



# *White-tailed Deer Education Trunk* **Curriculum Guide**

*Revised: August 2013*



Larry Hogan, Governor; Mark Belton, DNR Secretary  
[dnr.maryland.gov/wildlife](http://dnr.maryland.gov/wildlife)

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# Section 1:

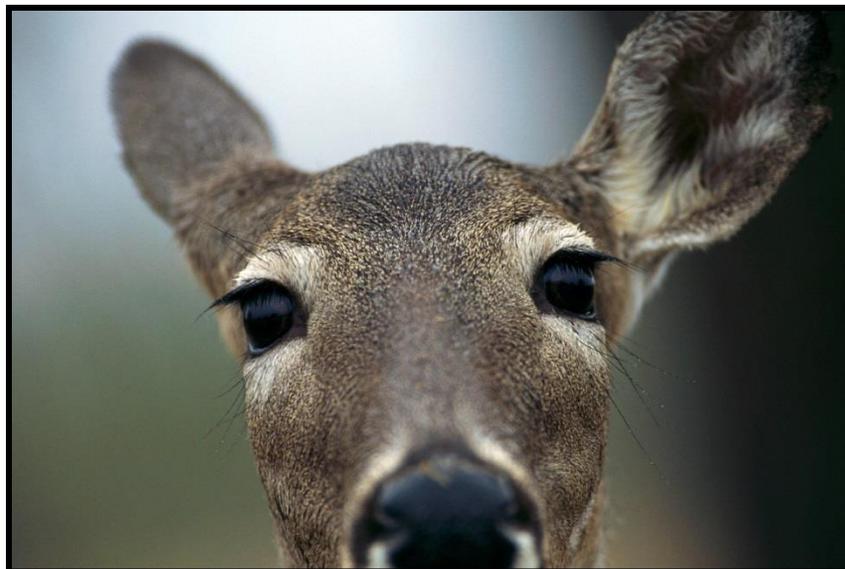


## *White-tailed Deer Ecology*

## White-tailed Deer Quick Facts

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- The white-tailed deer is the only deer species native to Maryland. Sika deer have been introduced.
- White-tailed deer have big eyes, sharp hearing and a keen sense of smell. Their coats are reddish brown in the summer and grayish brown in the winter.
- Fawns are reddish brown with white spots which fade away. They have a white tail which they flash back and forth when they run.
- A male white-tailed deer is called a **buck**, a female is called a **doe** and the young are called **fawns**.
- Males grow antlers from March - September. The antlers are shed in late winter. On rare occasions, a female will grow antlers.
- White-tailed deer give birth to their fawns in May and June.
- White-tailed deer are 3-3 ½ feet at the shoulder and weigh 50-250 pounds. Males are larger than females.
- White-tailed deer are herbivores and are characterized as browsers and grazers. They eat twigs, buds, and leaves of a wide variety of plants. They also feed on acorns, fruits, grasses and agricultural crops such as corn and soybeans.
- Deer are good jumpers and swimmers and can easily clear an 8-foot fence.
- White-tailed deer are very abundant and are found throughout Maryland in forests, farms, wetlands, parks, open areas, and suburban areas.
- When a white-tailed deer is startled, it may raise its tail to show the white underside, hence the name white-tailed deer. When a mother raises her tail, it helps to allow her fawn to follow her.
- Deer can run up to 35 mph.
- The lifespan of a deer can be up to 20 years in captivity .
- Deer antlers are the fastest growing bone known and can grow as much as a ½ inch a day.



## White-tailed Deer Taxonomy

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**Taxonomy** is the science of identification, naming and classification of living organisms. Taxonomy uses a hierarchal structure that classifies organisms from very broad categories to very specific categories. In terms of scientific classification, the broadest categories are Kingdoms while the most specific ones are Species and Subspecies. The following information details the taxonomic classification of white-tailed deer.

**Kingdom**-Animalia

**Phylum**-Chordata

**Class**-Mammalia

**Order**-Artiodactyla

**Family**-Cervidae

**Genus**-*Odocoileus*

**Species**-*virginianus*

The Order **Artiodactyla** refers to even-toed hoofed mammals (aka ungulates). These animals bore most of their weight on the third and fourth toes rather than on their third toes like Perissodactyls such as horses. There are over 200 species of Artiodactyls worldwide including pigs, hippopotamuses, camels, antelopes, sheep, goats and cattle.

