hemlock, and maple make up late successional forests, as do the smaller dogwood, striped maple, sassafras, and eastern redbud. Important wildlife shrubs include spicebush, huckleberry, blueberry, witch-hazel, and arrow-wood.



Animals that rely on these plants for survival would make up the late-successional wildlife community. Such communities might include ovenbirds, wood thrushes, scarlet tanagers, red squirrels, gray foxes, fishers, black bears, barred owls, wild turkeys, and goshawks.

Mid-successional plant communities might support species that rely on shrubby cover. These animals might include white-tailed deer, eastern cottontail, raccoon, ruffed grouse, and woodcock, among others. Plants and animals depend on each other. For example, squirrels plant acorns, which grow into oak trees that produce more acorns for squirrels to eat.



The oak tree and the squirrel are part of the same COMMUNITY.

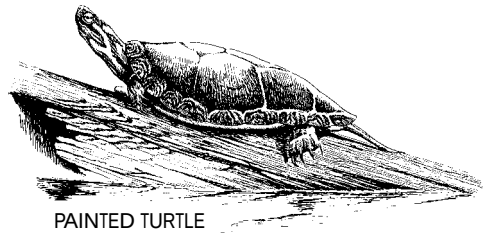
THE WILDLIFE INVENTORY

Often, wildlife researchers want to identify all the species that live in an area. A wildlife *inventory* is used for identifying all species found in an area, though it does not give information on the number of individuals in the area.

An inventory is done by going out into the field and closely observing animal signs and the animals that live there. Some species are easy to find in an inventory. You can usually tell pretty quickly if deer live in an area just by looking for tracks and droppings. Some species are more difficult to find. For example, how would you design a study to identify all of the moths living in an area?

Inventories are used when you are entering a new area that has never been closely studied and nobody knows what lives there. Many wildlife researchers conduct inventories around the world to explore and catalogue the diversity of life on earth.

Inventories are also useful if you want to see how the diversity of animals in an area has changed over time. If thorough inventories had been conducted 100 years ago, we would have a much better idea of how habitat changes affect Pennsylvania's wildlife.



PAINTED TURTLE

Forest Bioblitz

In the summer of 1999, more than 300 wildlife biologists gathered in Dauphin County to conduct the most thorough inventory of a Pennsylvania forest ever done. For 24 hours, teams of birdwatchers, mammal experts, insect specialists, and botanists thoroughly combed a 2.7-square-mile area. Altogether, they identified more than 1,500 species of plants and animals! Future wildlife biologists can now look back at this study to get an idea of what Pennsylvania forests were like at the end of the 1900s. Since 1999, bioblitzes have been staged in other locations, as well.

WILDLIFE CAREER: Wildlife Biologist

Wildlife biologists sometimes choose to specialize in a certain field of study. They usually get their bachelor's and master's degrees in Wildlife Science or Ecology before going on to get their Ph.D. Wildlife specialists may work as professors at colleges and universities, or they may work with zoos, museums, and other research institutions.

- **Mammalogists**—specialize in the study of mammals
- **Ornithologists**—specialize in the study of birds
- **Herpetologists**—specialize in the study of reptiles and amphibians
- **Icthyologists**—specialize in the study of fish

Journal Time!

Activity 9— Inventory Your Solo Spot

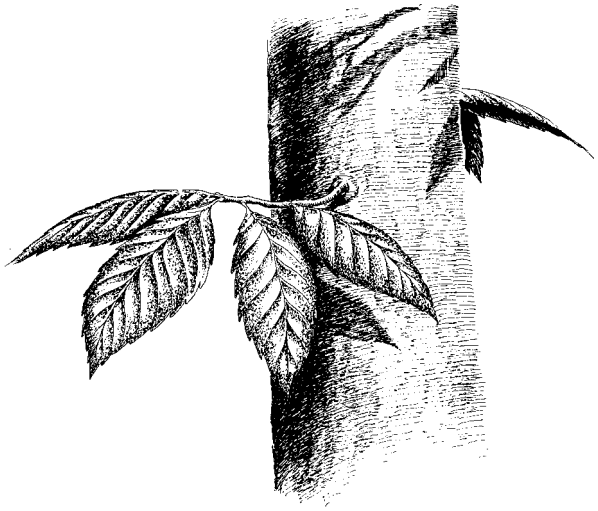
PURPOSE: Conduct an inventory of plants and animals.

