



Activity 1-4 The Gene Scene

AT A GLANCE

Play several different games that introduce genetic diversity and highlight why it's important within populations.

OBJECTIVES

Identify and classify genetic traits using a genetic wheel.
Explain why genetic diversity may be necessary for the long-term survival of a population of animals or plants.

SUBJECTS

science

SKILLS

gathering (simulating), analyzing (identifying patterns),
interpreting (identifying cause and effect, inferring)

LINKS TO ILLINOIS BIODIVERSITY BASICS CONCEPTUAL FRAMEWORK

genetic diversity

VOCABULARY

chromosome, evolution, gene, genetic diversity, inherit,
nucleus, population, species, trait

TIME

three class periods

MATERIALS

Part I—copy of the “Human Genetic Wheel” and “Checking Out Your Genetic Traits” for each student

Part II—15 to 20 index cards

Part III—scissors; copies of “All About White-tailed Deer,” “White-tailed Deer Genetic Wheel,” “White-tailed Deer Cards,” “Event Cards” and “White-tailed Deer Fawn Cards” (see Before You Begin! Part III for specific details regarding numbers and types of paper to use)

CORRELATION TO COMMON CORE STANDARDS AND NEXT GENERATION SCIENCE STANDARDS

science: MS-LS4-4, HS-LS4-3

From a scientific perspective, conserving biodiversity means more than just protecting the variety of different species on earth. It also means preserving the natural variation that exists among the individuals of each species. Just as humans vary in their appearances and abilities, so, too, do individual fishes, mushrooms, oak trees and amoebae. Preserving variety within populations of species is essential for preserving the ability of that species to cope with environmental change. An organism's ability to adapt to environmental change determines how well it will survive in the long run. The greater the diversity of genes in a population, the greater the chances that some individuals will possess the genes needed to survive under conditions of environmental stress. As wild populations of plants and animals become smaller and more fragmented because of habitat loss, it becomes less likely that the remaining individuals will possess the genes needed to survive environmental changes. The individual—and the species—is subject to destruction.

This three-part activity will introduce your students to the concept of genetic diversity within a population. In Part I they will observe and compare human traits within their classroom population. This exercise should demonstrate that each individual has a variety of traits that make him or her unique and that create a diverse population within the classroom. In Part II they will discover through a quick, active demonstration that increased diversity contributes to greater survivability. Part III will reinforce this idea as your students play a game in which they represent populations of white-tailed deer coping with changes in the environment over time.





Activity 1-4

The Gene Scene (continued)

BEFORE YOU BEGIN! PART I

For each student, make a copy of the “Human Genetic Wheel” and “Checking Out Your Genetic Traits.”

WHAT TO DO! PART I

1. Introduce genes.

Your students may know that the physical characteristics of all creatures on earth are determined by their genes. But what are genes and how do they work? Genes are sections of DNA that manifest themselves as visible traits, such as eye color and hair texture, and nonvisible traits, such as a susceptibility to a certain disease. Genes form visible bars on thread-like structures called chromosomes, which are inside the central part, or nucleus, of every plant and animal cell. Chromosomes contain the genetic material of each cell, made up mostly of DNA. Chromosomes become visible under a microscope when any animal or plant cell divides.

In mammals, most healthy cells have two copies of each chromosome—one from each parent. Reproductive cells (egg and sperm) have one copy of each chromosome. Different species have different numbers of chromosome pairs. In humans, for example, there are normally 23 pairs of chromosomes.

2. Discuss genetic diversity.

Explain that in a healthy population (a group of organisms of the same species living in a certain geographic area) there is a wide variety of genes that combine in many different ways to form a broad diversity of individuals. If the population is suddenly subjected to stress, such as disease or environmental change, the genetic variety makes it likely that at least some individuals will be adapted well enough to survive and continue the species.

Populations of some species have become so small or fragmented that they have lost much of their original genetic diversity. If these populations are suddenly subjected to a disease or other stress, there might not be any individuals with the genes that provide protection from the disease and enable the individuals to survive.

3. Determine the characteristics of the class population.

Give each student a copy of “Checking Out Your Genetic Traits.” Go over the list of traits with your class. Have your students work in pairs to help each other determine their traits and check the traits off their worksheets. As you read the list, instruct your students to check the box that describes the trait they possess. They can also work in pairs to observe the traits in each other. For each trait, there are two possibilities:

- Your ear lobes are either hanging loose, or they are attached to the side of your head.
- Your hair is either curly or straight.
- You can either curl your tongue, or you cannot curl it. (This trait refers to whether you can or cannot roll the sides of your tongue to make it into a tubelike shape.)
- You either have hair on your fingers, or you don’t have it. (Look at the part of your finger between your knuckle and first joint.)
- You either have light-colored eyes (blue or green), or you have dark eyes.
- You either have a widow’s peak, or you don’t have one. (If your hairline comes to a point in the middle of your forehead, you have a widow’s peak.)
- Your little finger is either straight, or it is bent.