The Family **Cervidae**, also known as the deer family, includes 47 species such as various types of deer, moose, elk (wapiti), caribou, and reindeer. Some deer species are social, but others are solitary. The earliest deer appeared during the late Oligocene Epoch, roughly 35 million years ago. The "Irish elk" *Megaloceros* was a large, prehistoric deer that had antlers that were 11 feet wide! The largest Cervid today is the Moose and the smallest is the Andean Pudu.

The genus *Odocoileus* contains two medium-sized deer species native to the Americas. The name is from a contraction of the roots *odonto-* and *coelus* meaning "hollow-tooth". The white-tailed deer is the only *Odocoileus* species native to Maryland. The other species in *Odocoileus* is the mule deer (*Odocoileus hemionus*) which is indigenous to the western half of North America. Mule deer and white-tailed deer have evolved from primitive deer of the genus *Odocoileus*. The white-tailed deer is the oldest species of this family. It first appeared in the southern part of North America some 4 million years ago.

# White-tailed Deer Fact Sheet

(*Odocoileus virginianus*)

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## Description and Range:

Adult white-tailed deer are about three feet tall at the front shoulders. Maryland yearling **bucks** (males) weigh an average of 105 pounds; yearling **does** (females) average 90 pounds. During the warm months, deer possess reddish-brown hair. A grayish-brown coat with a thick undercoat replaces the reddish hair during the cold time period. The white-tailed deer's distinctive white tail and white rump patch is readily visible when they bound away from real or perceived danger. White-tailed deer sprint up to 35 miles per hour and are able to leap over 8 foot tall barriers.

Only white-tailed bucks possess **antlers**. In extremely rare cases, does may grow antlers. Bucks use their hard antlers to establish dominance over other bucks during breeding season. Antlers are grown and shed each year. Antlers, which are composed of true bone, begin to grow in late March and early April. The growing antlers are covered with skin and blood vessels called **velvet**.

White-tailed deer can be found in every county in Maryland. White-tailed deer are also common throughout much of the United States, southern Canada and even parts of central America.



Doe (left) by John White and a buck with velvet antlers (right) by Kerry Wixted

## Habitat:

Maryland white-tailed deer habitat includes most of the state except for open water and intensely developed urban areas (e.g. downtown Baltimore). Deer thrive in landscapes with wooded/brush sections and open areas such as cropland, pasture or landscaped yards. Deer use the wooded areas for food and cover, and open areas provide food. Landscapes with an abundance of edge habitat (areas where forested and open habitat

meet) are prime deer habitats. Because of this, suburban sprawl creates ideal habitat conditions for white-tailed deer. When forested areas or open farmland are converted into housing developments, portions are cleared for roads and home sites, while other sections remain forested. Both of these types of residential conversions provide excellent deer habitat.

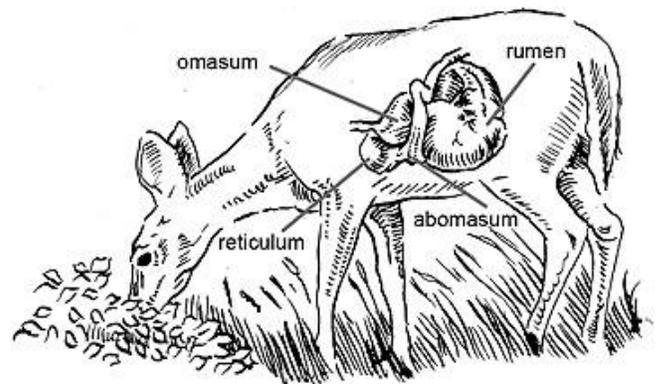
The typical, annual average **home range** for white-tailed deer is considered about one square mile (640 acres). However, the sex and age of the deer and habitat types will influence varying size home ranges. Yearling males will move many miles while adult females usually have smaller stable, annual home ranges. Deer in good quality habitat will need to travel less than deer in poor quality habitat.

### **Diet:**

Deer feed on nuts and berries, leaves, woody shoots and stems, grasses and cultivated crops. Some of their favorite natural foods include acorns, honeysuckle, poison ivy, green briar, young tree seedlings and mushrooms. Soybeans, corn and ornamental shrubs are several of their favorite foods planted by humans.

Deer have a four-chambered stomach that is required to digest the vegetation. Food first travels to the **rumen** that contains the bacteria and protozoans, which begin the digestive process. The **reticulum** circulates food back to the mouth so that the deer can chew the food again. The **omasum** functions as a pump and directs the partially digested food from the reticulum to the **abomasum**.