1. Label the top of a journal page "Trees."

2. Use a field guide or *The 4-H Summer Key to Pennsylvania Trees* to identify each tree species growing in your journal area.

3. On your "Trees" page, create a tree inventory by listing all the tree species found in your study area. If you find a species you cannot identify, ask your leader or teacher to help you. You may also ask your county extension agent or service forester for assistance.

4. Now create an inventory of the shrubs, birds, and mammals found in your study area. To identify birds and mammals, you will need to visit the site at different times of the day and will have to observe carefully. You can also ask your teacher or leader to help you find knowledgeable people in your area who can help you identify species.



AMERICAN BEECH

Appendix

Habitat Requirements of Pennsylvania Wildlife

Of course, you won't find every species described here in your solo spot or habitat area. Some will show up only if you look for them near a forest; others will show up only if you search near a farm. Careful observation of your study area, combined with the use of field identification guides, will soon make you familiar with Pennsylvania's most common species. Additional information is available in the book, *Wildlife of Pennsylvania and the Northeast,* by Charles Fergus (Stackpole Books, 2000).

INSECTS

Bees (Family Apidae)

Food: Larvae feed on food supplied by adults. Adults feed on plant material and pollen. Honey bee adults are important insect pollinators, gathering and distributing pollen from a variety of flowers, fruits, vegetables, clover, cotton, tobacco, etc.

Water: Bees obtain adequate moisture from their diet. They sometimes drink from the edge of open water, birdbaths, and moist earth.

Cover/Shelter: Various species nest underground or in natural cavities, like hollow trees; some species nest in human-made nest boxes or hives.

Common species: Honey bee, carpenter bee, bumble bee, digger bee, cuckoo bee.

Butterflies and Moths

Food: Larvae of most species feed on plant material, such as leaves, flowers, and fruit. Adults feed on nectar and other fluids.

Water: Obtain adequate moisture from diet. Adults sometimes drink from the edge of open water, birdbaths, and moist earth.

Cover/Shelter: Herbaceous and woody plants serve as both food and shelter for larvae and adults. Some species hibernate in brush piles and rock piles. Larvae and adults of the same species may require very different host plants. Plants and the species attracted to them can be found in butterfly guides and gardening books.

Common families: Common butterflies include swallowtails, sulphurs and whites, fritillaries, admirals, skippers, and metalmarks. Common moths include sphinx, silk moths, tigers, noctuids, cutworms, and underwings.

AMPHIBIANS

Frogs

Food: Diet includes a variety of snails, insects, earthworms, and other small invertebrates. Larger frogs, like the bullfrog, may feed on fish, other frogs, crayfish, reptiles, and small mammals.

Water: Find most of their life requirements in or near water.

Cover: Dense vegetation on shore adjacent to water. Frogs hide among floating vegetation in water next to the shore. They need muddy bottoms so that they can bury themselves for hibernation during the winter.

Common species: Bull frog, wood frog, pickerel frog, spring peeper.

Salamanders

Food: Hunt at night for earthworms, terrestrial or aquatic insects, and other invertebrates.

Water: Moisture is an absolute necessity. Some salamanders are completely aquatic; even terrestrial species must have a damp environment. Freshwater pools and ponds are required for spring breeding.

Cover/Shelter: Terrestrial species rest during the day in the damp earth beneath rocks, logs, and leaf litter, or underground.

Common species: Spotted salamander, Eastern tiger salamander, red-spotted newt, dusky salamander, red-backed salamander.