Point out to your students that their genes have determined each characteristic on the worksheet.

4. Use the Human Genetic Wheel.

Pass out a copy of the “Human Genetic Wheel” to each student. Instruct each student to start at the inner band and find the appropriate letter code that describes his or her own ear lobe type (it will be either “L” for loose or “I” for attached). Instruct them to continue moving outward on the wheel, finding their characteristics for each trait, until they have located their little finger type in band seven. Each person should then find the number next to his or her finger type and record this number on the worksheet.



Activity 1-4 The Gene Scene (continued)



Every individual in any population is different from every other individual. Have students look at the variations among the people in their class as an example. But these variations don't make any individual a different species. Everyone in the class, regardless of his or her differences, is still a human being.

5. Pool the results.

There are 128 possible combinations of the seven traits. To find out how many different combinations are present in the class population, go around the room and have each student give his or her “Genetic Wheel” number. Record the numbers on the board. If multiple students have the same number, place a check next to that number.

6. Discuss your findings.

Are there any two students in the class who have the same seven traits? Then ask the students if they can think of an eighth trait that would set these two people apart. Are there any numbers that have clusters of classmates? Why?

the game starts they are not allowed to change anything about themselves.

Tell them that you’re going to read several of these cards aloud and that if anyone on either team has the characteristic listed on that card, he or she will “die.” Those students who are “dead” must sit down. The object of the game is to have at least one member of their team “alive” at the end.

BEFORE YOU BEGIN! PART II

You will need 15 to 20 index cards. On each card, write one characteristic that distinguishes one student from another. See “Indexing Student Characteristics.”

2. Do the demonstration.

Have the students get into their teams and then stand facing you. Read one of the index cards you made earlier and ask all the students with the characteristic listed on the card to sit down. Repeat until you have gone through about three or four of the cards. (At least one of the teams should still have members standing.) Tell the students that if there’s anyone still standing on their team, they can all regenerate and join back in. If both teams still have members standing, play another round, reading through three or four additional cards. Then go on to step three.

WHAT TO DO! PART II

1. Introduce the demonstration.

Divide the students into two teams and explain that they’re going to do a demonstration that illustrates why genetic diversity is important. Show them your stack of index cards and explain that each one lists a characteristic that, for the purposes of the game, is going to represent a genetic trait. Tell them that once

Indexing Student Characteristics

To do this demonstration you will need a stack of index cards, each of which has a “genetic” characteristic that can distinguish your students from one another. Because it may be difficult to come up with enough truly genetically based traits, you should feel free to use traits, such as clothing color or type of shoes, in the demonstration. Below are some possibilities for the cards. You will need to choose characteristics that will weed out your group—but not wipe out the entire class all at once. During the demonstration, each time you read one of these traits, every student who has the trait will “die out” for the rest of the round.

- light-colored eyes
- bent little finger
- not wearing glasses
- shoes laced and tied
- shoes without laces
- wearing earring(s)
- wearing a sweater
- wearing hair clips of any kind
- wearing a watch
- a widow’s peak
- not able to curl tongue
- attached ear lobes
- wearing a hat
- not wearing red



Activity 1-4

The Gene Scene (continued)

3. Discuss the demonstration.

Ask the students what happened. Did any “characteristics” wipe out more people on their team than others? Did one team do better than the other? Why? (Answers will vary depending on what happens with your group. However, students should be figuring out that their team has a better chance of surviving when the characteristics of the team members are more diverse.)

4. Do the demonstration again.

Restore each team to its full number of “live” members. Then tell the teams that they’re going to try the demonstration again but that before you start they are allowed to make any adjustments they want on their teams. (Students should do things that give the group a wider range of traits. For example, some team members may untie their shoes while others may leave them tied, and some may add layers of clothing.) Shuffle the stack of cards and then read through several of them, having students with any of the characteristics “die” and sit down.

5. Wrap up.

Have the students describe what happened. Did their team last longer this time? What helped them or hurt them? What can they say about how genetic diversity might help wild populations of animals or plants survive? (Students should understand that the more diverse their team was, the greater the chance it had of having at least one member left at the end of several rounds. They should also be able to generalize that the more genetically diverse a wild population is, the greater its chances of surviving over time. However, if the students can’t quite make this leap yet, don’t worry. They’ll get a chance to apply these ideas in Part III.)

BEFORE YOU BEGIN! PART III

Make several copies of the “White-tailed Deer Genetic Wheel” for each group. Also make two copies of the “White-tailed Deer Cards” for each group (one copy on white paper and one copy on colored paper). You’ll need to make two copies of the “White-tailed Deer Fawn Cards” on white paper and two copies on colored paper,

cut the cards apart, and put them in a container. Then make one copy of the “Event Cards,” cut them apart, and put them in another container. If possible, laminate the cards for future use. (If “All About White-tailed Deer” is used as a homework assignment, copy one for each student.)