This final chamber functions as a true stomach and completes the digestive process. Because of this special digestion process, it is generally not recommended to feed deer corn or other supplemental foods. Deer are adapted to survive in the wild without help from humans, even during harsh winters.



Deer digestive tract by U.of Missouri Extension

### **Reproduction:**

Maryland white-tailed deer begin breeding in October and continue to breed through mid December. The shortening of day length (photo period) triggers the breeding season. Most does become pregnant during the first half of November. Because white-tailed deer are polygamous, one dominant buck can breed numerous does. Any receptive doe that does not become pregnant will cycle back into **estrous** (heat) in about 28 days and will mate again.

**Fawns** (baby deer) are born during May and June after a gestation period of about 200 days. Yearling does usually give birth to single fawns. Mature does in good physical condition frequently produce twins.

Newborn fawns remain hidden and solitary for about 3 weeks. The doe visits her young only 2-3 times per day in order to nurse and groom the offspring. When the fawn is strong enough to run with the doe, it will follow its mother and begin to sample foods eaten by the doe. Fawns can live independently of their mother at about 2 months old.



Fawn Photo by: Kerry Wixted

### **Sounds:**

Deer typically make 3 different types of sounds: alarm, maternal, and reproductive. Alarm calls help to warn other deer of real or perceived danger. When a deer is surprised, it will snort by forcing out air rapidly from the nostrils. When fawns or young adults are captured by a predator, they will make a bleating or groaning sound. Does also use low grunts to communicate with their young and to maintain contact. Fawns respond with a mew like sound. Fawns will also use bleats to get attention from the maternal doe. Communication between does and young helps to maintain a close pair bond. During the breeding season, bucks make grunt sounds while searching for receptive does and while tending does. Bucks also advertise their presence to prospective does and potential competitive bucks with grunts of varying pitch and volume.

### **Behavior:**

Bucks are often solitary creatures aside from the breeding season and occasionally during the summer when they form bachelor bands. In the breeding season, aka the **rut**, bucks will find females to mate and will spar with other males for the rights to breed.

Does, on the other hand, can often be seen traveling together, particularly in the winter when food tends to be scarce. Often, fawns will remain with their mothers through the winter and into early spring. Typically, young bucks are forced away by their mothers while young does often will set up a home range partially over-lapping its mother.

### **Management:**

Maryland has an abundance of deer, and hunting is the only effective tool to manage them on a broad scale. Deer seasons and bag limits are structured to encourage the harvest of does. Harvesting does is the key to controlling deer populations since one buck can breed with many does. If a hunter harvests a buck, he or she removes one deer from the population and there are always other bucks available to replace it for breeding. However, if a hunter harvests a doe, he or she removes that deer and any subsequent offspring. Hunters in Maryland currently harvest 90,000 - 100,000 deer annually, and over 50% are females.



## White-tailed Deer Adaptations

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Adaptations are traits that help organisms survive and reproduce in their ecological niche or habitat. Adaptations occur over many years. Adaptations can be physical, behavioral or physiological.

A **physical (anatomical) adaptation** is one that entails a physical feature like the shape or color of an animal. Camouflage is an excellent example of a physical adaptation. Other example of physical adaptations include the well developed carnassial teeth on mustelids (weasels) that help them shear flesh or the clear eyelids that beavers have to be able to see underwater.

**Behavioral adaptations** are adaptations that have been learned or inherited. Language, swarming and use of tools are all examples of behavioral adaptations.

**Physiological adaptations** permit the organism to perform special functions. An example of this would be the production of venom by timber rattlesnakes. Another physiological adaptation is the process of **estivation** or when some animals enter a state of inactivity during prolonged periods of drought or high temperatures.

The following pages list physical adaptations of white-tailed deer such as their antlers, coat, ears, eyes and tracks.



Long-tailed weasels have well-developed carnassials

Photo by: Robert Barber/Painet Inc.

## Adaptations: Antlers

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Typically, only male white-tailed deer grow bony structures known as **antlers**. However, one in ten thousand female deer can grow antlers as well. Deer antlers begin as small "buttons" on the skull and gradually become "spikes" around 10 months of age. During peak development, antlers can grow up to ½ inch per day. While growing, antlers are covered in living tissue called **velvet**. Antlers continue to grow through September, and during the rut, testosterone levels increase causing antlers to calcify. At this time, the velvet is shed or rubbed off by bucks on saplings and small trees.