Toads

Food: Hunt at night for earthworms, terrestrial or aquatic insects, and other invertebrates.

Water: Moisture is an absolute necessity. Although usually terrestrial, toads must have a somewhat damp environment. Require freshwater pools and ponds for spring breeding.

Cover/Shelter: Toads rest during the day in the damp earth beneath rocks, logs, and leaf litter, or underground. Sometimes use commercial “toad houses” or small rock piles placed in yards and gardens.

Common species: The American toad is the only common toad of Pennsylvania.

REPTILES

Lizards

Food: Feed on a variety of insects, spiders, and other invertebrates.

Water: No specific requirements for open water, though often found near moist areas.

Cover/Shelter: Resting and escape cover under stones, brush and rock piles, logs, leaf litter, and other structures. Some species may climb trees.

Common species: Families include skinks and fence lizards.

Snakes

Food: Feed on a variety of insects, spiders and other invertebrates, rodents, frogs, lizards, bird eggs, and nestlings.

Water: No specific requirements for open water, though often found near moist areas. Some species are tied to aquatic habitats (e.g., water snakes).

Cover/Shelter: Resting and escape cover under fallen logs, stones, brush and rock piles, logs, leaf litter, buildings, and almost any other structure. Some species may climb trees. During the winter, snakes hibernate in rocky crevices. Found in all Pennsylvania habitats.

Common species: Black rat, garter, northern water, red-bellied, milk, ringneck, and hognose. Timber rattlesnake and northern copperhead are venomous species found in some habitats.

Turtles

Food: Feed on a variety of insects, spiders and other invertebrates, leafy vegetation, fruit, and berries.

Water: Many species found near or in open water; even terrestrial wood and box turtles often found near moist areas. Some species aquatic.

Cover/Shelter: Resting and escape cover under stones, brush and rock piles, logs, leaf litter, and other structures. Hibernate in muddy bottoms of lakes and ponds.

Common species: Box, wood, spotted, painted, snapping.

BIRDS

American Crow

Food: Varied diet includes insects, frogs, snakes, shellfish, grain, berries, carrion, eggs and young of other birds, and mice.

Water: No specific requirements for open water.

Cover/Shelter: Places bulky nests high up in large trees.

American Goldfinch

Food: Weed seeds, flower seeds, and tree buds.

Water: No specific requirements for open water. Will drink and bathe in puddles and birdbaths.

Cover/Shelter: Brushy thickets and weedy grasslands with nearby trees. Places nest in upright fork of small sapling or shrub.

American Kestrel

Food: Various insects, including grasshoppers and crickets, and mice, shrews, frogs, snakes, and small birds.

Water: No specific requirements for open water. Gets adequate moisture from diet.

Cover/Shelter: Open fields for hunting; often rests on utility wires and fence posts. Will use nest boxes placed in or on the edge of open areas.

American Robin

Food: In warm seasons, insects and worms; in winter, fruits and berries from shrubs and trees. Does not often use bird feeders.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Nesting sites and hiding areas in shrubs and in evergreen and deciduous trees. Prefers evergreen trees for early spring nests. Commonly found in urban and suburban settings with large open areas and nearby trees and shrubs. Parks, golf courses, and lawns in residential areas are favorite places. Will use nesting platforms.

Baltimore Oriole

Food: Caterpillars, insects, fruit and berries, nectar, and wild grapes.

Water: No specific requirements for open water. Will feed from nectar feeders designed for orioles.

Cover/Shelter: Nests in high tree tops in residential areas. Places finely woven pouch nests at the ends of small branches high in deciduous trees.

Black-capped Chickadee

Food: Insects and spiders gleaned from the branches and boles of shrubs and trees. In winter, seeds and nuts from shrubs and trees.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Nests in cavities, usually in dead or hollow trees. Can dig the cavity only in soft or rotted wood. Uses woodpecker holes, natural cavities, and birdhouses. Thick shrubs and tree canopies provide hiding cover.