WHAT TO DO! PART III

1. Introduce the white-tailed deer game.

Tell students that they will play a game that illustrates why genetic diversity is important. The game focuses on the white-tailed deer. You may want to read “All About White-tailed Deer” to the class as an introduction to the activity or give it to the students to read for homework the night before.

2. Set up for the game.

Divide the class into five groups and give each group its “White-tailed Deer Cards” (one set on white paper, one set on colored paper). Explain that each group of students is “watching over” a small population of white-tailed deer, represented by the “White-tailed Deer Cards.” Each card identifies the characteristics (genetic traits) that each white-tailed deer will have during the game. The traits used in the game are as follows: sex; acuity of hearing; resistance to disease; sense of smell; and home range size. Colored cards represent males and white ones represent females. The other traits are written on each card.

3. Determine the genetic number of the white-tailed deer.

Hand out several copies of the “White-tailed Deer Genetic Wheel” to each group. Using the traits provided on each white-tailed deer card, tell the students to work together to determine the genetic number of each white-tailed deer in their population. They should use the “White-tailed Deer Genetic Wheel” to find the number of each white-tailed deer in the same way they used the “Human Genetic Wheel” (Part I) to find their own numbers. Students should write the genetic number of each white-tailed deer on each white-tailed deer card.



Activity 1-4 The Gene Scene (continued)

Genetic Numbers of Individual White-tailed Deer	5 5	8	11 11	12 12	17 17 17 17	23	24 24 24 24 24 24	30	31
Genetic Combinations	1	2	3	4	5	6	7	8	9

4. Determine the genetic diversity of each group's population of white-tailed deer.

Next ask the students to determine the genetic diversity of their group of white-tailed deer. Ask the student groups to count how many different individual genetic numbers are exhibited by their 20 white-tailed deer. This is the group's diversity number. Consider that a student group has a population of white-tailed deer with the genetic numbers shown in the table above.

In this case, the student group would have a total of nine different genetic combinations represented by their white-tailed deer group so the diversity number is nine. Write a tally on the board, recording each student group's number of white-tailed deer and diversity number. The larger a group's diversity number, the more genetically diverse the population of white-tailed deer.

Each student group should start with 20 white-tailed deer. The diversity number of group one should be 4, group two should be 8, group three should be 12, group four should be 14 and group five should be 20. Some students may realize that they have an advantage—or disadvantage—at this point.

Rules and Strategies

Before students begin the game, share the following information:

- If a white-tailed deer dies, the students should turn the card that represents that white-tailed deer face down.
- Only the dominant male white-tailed deer can mate with the females. If the dominant male dies, a new dominant male must be designated. If a group loses all its males or females, it cannot reproduce.
- Events usually affect half of a population. If you have an odd number of white-tailed deer that are affected by an event, round down to find the number of white-tailed deer affected.

- Female fawns cannot reproduce in this game.
- During reproduction events, each qualifying female will receive a fawn card. Students must choose traits for each fawn based only on the traits of that female and the dominant male. See the following example:

Female	Dominant Male
excellent hearing	poor hearing
resistant to disease	resistant to disease
poor sense of smell	good sense of smell
large home range	large home range

The fawn can have either excellent hearing or poor hearing and have either poor sense of smell or good sense of smell, but the fawn must be resistant to disease and have a large home range (because both parents have these traits). Every time a female has a fawn, the students will assign traits in this manner. Circle the traits on the fawn cards.

5. Have each group select a dominant male.

Each group of students should select one male in its white-tailed deer population to be the dominant male. Students should place a big letter "D" on the dominant male white-tailed deer's card. This white-tailed deer will be the only one that mates with the females in the population during the course of the game. If this male dies, the group will have to designate a new dominant male to take its place.

6. Have students choose cards from the "Event Cards" and read them to the class.

"Event Cards" depict scenarios of environmental change that the white-tailed deer populations must confront. Italicized text on the cards indicates the impact that the environmental change has on individuals in the population: loss (death) and reproduction. Remind your students that this exercise is a simulation of what could happen to a real white-tailed deer



Activity 1-4 The Gene Scene (continued)

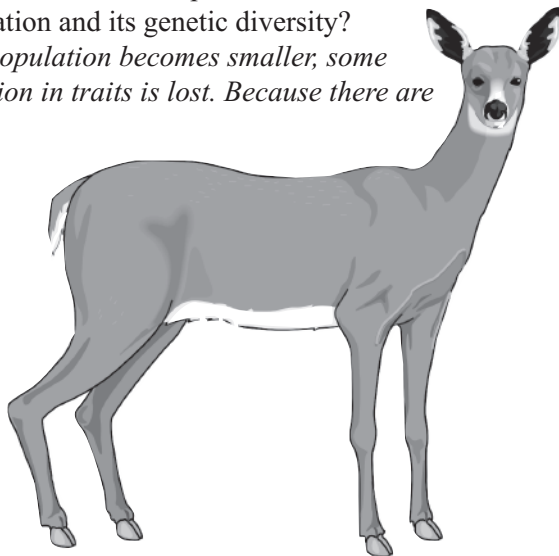
population. While the events are not real, they do represent some of the many pressures exerted on populations by natural and human forces. Allow your students to take turns picking an event card at random and reading it aloud to the class. Tell your students to pay attention to the event being read and respond to that event based on the white-tailed deer they have in their population. Every group follows the directions of each event card.