A yearling buck can support a six to eight point rack by fall, given the right nutritional conditions. A common misconception is that deer age can be determined by the number of points. Antler growth is tied closely to genetics and nutrition. Age of deer can be determined by examining tooth replacement and wear.

During the rut, antlers are used in displays of dominance and strength for does in heat. Antlers are also used to fight off rival males. Once the need to breed and fight has passed, antlers are shed from early December through March. The time of antler drop depends on the amount of stress on the buck after the rut, heredity and nutrition.

Dropped antlers are called "**sheds**." Looking for sheds can be a good way to spend late winter days in the field. Usually only one side of the rack can be located at a time, because both sides of the antlers do not drop simultaneously. Sheds often are difficult to find after late winter as small mammals, mice and squirrels consume the antlers for calcium in them.



Spike buck by Ken Thomas (left); buck by Scott Bauer (right)

## Adaptations: Deer Coat

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During the warm months, deer possess reddish-brown hair. The summer coat hairs are short and wiry. A grayish-brown coat with a thick undercoat replaces the reddish hair during the winter. At this time of the year, the hair on the coat is hollow. This adaptation allows pockets of air to get trapped in the hair, creating an insulating effect. The hollow hairs also make it easier for deer to float.

A genetic defect produces a few white-tailed deer that are brown and white spotted, similar to a pinto horse. These white-tailed deer are called **piebald**. In addition to the coloration deficiency, many piebald deer have skeletal deformities such as short legs, bowing of the nasal bone, arching of the back bone and heart defects. Piebald deer make up less than one percent of white-tailed deer herds.

The white-tailed deer's distinctive white tail and white rump patch are readily visible when they bound away from real or perceived danger. This display helps signal other deer of potential danger. The white tail also helps fawns follow their mothers away from danger.

When born, fawns have reddish-brown coats with white spots. The spots act as camouflage and help the fawn blend in with their surroundings. The spots on a fawn disappear when the fawn gets a winter coat at about five months old.



Piebald deer by USFWS



Photo by: D. Gordon E. Robertson

## Adaptations: Ears

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White-tailed deer have large, cup-shaped ears. Deer have a keen sense of hearing and can even rotate their ears up to 180 degrees to listen to specific sounds. Like dogs, deer can hear sounds at higher frequencies than humans, although their frequency range is not as high as that of a dog. A deer's hearing is so acute that it can also detect the time it takes for a sound to reach one ear relative to the other; this allows the deer to establish how far away a sound is. Once a sound is made, both ears instantly focus on that noise and carefully try to decipher its source.



Fawn Ears by Clay Heaton

## Adaptations: Eyes

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White-tailed deer have eyes on the sides of their skull. This allows the deer to have almost a 310 degree view of the world around them. Prey species like white-tailed deer tend to have eyes on the sides of their skull while predators typically have eyes situated in the front of their skulls. This helps predators see prey easier by producing a binocular or stereoscopic vision. This binocular vision allows predators to see and judge depth in order to pursue and track prey. In contrast, most prey species have poor depth perception.

*"Eyes in the front, the animal hunts. Eyes on the side, the animal hides."*

Deer see best at night, in part due to a light-detecting membrane in their eye known as the **tapetum lucidum**. This membrane is well-developed in most nocturnal animals and causes "eye shine" when harsh light is shined on them. Deer see at a lower resolution than humans. Recent research from University of Georgia has found that deer are red-

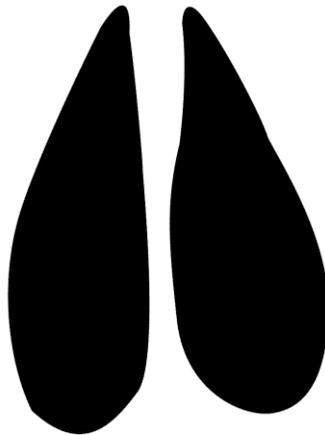
green colorblind in which they can distinguish blue from red, but not green from red, or orange from red. Therefore, it is likely that white-tailed deer perceives a hunter's blaze orange coat as neutral gray in color. In addition, deer have a well-developed ability to see short-wavelength "blue" light which enables deer to easily see ultra-violet emissions.



## Adaptations: Tracks

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White-tailed deer are ungulates, also known as hoofed mammals. The track of a white-tailed deer is easy to distinguish. Each hoof has two large toes. The outer hoof is made of **keratin**, the same material which makes up our fingernails and toenails. The inner hoof is soft and spongy. When deer run, their hooves often spread apart. Deer tracks are 1½ to 3¼ inches long. As deer get older, their hooves become wider and experienced trackers can often tell the difference between tracks left by young deer versus adults. The smallest prints belong to fawns and the largest to mature bucks. Deer hooves also contain a scent gland, and as they walk through the woods, the deer's scent is left on the ground.