Blue Jay

Food: Varied diet including berries, seeds, nuts, and insects. Also eats spiders, snails, fish, mice, eggs, and young birds. Plants many trees by burying acorns and other seeds.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Nests of coarse sticks usually placed in well-concealed crotches of conifers 10-15 feet aboveground.

Brown-headed Cowbird

Food: Insects and weed seeds.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Suburban areas, open fields, woodland edges. Often travels with other blackbirds. Cowbirds are nest parasites—laying their eggs in other birds' nests and forcing other birds to raise cowbird young.

Common Grackle

Food: Varied diet, including insects and insect larvae, snakes, crayfish, minnows, frogs and salamanders, eggs and nestlings of other birds, grains, and fruit.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Lawns, parks, fields, and open woodland. Usually places nests high up in dense conifers; may also nest in dense bushes.

Dark-eyed Junco

Food: Weed seeds and flower seeds. Feeds on ground below bird feeders.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Coniferous and mixed forests. Winters in fields, gardens, city parks, and roadside thickets. Places cup nests in well-concealed areas on or near the ground.

Eastern Bluebird

Food: Insects and spiders make up a large portion of diet. Also eats a limited amount of fruit, especially during spring and fall migration. Usually forages in open grassy or weedy areas.

Water: No specific requirements for open water. Gets adequate moisture from diet.

Cover/Shelter: Nesting sites are in natural cavities and old woodpecker holes.

Eastern Phoebe

Food: Eats a wide variety of insects in summer and berries in winter.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Open woodland near streams. Builds nests of mud and moss and places them on cliffs, bridges, and building ledges, and under the roots of fallen trees.

European Starling

Food: Insects, fruit, seeds, human garbage, and dog and cat food. Usually does not use bird feeders.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Nests in cavities found in trees, old buildings, and old houses. Prefers older urban residential areas with large trees and shrubs. Will use birdhouses.

Forest-dependent, Neotropical Migrant Songbirds

Food: Feed primarily on insects during the breeding season in the United States. May switch diets dramatically after migrating south for winter.

Water: No specific requirements for open water. Get adequate moisture from diet.

Cover/Shelter: Generally require mature deciduous or coniferous forests with brushy undergrowth for nesting. Different species nest in different vertical layers within the forest, although many species nest on or near the ground.

Common species: Various warblers, vireos, tanagers, and thrushes.

Gray Catbird

Food: Beetles, grasshoppers, and other insects; fruits and berries; wild grapes.

Water: No specific requirements for open water. Gets adequate moisture from diet.

Cover/Shelter: Places a coarse nest in dense, leafy shrubs or vine tangles. Nests and rests in thickets and brush in residential areas and gardens.

Hairy Woodpecker[a]

Food: Ants, beetle larvae, caterpillars, and adult beetles. Diet also includes some fruit and nuts. Searches for insects on tree trunks, stumps, snags, and downed logs, and on the ground.

Water: No specific requirements for open water. Gets adequate moisture from diet.

Cover/Shelter: Digs nest holes in mature and dying trees and dead snags. Nests in wooded areas and along streams.

[a]Downy, red-bellied, and pileated woodpeckers have similar habitat requirements.

House Finch

Food: Soft fruits, buds, and weed seeds. Eats some insects in the warm season. Will use artificial feeders of all types.

Water: No specific requirements for open water. Drinks and bathes in pools and birdbaths.

Cover/Shelter: Found in nearly all urban areas having trees, shrubs, and some open places. Not as abundant in inner cities. Nests on low branches of trees, in bushes, in natural cavities, in old woodpecker holes, and on building ledges. Nests are built of weed stems, small branches, and leaves, and are placed 5 to 7 feet above the ground.

House Sparrow (English Sparrow)

Food: Eats a variety of insects, fruits, buds, and weed seeds. Will use bird feeders of all types.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Found in nearly all urban areas that have trees, shrubs, and some open places. Nests on low branches of trees, in bushes, in natural cavities, in old woodpecker holes, and on building ledges. Nests, placed 5 to 7 feet above ground, are built of weed stems, small branches, and leaves.