7. **Record how many white-tailed deer are left after the events have been read, and analyze the results.** After all the “Event Cards” have been read, record on the board the number of white-tailed deer (adults and fawns) surviving in each group’s population. Compare different groups of white-tailed deer and determine which ones were more successful. Did genetic diversity contribute to this success? How?

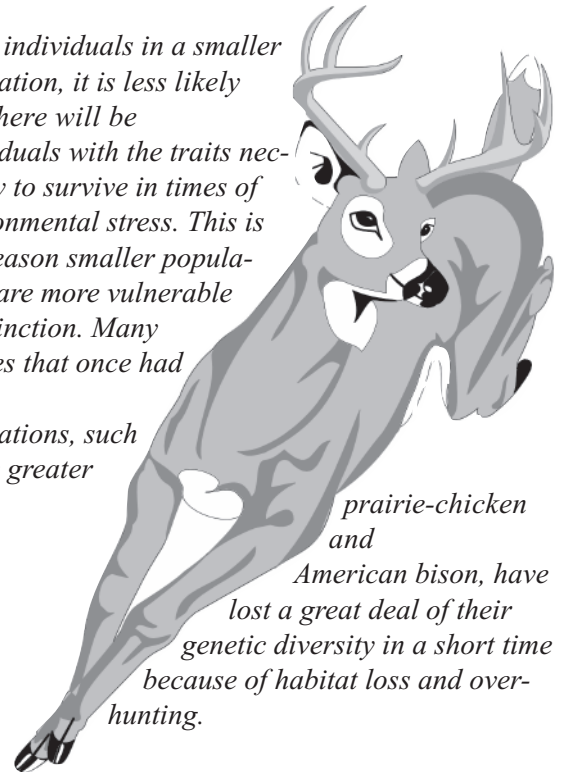
8. **Discuss the results of the game.**

After you finish the game, discuss genetic diversity using the following questions:

- a. Why is genetic diversity important?
Generally speaking, a more genetically diverse population is more likely to contain some individuals that have the traits necessary to survive and adapt to changes in the environment than populations that aren't as genetically diverse.
- b. What is the relationship between the size of a population and its genetic diversity?
As a population becomes smaller, some variation in traits is lost. Because there are



fewer individuals in a smaller population, it is less likely that there will be individuals with the traits necessary to survive in times of environmental stress. This is one reason smaller populations are more vulnerable to extinction. Many species that once had large populations, such as the greater



prairie-chicken and American bison, have lost a great deal of their genetic diversity in a short time because of habitat loss and over-hunting.

- c. What can be done to prevent the loss of genetic diversity?
To preserve genetic diversity, it is important that wild populations of plants and animals do not become small or fragmented. Preservation is becoming more and more challenging as human populations expand and increase their level of consumption as well as demand for space.
- d. Did some traits seem to be favored over others? Were there any traits that were favored in one instance but selected against in another? How does this relate to the importance of genetic diversity?
A trait that is advantageous under one set of environmental conditions may be detrimental under another.



Activity 1-4 The Gene Scene (continued)

WRAPPING IT UP

Assessment

1. Pick a common animal or plant and describe several distinct individuals, noting their physical traits. (Dogs and cats work especially well.) Students may illustrate their descriptions. How are the individuals different from one another? What sort of advantage or disadvantage might their characteristics provide?
2. Have students create displays focusing on how people have changed genetic diversity within species. Why do they do it? Each student should make a presentation about his/her display to the rest of the class. After student presentations, ask how human manipulation of genes might help or hinder biodiversity.

Portfolio

Have students record their ideas about using a genetic wheel to compare human traits and their understanding of genetic diversity from the game.



Resources

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- Southern Regional 4-H Wildlife Literature Committee. 1996. *Wildlife project: white-tailed deer*. University of Illinois Extension 4-H, Urbana, Illinois. 14 pp.

The genetic wheel approach was inspired by similar activities in *Losing Biodiversity* by Katherine Barrett, Global Systems Science, Lawrence Hall of Science, University of California at Berkeley (1996); and in *Biological Science: A Molecular Approach*, D. C. Heath and Co., Boston (1985).



Student Page
The Gene Scene

CHECKING OUT YOUR GENETIC TRAITS

Which of the following traits did you inherit from your parents? Check the box next to the trait that best describes you.