# Section 2:



## *White-tailed Deer Management*

## White-tailed Deer Management Timeline

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- **Pre 1700s & Later** – Deer were utilized by Native Americans for food, clothing and tools. European colonists arrived to find numerous white-tailed deer.
- **1729** – Colonists passed a legislative act which prohibited the hunting deer between January 15 and July 31.
- **1800s** – Unregulated deer hunting combined with minimal conservation laws, uncontrolled timber harvesting and large scale land clearing for agricultural use eliminated the white-tailed deer from many parts of the state.
- **1900** – Deer survived only in remote sections of western Maryland.
- **1902** – Deer hunting closed statewide.
- **1916** – The Maryland Legislature created the Conservation Commission to protect and propagate wildlife.
- **1918** – The first Maryland hunting license requirement became law. The funds from these licenses initiated wildlife conservation efforts for deer and other game species.
- **1920s** – Deer populations and habitat began to increase across the state.
- **1927** – Deer season was opened in Allegany County.
- **1929** – Deer season was opened in Garrett County.
- **1931** – Deer hunters were required to register deer at official checking stations.
- **1940s** – Other counties were opened to deer hunting as populations increased.
- **Mid 1950s** – Deer relocation efforts and population monitoring using modern wildlife management began to show results. Data collection began.
- **1954** – 1549 deer were taken in 17 Maryland counties.
- **1951** – The first archery season was opened.
- **1957** – Firearm hunters could take antlerless deer in Wicomico, Somerset and Worcester Counties. Permits were obtained at firehouses.
- **1972-1988** – Antlerless deer permits were required during firearms season.
- **1987** – The first muzzleloader season was held in Maryland.
- **1989** – Deer numbers had increased to levels where antlerless permits were no longer needed except in some far western habitats.
- **1960s & 1970s** – Deer populations were growing and spreading as human populations began rapid expansion and relocation. Developments were created where farms and forested tracts once occurred.
- **1994** – First early (October) muzzleloader season held.
- **1995** – First Youth Deer Hunt held in Maryland.
- **1998** – Maryland completed a management plan for the white-tailed deer.
- **1990s – Present** – Public lands developed hunting programs in conjunction with DNR.
- **Present** – Deer are abundant in the entire state. The Maryland deer management project continues to investigate all new and experimental deer management options for all Maryland landscapes.



# History of White-tailed Deer Management in Maryland

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## Pre-Colonial Era

North American deer are thought to have descended from Asiatic forms which traveled to North America at various times from the middle Miocene to the late Pleistocene Epochs (~ 1-18 million years ago). On a geologic scale, white-tailed deer are comparatively recent immigrants and are still quite similar in form to the Asiatic and European representatives of the deer family (Cervidae).

Native Americans and large predators such as wolves and mountain lions hunted white-tailed deer throughout the year. White-tailed deer provided the eastern Native American tribes with food, clothing, shelter and tools. For example, sinew was used as thread and string and bones were made into needles, awls, hoes, digging sticks, hide scrapers, fishhooks, arrowheads, clubs, arrow straighteners, corn scrapers, cutting tools and decorative beads. Hooves were made into glue and rattles. White-tail deer hair was used for insulation in moccasins and for embroidery.



Pouch made from deerskin by Explore PA History

## Colonial Era

When the European colonists arrived in the New World they found numerous white-tailed deer within the fertile North American landscape. Maryland's early colonists soon relied on white-tailed deer for food and clothing as well. The colonists recognized the importance of the white-tailed deer resource and passed a legislative act in **1729** that prohibited the killing of deer between January 15 and July 31. Violators of the law were fined 400 pounds of tobacco for each deer they took out of season. Unfortunately, the legislative act wasn't enough to protect white-tailed deer. The demand for deer meat and buckskin increased substantially as Great Britain imported white-tailed deer hides

to support the thriving leather industry. The demand was magnified when the European cattle industry suffered an epidemic thought to be hoof and mouth disease.

At the same time that deer were being exploited for meat and hide, expansive tracts of woodlands continued to be cleared to supply Maryland's growing population with wood for shelter, heating and other products. Deer habitat was being destroyed at an astounding rate, and as towns sprouted across the colonial landscape, unregulated market deer hunting helped to supply the food requirements of the growing Maryland population.