House Wren[b]

Food: Spiders, grasshoppers, crickets, beetles, caterpillars, ants, bees, ticks, and millipedes. Also eats small soft fruits and berries. Usually does not use bird feeders.

Water: No specific requirements for open water. Gets adequate water from diet.

Cover/Shelter: Prefers older residential areas with large shrubs and trees. Nests in natural cavities in trees, old buildings, and other structures. Will use bird boxes, occasionally destroying the eggs and nestlings of other birds if nest boxes are too close.

[b]The Carolina wren has similar habitat requirements.

Mourning Dove

Food: Waste grain from cropland and a variety of grass and weed seeds. Often feeds on seed fallen from bird feeders.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Prefers tall shrubs and trees for nesting and resting. Nests are made of twigs placed on branches of shrubs or trees. Nests may also be placed on the ground. Will use artificial nesting platforms.

Native Sparrows

Food: Weed, grass, and flower seeds, as well as insects. Will use bird feeders of all types.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Meadows, fields, and shrub areas. Thick shrubs and weedy areas for nesting and hiding. Nests on the ground under shrubs or in thick weeds and grass. Nests are made of grass, leaves, and weeds.

Common species: Chipping, field, fox, song, and white-throated sparrows.

Northern Cardinal

Food: Waste grain from cropland, weed seeds, fruit, buds, and insects.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Dense shrubs and tangled vines for resting and hiding. Nests in forked branches deep in dense pines, spruce, and hemlocks, vines, or climbing roses.

Northern Flicker

Food: Ants are a favorite; over half of the diet is made up of insects. Also eats eat seeds, fruits, and berries. Often eats the fruit of poison ivy. Usually feeds in open areas and occasionally uses bird feeders.

Water: No specific requirements for open water. Gets adequate moisture from diet.

Cover/Shelter: Prefers older residential areas with large trees, golf courses, and parks. For nesting, digs holes in trees, preferring softwood trees like poplar and willow. Likes old, mature trees that show signs of dying or rotting. In treeless areas, will nest in posts, holes in banks, and holes in buildings.

Owl

Food: Small mammals, birds, salamanders, frogs, and insects.

Water: No specific requirements for open water. Obtains adequate moisture from diet.

Cover/Shelter: Forests and open areas near forests. Roosts during the day in thick woods or conifer stands. At night, often feeds in open areas near forests. Nests in tree cavities, or in abandoned hawk, crow, or squirrel nests. Great-horned owls construct their own large nests in trees.

Common species: Barred, barn, great-horned, and screech owls.

Pigeon (Rock Dove)

Food: Feeds on the ground, preferring waste grain and weed seeds. In urban areas, lives mostly on handouts. Will feed on seeds that have fallen from bird feeders.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Nests on window ledges, rooftops, and bridges.

Ring-necked Pheasant

Food: Cultivated grains and weed seeds; buds and parts of herbaceous vegetation; fruits; and insects.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Prefers tall, grassy cover for nesting, especially cover located next to grainfields.

Ruby-throated Hummingbird

Food: Nectar from flowers and insects found on flowers. Requires high-energy foods. Nectar is high in sugars that supply energy, while insects are an excellent source of protein.

Water: Obtains adequate moisture from diet. Will drink from nectar feeders designed for hummingbirds.

Cover/Shelter: Constructs tiny nests on tree branches, usually 5 to 20 feet aboveground. Occasionally builds nests on secluded areas of buildings. Nests are made of leafy materials, lichen, and spider webs.

Ruffed Grouse

Food: Buds, flowers, and twigs of aspen; grapes; dogwood berries; and berries of other shrubs. Young feed primarily on insects.

Water: No specific requirements for open water. Obtains adequate moisture from diet.

Cover/Shelter: In summer, uses shrubs and deciduous trees for cover; in winter, roosts in low branches of conifers.