1. ear lobes

attached (ll)

loose (L)

5. pigmented iris

light eyes (ee)

dark eyes (E)

2. hair type

straight (tt)

curly (T)

6. widow's peak

no peak (ww)

peak present (W)

3. tongue curling

can't curl (cc)

can curl (C)

7. little finger

straight (bb)

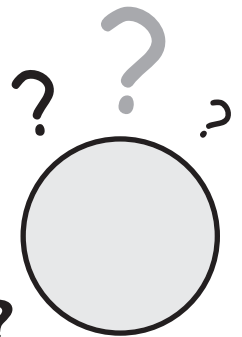
bent (B)

4. hair on fingers

no hair on fingers (mm)

hair on fingers (M)

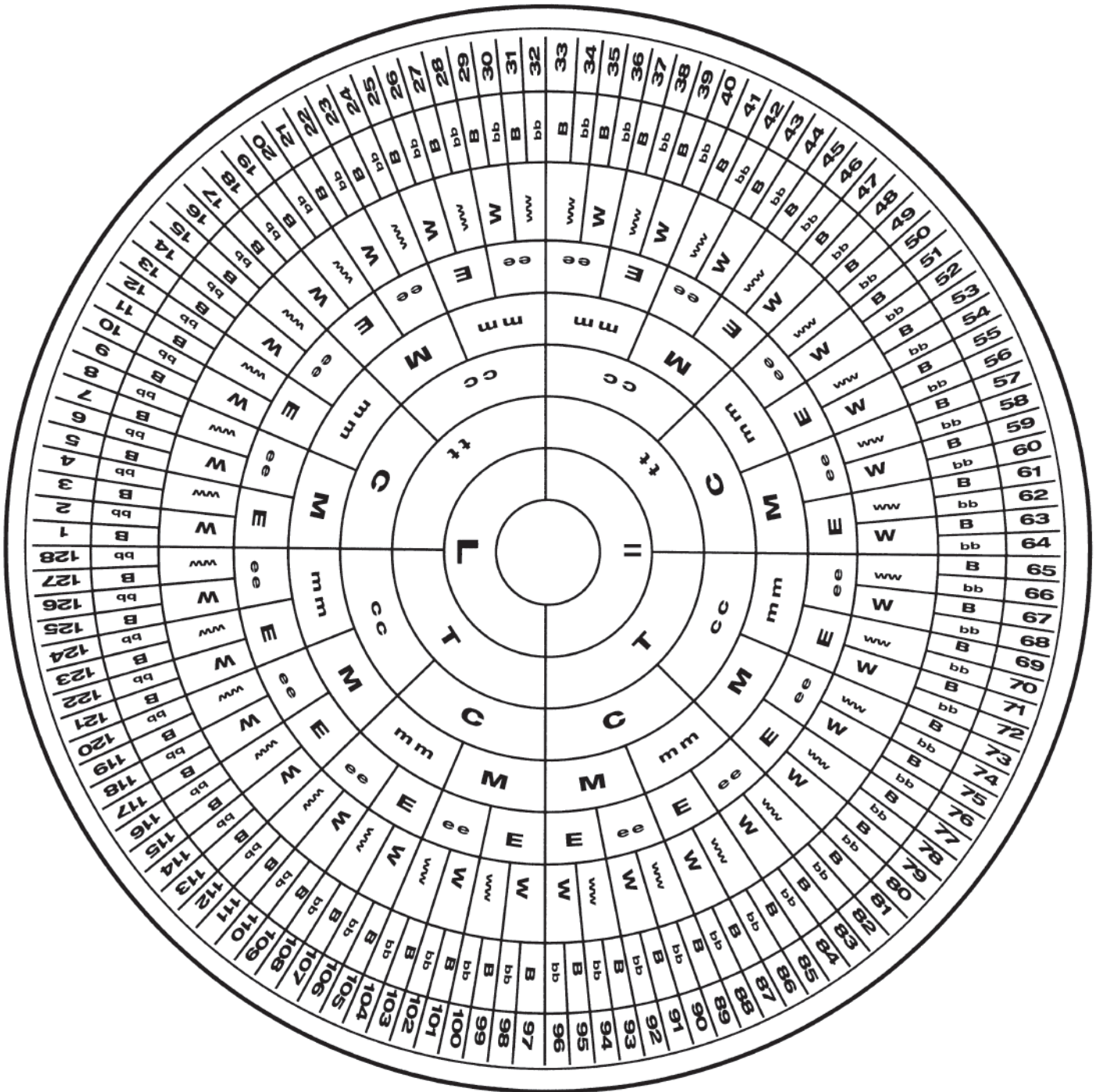
What is
your number
from the
genetic wheel?





Student Page
The Gene Scene (continued)

HUMAN GENETIC WHEEL



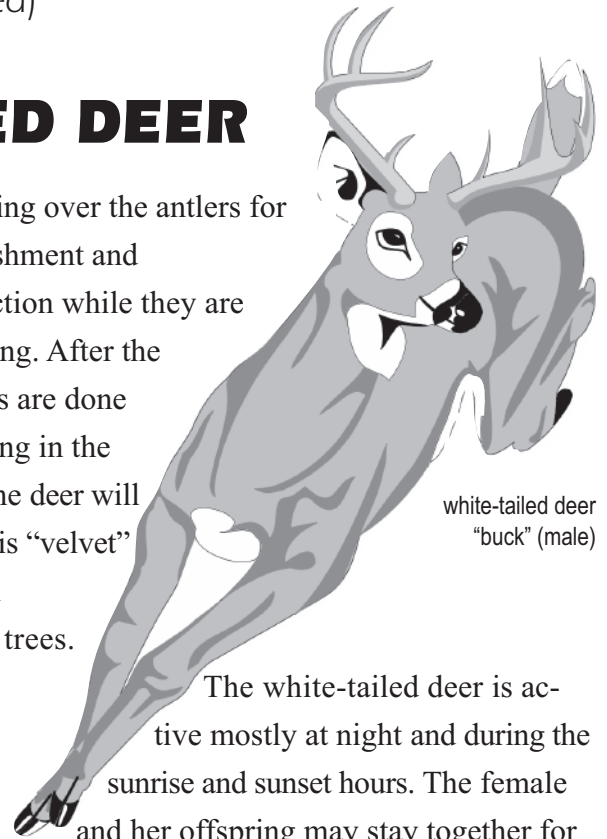


ALL ABOUT WHITE-TAILED DEER

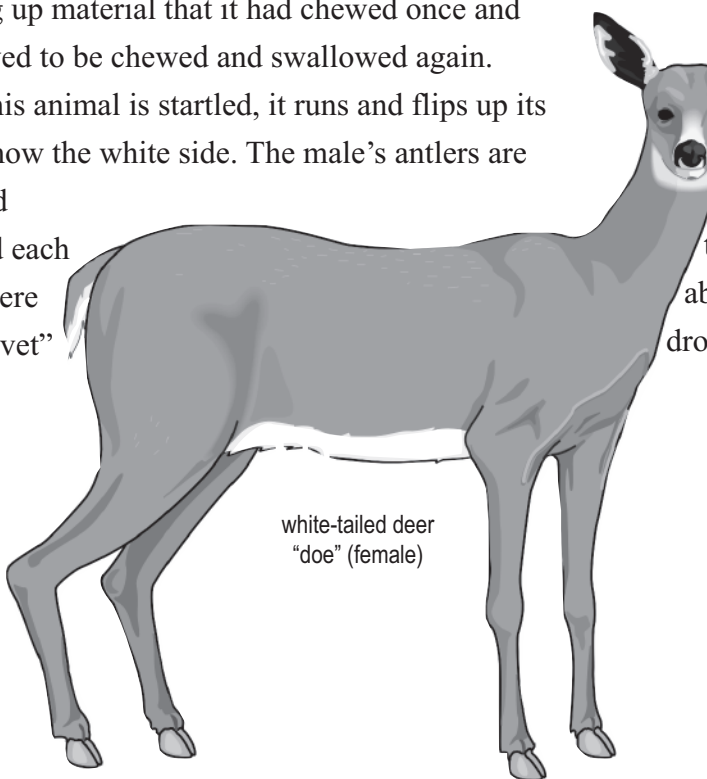
The white-tailed deer is a large mammal, weighing 100 to 300 pounds. Color varies seasonally. During the summer, the hair has a red tint, but during the fall and winter, it is gray-brown. The belly is white. The large tail has a white underside. Young white-tailed deer have white spots on their back. Males grow and shed antlers annually. There are no incisors or canine teeth on the upper jaw.

The white-tailed deer may be found statewide in Illinois. It lives in wooded areas but may be seen feeding far from such locations. The white-tailed deer is an herbivore, feeding on fruits, grasses, grains, vines, mushrooms, nuts and the leaves and twigs of trees and shrubs. It chews its cud, that is, bringing up material that it had chewed once and swallowed to be chewed and swallowed again. When this animal is startled, it runs and flips up its tail to show the white side. The male's antlers are shed and replaced each year. There is a "velvet" covering over the antlers for nourishment and protection while they are growing. After the antlers are done growing in the fall, the deer will rub this "velvet" off on small trees.

The white-tailed deer is active mostly at night and during the sunrise and sunset hours. The female and her offspring may stay together for several months. The male white-tailed deer is called a "buck," and the female is a "doe." A male will mate with several females. Mating occurs October through January. The gestation period is about seven months, and the doe usually produces two offspring. Young deer, called fawns, are able to run within a few hours of birth. Males drop their antlers during February and March.



white-tailed deer
"buck" (male)



white-tailed deer
"doe" (female)



white-tailed deer
"fawn" (young)