Sharp-shinned Hawk[c]

Food: Birds and small mammals. In residential areas, feeds on songbirds. Often perches near feeders to ambush visiting songbirds.

Water: No specific requirements for open water. Obtains adequate moisture from diet.

Cover/Shelter: Coarse nests placed high in trees deep in forests.

[c]The slightly larger Cooper's hawk has similar habitat requirements.

Tufted Titmouse

Food: Varied diet includes beetles, ants, and other insects and insect larvae; seeds and nuts; and fruits and berries.

Water: No specific requirements for open water. Will drink and bathe in pools and birdbaths.

Cover/Shelter: Nests in tree cavities or in birdhouses.

White-breasted Nuthatch[d]

Food: Insects and insect eggs, seeds, and nuts.

Water: No specific requirements for open water.

Cover/Shelter: Deciduous and mixed forests. Nests in natural cavities, in birdhouses, or in holes excavated in soft or rotten wood.

Wild Turkey

Food: For adults, acorns and hickory nuts are the primary food. Adult turkeys also feed on the berries of dogwoods and other shrubs, wild grapes, small grains, and corn. The young feed on insects.

Water: Requires water daily during the nesting and brood-rearing periods. Spring seeps provide water. In the nonbreeding season, gets adequate moisture from diet.

Cover/Shelter: Roosts in flocks in large hardwood trees with open branches, or in mature pines. Mature forests with small, open fields provide ideal habitat.

[d]The red-breasted nuthatch has similar habitat requirements, but it is usually found in mixed forests or stands of conifers.

MAMMALS

Bat

Food: Variety of nocturnal insects, ranging in size from mosquitoes to large moths and beetles.

Water: Skims across the surfaces of lakes, ponds, streams, and swimming pools to drink.

Cover/Shelter: In spring and summer, requires protected roost sites for raising pups. Some bats form colonies in buildings during spring and summer. Most bats require a cave for hibernation in winter.

Common species: Little brown, big brown, eastern pipistrelle.

Beaver

Food: Preferred winter food is the inner bark of deciduous trees, such as aspen, birch, and willow. Summer food includes leaves, grasses, flowering plants, and streamside vegetation.

Water: Open water or streams are essential for beavers to establish themselves in an area.

Cover/Shelter: Constructs dams to flood lowland areas before building a lodge of sticks and logs. Entrances to the lodge are then protected by open water. Along lakes, rivers, and large creeks, will dig a burrow in the bank to serve as a den. Intermediate-age forests of saplings and pole timber are the most favored.

Black bear

Food: Feeds on a variety of seeds, grains, nuts, berries, insects, mushrooms, roots and tubers, small mammals, and carrion.

Water: No specific requirements for open water.

Cover/Shelter: Makes dens in hollow logs, small caves, rocky outcrops, or depressions in the ground.

Bobcat

Food: Rabbits, snowshoe hares, birds, eggs, rodents, fish, and frogs.

Water: No specific requirements for open water.

Cover/Shelter: Uses a variety of shelters for den sites, including rock ledges, hollow stumps, hollow trees, and root masses.

Chipmunk

Food: Feeds on a variety of seeds, grains, nuts, berries, insects, mushrooms, roots, and tubers.

Water: No specific requirements for open water.

Cover/Shelter: Creates extensive underground burrow system for nesting and semi-hibernation. For escape cover, uses logs, rock and brush piles, and rock walls.

Eastern Cottontail

Food: From spring through fall, eats a variety of herbaceous plants, grasses, and garden vegetables. In winter, eats the bark of trees and shrubs. Will eat small grains in food plots.

Water: No specific requirements for open water.

Cover/Shelter: Ideal habitats are one-third grassland, one-third cropland, and one-third shrub cover all mixed together. Also makes use of parks, golf courses, and stream corridors in urban areas. Uses thick shrub or herbaceous cover for hiding and resting. Will use brush piles. Avoids extensive forests or open areas with no cover.