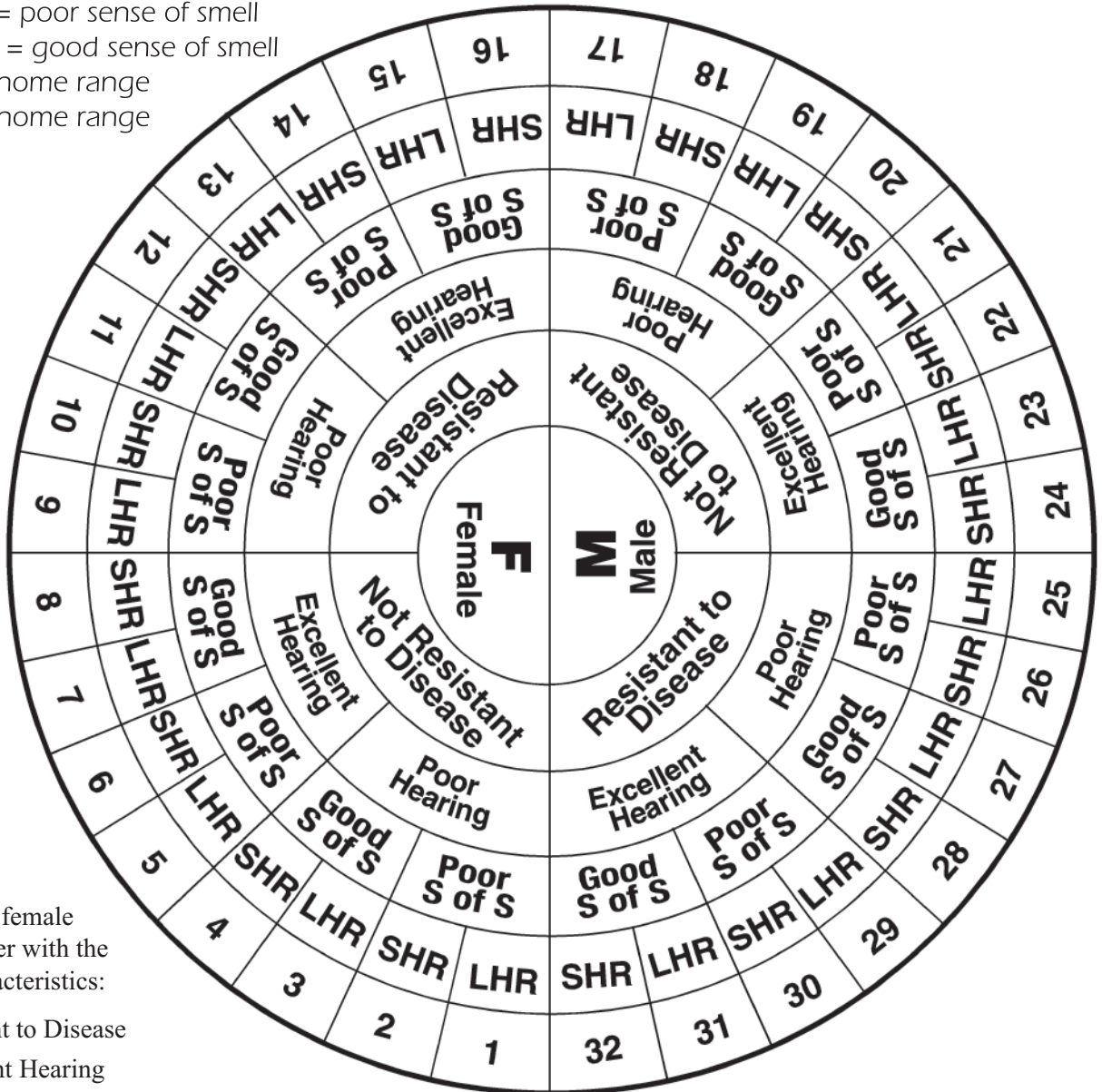
Student Page
The Gene Scene (continued)

WHITE-TAILED DEER GENETIC WHEEL

Begin with the center and move outward based on your white-tailed deer's traits.

Key:

- Poor S of S = poor sense of smell
- Good S of S = good sense of smell
- LHR = large home range
- SHR = small home range



For example, a female white-tailed deer with the following characteristics:

- Resistant to Disease
- Excellent Hearing
- Poor Sense of Smell
- Large Home Range

would have a genetic number of 13. A male with the same characteristics would have a genetic number of 29.



WHITE-TAILED DEER CARDS—GROUP 1

	<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Large home range</p>		<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Small home range</p>
	<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Small home range</p>		<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Large home range</p>
	<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Large home range</p>		<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Small home range</p>
	<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Small home range</p>		<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Small home range</p>
	<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Large home range</p>		<p>DEER CARD</p>	<p>Not resistant to disease Excellent hearing Good sense of smell Large home range</p>



WHITE-TAILED DEER CARDS—GROUP 2

	DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Large home range		DEER CARD	Not resistant to disease Excellent hearing Poor sense of smell Large home range
	DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Small home range		DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Small home range
	DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Large home range		DEER CARD	Not resistant to disease Excellent hearing Poor sense of smell Large home range
	DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Small home range		DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Small home range
	DEER CARD	Resistant to disease Excellent hearing Good sense of smell Small home range		DEER CARD	Not resistant to disease Excellent hearing Poor sense of smell Large home range



WHITE-TAILED DEER CARDS—GROUP 3

	DEER CARD	Resistant to disease Excellent hearing Poor sense of smell Large home range		DEER CARD	Not resistant to disease Poor hearing Good sense of smell Small home range
	DEER CARD	Not resistant to disease Excellent hearing Poor sense of smell Large home range		DEER CARD	Not resistant to disease Poor hearing Good sense of smell Small home range
	DEER CARD	Resistant to disease Excellent hearing Good sense of smell Small home range		DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Large home range
	DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Small home range		DEER CARD	Resistant to disease Excellent hearing Poor sense of smell Large home range
	DEER CARD	Resistant to disease Excellent hearing Good sense of smell Small home range		DEER CARD	Resistant to disease Excellent hearing Poor sense of smell Large home range



WHITE-TAILED DEER CARDS—GROUP 4

	DEER CARD	Resistant to disease Excellent hearing Poor sense of smell Large home range		DEER CARD	Resistant to disease Poor hearing Poor sense of smell Small home range
	DEER CARD	Resistant to disease Excellent hearing Poor sense of smell Large home range		DEER CARD	Not resistant to disease Poor hearing Poor sense of smell Small home range
	DEER CARD	Resistant to disease Excellent hearing Good sense of smell Small home range		DEER CARD	Not resistant to disease Poor hearing Good sense of smell Large home range
	DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Large home range		DEER CARD	Not resistant to disease Excellent hearing Good sense of smell Large home range
	DEER CARD	Resistant to disease Excellent hearing Good sense of smell Small home range		DEER CARD	Resistant to disease Excellent hearing Poor sense of smell Small home range



WHITE-TAILED DEER CARDS—GROUP 5

	DEER CARD	Resistant to disease Poor hearing Poor sense of smell Large home range		DEER CARD	Resistant to disease Poor hearing Poor sense of smell Small home range
	DEER CARD	Resistant to disease Poor hearing Good sense of smell Large home range		DEER CARD	Resistant to disease Poor hearing Good sense of smell Small home range
	DEER CARD	Not resistant to disease Poor hearing Good sense of smell Large home range		DEER CARD	Not resistant to disease Poor hearing Good sense of smell Small home range
	DEER CARD	Not resistant to disease Excellent hearing Poor sense of smell Large home range		DEER CARD	Not resistant to disease Excellent hearing Poor sense of smell Small home range
	DEER CARD	Resistant to disease Excellent hearing Good sense of smell Large home range		DEER CARD	Resistant to disease Excellent hearing Poor sense of smell Small home range



WHITE-TAILED DEER FAWN CARDS

 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>	 <p>DEER FAWN CARD <i>(circle the trait)</i></p> <p>Resistant to disease Not resistant to disease</p> <p>Excellent hearing Poor hearing</p> <p>Good sense of smell Poor sense of smell</p> <p>Large home range Small home range</p>
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Student Page
The Gene Scene (continued)

EVENT CARDS

The deadly EHD (epizootic hemorrhagic disease), a disease spread by a virus, is killing many deer. White-tailed deer with resistance to the disease are much more likely to survive and reproduce.

Lose half of your white-tailed deer that are “not resistant to disease.”

EVENT CARD

Nondominant males may wander from group to group.

Every group should give one nondominant male white-tailed deer to the group to their left.

EVENT CARD

A severe drought has hit Illinois. Because of the extreme dry conditions, white-tailed deer must travel farther to find food and water.

Lose one white-tailed deer that has a “small home range.”

EVENT CARD

Young fawns are particularly vulnerable to predation by coyotes. A fawn with a poor sense of smell might not be able to detect a coyote in time to escape.

Lose half of your fawns with a “poor sense of smell.”

EVENT CARD

Deer meat, otherwise known as venison, has recently become popular. Poachers are illegally hunting white-tailed deer after dark. Deer with poor hearing are easy targets as the poachers drive up in their vehicles.

Lose half of your white-tailed deer with “poor hearing.”

EVENT CARD

Habitat fragmentation has resulted from construction of new housing developments and an increase in roads. As they move between the smaller habitats, white-tailed deer have a greater chance of being hit by cars and trucks on the roads.

Lose one white-tailed deer with a “small home range.”

EVENT CARD

In the breeding season, males mark their territories with scents and visit the scented sites often. A female with a good sense of smell is more likely to know where the male will be when she is ready to mate, increasing her chances of successful reproduction. Add one fawn for each “good sense of smell” female white-tailed deer in your group, only if a male is present to mate with her.

Each group should take the appropriate number of fawn cards out of the fawn card container.

Assign traits that are present in the parents (each “good sense of smell” female and the dominant male) to their fawn.

EVENT CARD

It has been a mild winter this year, yielding an abundance of food. Because of good nutrition, all of your female white-tailed deer give birth in the spring.

Add one fawn for each “small home range” female white-tailed deer, only if a male is present to mate with her.

Add three fawns for each “large home range” female white-tailed deer, only if a male is present to mate with her.

Assign traits that are present in the parents of the fawns.

EVENT CARD