Eastern Gray Squirrel

Food: Spends much time foraging on the ground. Feeds on a variety of nuts, grains, acorns, seeds, mushrooms, and buds.

Water: No specific requirements for open water.

Cover/Shelter: Nests in tree cavities or builds nests of twigs and leaves. Nests are usually placed in the crotch of a tree over 30 feet above the ground. Where den sites are scarce, will use nest boxes.

Elk

Food: Primarily grazers, consuming a variety of shrubs, herbaceous plants, grasses, waste grain, and tree leaves; will eat buds and branches when necessary. Acorns, nuts, and conifer needles also are eaten, particularly during the winter.

Water: No specific requirements for open water.

Cover/Shelter: Use brushy woodlands and tall shrubs for hiding and travel cover. Mature forests do not provide as much food as brushy, intermediate-age forests.

Gray Fox

Food: Apples, berries, cherries, grasses, grains, insects, birds, eggs, carrion, small mammals, and rabbits.

Water: No specific requirements for open water.

Cover/Shelter: Makes dens in rock piles, hollow trees and logs, log piles, or burrows. Preferred habitat is unbroken forest.

Mole

Food: Feeds on earthworms, insects, and other invertebrates.

Water: No specific requirements for open water. Obtains adequate moisture from diet.

Cover/Shelter: Lives in a network of deep and shallow underground burrows, occasionally venturing aboveground. May be found in most Pennsylvania habitats.

Common species: Hairy-tailed, eastern, star-nosed moles.

Mouse

Food: Varied diet includes grass, tree seeds, ferns, moss, fungi, roots, leaves, acorns and other nuts, cherry pits, berries, snails, and insects and other invertebrates.

Water: No specific requirements for open water.

Cover/Shelter: Uses a variety of shelters, including fallen logs, boards, rocks, brush piles, rock piles, leaf litter, old squirrel and bird nests, and buildings. Constructs soft, lined nest in dry areas of fence posts, birdhouses, logs, or hollow trees. Found in most Pennsylvania habitats.

Common species: White-footed and deer mice. Jumping mice have slightly different habitat requirements.

Muskrat

Food: Feeds on a variety of grasses and herbaceous plants; also eats carrion and some crustaceans.

Water: Open water a necessity for muskrat establishment. Found in marshes and streams.

Cover/Shelter: In marshes, constructs lodges made of cattails and other vegetation. Burrows into stream and pond banks.

Opossum

Food: Varied diet includes insects, berries, carrion, and eggs.

Water: No specific requirements for open water.

Cover/Shelter: Uses a variety of shelters, including abandoned squirrel nests, woodchuck burrows, brush or rock piles, hollow logs, and buildings. Stays in den during coldest weather.

Porcupine

Food: In summer, feeds on a wide variety of plant materials, fruit, and berries; in winter, feeds primarily on the inner bark of pine, hemlock, cherry, maple, aspen, birch, oak, and beech trees.

Water: No specific requirements for open water.

Cover/Shelter: Dens may be in small caves, rocky outcrops, and rock piles, and under buildings.

Raccoon

Food: Wide variety of foods, including garbage, birds, eggs, fish, small mammals, insects, crayfish, grains, seeds, fruits, and human and pet foods.

Water: No specific requirements for open water.

Cover/Shelter: Nests and rests during the day in natural tree cavities, in dens in the ground, under brush and junk piles, in abandoned buildings, and on rocky cliffs and ledges. Most abundant near water, riparian areas, and areas near wetlands. Aso found in urban areas. Prefers areas interspersed with varying successional stages.

Red Fox

Food: Apples, berries, cherries, grasses, grains, insects, birds, eggs, carrion, small mammals, rabbits, and domestic fowl when available.

Water: No specific requirements for open water.

Cover/Shelter: Dens in old woodchuck burrows, hollow logs, and hollow tree stumps. Females may also dig their own dens. Most often found in brushy open forests and agricultural areas. Avoids dense, unbroken forest or open areas with little cover.

Shrew

Food: Voracious insect predator; also consumes spiders, snails, earthworms, and carrion.

Water: Obtains adequate moisture from diet.

Cover/Shelter: Uses fallen logs, rocks, leaf litter, rock and brush piles, and herbaceous and shrubby areas for nesting and resting cover. Often travels in shallow tunnels beneath leaf litter. Found in most Pennsylvania habitats.

Common species: Masked, smoky, short-tailed.

Skunk

Food: Varied diet including insects, berries, carrion, eggs, earthworms, mice, frogs, and ground-nesting birds.

Water: No specific requirements for open water.

Cover/Shelter: Excavates own burrow or uses abandoned woodchuck and fox dens; also makes dens in brush piles and hollow logs, or under buildings. Stays in den during coldest weather. Found in most Pennsylvania habitats.

Vole

Food: Varied diet including grass, ferns, moss, fungi, roots, leaves, acorns and other nuts, cherry pits, and berries.

Water: No specific requirements for open water.

Cover/Shelter: Constructs grass-lined nests under various shelters, including fallen logs, rocks, brush piles, rock piles, and leaf litter. Travels along shallow or surface runways in leaf litter and grass. Stays in den during coldest weather. Found in most Pennsylvania habitats.

Common species: Red-backed, meadow, rock, pine.

White-tailed Deer

Food: Variety of shrubs, forbs, and grasses; also eats waste grain. Acorns and nuts are favorite foods. In winter, deer feed on buds, leaves, and twigs of trees and woody shrubs. Water: No specific requirements for open water.

Cover/Shelter: Uses woodlands and tall shrubs for hiding and travel cover.

Woodchuck

Food: Grass, clover, alfalfa, corn, fruit, and vegetables.

Water: No specific requirements for open water.

Cover: Uses underground burrows for escape cover and true hibernation. Also burrows under rock walls, buildings, and other large, stationary objects. Most common in open fields and meadows with brushy fencerows and young woods nearby.

NOTES:

NOTES:

4-H ACTIVITIES REPORT

This report will help you keep a better record of your club activities. Fill it in as you complete each assignment. Refer to this record when you are entering county, state, and national programs. Ask your 4-H leader to explain these programs to you.

Projects taken _____

_____

Offices held _____

Club _____

County _____

Committees _____

_____

"Show-and-tells" or presentations given to:

Local club _____

County _____

Region _____

State _____

Others _____

News articles _____

Radio _____

TV _____

Displays or exhibits _____

_____

Things done to improve your health _____

_____

Community service or citizenship work done:

By yourself _____

With club _____

Number of meetings your club(s) held this year _____

Number you attended _____

Number of persons you encouraged to join 4-H _____

Number of 4-H'ers you helped with projects _____

In what way _____

_____

_____

Check activities in which you participated and tell how you helped

- ❑ **Camp** _____
- ❑ **Club or county tours** _____
- ❑ **Club picnic** _____
- ❑ **County fair** _____
- ❑ **Achievement programs** _____
- ❑ **Roundup** _____
- ❑ **Leadership training** _____
- ❑ **State 4-H Capital Days** _____
- ❑ **Penn State 4-H Achievement Days** _____
- ❑ **Pennsylvania Farm Show** _____
- ❑ **National 4-H Week** _____
- ❑ **State Ambassador Conference** _____
- ❑ **Quiz bowls** _____
- ❑ **Hippology** _____
- ❑ **Judging** _____
- ❑ **Others** _____

_____

_____

_____

_____

_____

_____

4-H Club Motto

"To make the best better"

4-H Club Pledge

I pledge
my head to clearer thinking,
my heart to greater loyalty,
my hands to larger service, and
my health to better living, for
my club,
my community,
my country, and
my world.

4-H Club Colors

Green and White

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Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

This publication is available in alternative media on request.

Produced by Information and Communication Technologies in the College of Agricultural Sciences.

5M11/01nvo4442

D0610A