Example of

market hunting of deer

### **Modern Era**

Early deer conservation in Maryland and other eastern states proved inadequate because there was little effort to enforce the few conservation laws. By the beginning of the 20th century, Maryland's white-tailed deer survived only in remote sections of Garrett, Allegany, Washington and Frederick counties. Deer hunting season was eventually closed statewide in **1902**. At this time, less than 1/2 million white-tailed deer remained in the nation.

In **1916**, the Maryland Legislature created a Conservation Commission to protect and propagate wildlife. The first Maryland hunting license requirement became law in **1918**. These licenses provided funds to initiate wildlife conservation efforts for deer and other game species.

Deer conservation efforts during the **1920s** focused on creating deer refuges. Relocated Maryland deer and deer purchased from nearby states served as breeding stock within these refuges. These deer soon reproduced and expanded their range into the

surrounding habitat. An area near Gwynnbrook (Baltimore County) and the landscape near Libertytown (Worcester County) served as two of these refuges. Some deer naturally moved south from Pennsylvania into adjacent Maryland counties as well. These initial management efforts, coupled with effective law enforcement, resulted in an increase in deer numbers across the state by the late **1920s**.

Maryland's deer habitat was improving at the same time that white-tailed deer populations were responding to initial wildlife management efforts. Lands that had been cleared of forests through the 1800s were returning to woodlands. During the Great Depression, modern forestry practices and soil conservation activities encouraged the planting of trees on marginal farmlands, creating more deer habitat.

Maryland reopened deer hunting in Allegany County in **1927**. At least five bucks were taken that season. Garrett County opened two years later with a one-buck bag limit that resulted in nine deer being taken. In **1931**, a total of 32 bucks were harvested in Allegany and Garrett counties. The Woodmont Rod and Gun Club in Washington County, a private 5,000-acre deer propagation enclosure, took 26 additional deer that same year.



With the opening of the **1931** deer season, Maryland initiated the first-ever check-in requirements for deer. Hunters were required to register all hunter-harvested deer at a designated check station within 24 hours of the kill.

During the **1930s**, deer from a Pennsylvania game farm were released at Aberdeen Proving Ground (APG), a U. S. Army installation in Harford County. During World War II, the APG deer population grew to levels that created a hazard to military operations. State wildlife personnel trapped over 2,000 deer on APG and released them in various locations across Maryland until the early 1960s.

The **1950s** spawned the earliest Maryland studies on white-tailed deer biology. State wildlife personnel examined deer that were brought to check stations, recorded weights and estimated ages by examining the teeth. Researchers used the data to monitor the health and density of the deer population across Maryland. That effort continues today at Maryland's statewide network of deer processors. By the mid **1950s**, the deer relocation efforts and population monitoring using modern wildlife science began to

show results. A total of 1,549 deer were taken within 17 Maryland counties during the **1954** firearm deer season.

Based partially on the data that were now being collected, new deer management strategies began to emerge in the **1950s**. Prior to that time, deer managers prohibited the taking of does in order to allow for continued herd growth and range expansion. This changed when the first either-sex archery season opened in **1951** in Baltimore and Harford counties. In **1957**, antlerless deer were allowed to be taken during firearm season in Wicomico and Worcester counties.

Antlerless deer hunting in firearm season was by special permit only and deer biologists limited the number of permits available by county in order to obtain a more controlled growth of the herd.

Through **1969**, hunters picked up their antlerless deer permits from state wildlife staff at firehouses across Maryland. By **1972**, computers allocated the predetermined number of antlerless permits for each county, and they were issued by mail. As the deer population grew, the requirement for these permits began to dissipate. By **1989**, only deer populations in the far western counties required regulation through antlerless permits. These regulations were eliminated in western Maryland during the late **1990s**.

### **Excessive Deer**

By the mid-**1980s**, an expanding deer population coupled with a rapidly growing human population lead to increasing conflicts between deer and their human neighbors. Deer began to damage ornamental landscaping planted by residents of Maryland's new housing developments. Deer bounded in front of commuters traveling between work and home. Deer were also associated, perhaps too strongly, with the increased prevalence of **Lyme disease**. Deer managers soon realized that the **cultural carrying capacity** of deer (the deer density that the general public can tolerate) often was lower than the **biological carrying capacity** (the deer density that the habitat can sustain) and that deer must be managed with consideration for both thresholds.



Example of an overabundant deer herd

During this period, agricultural and forest lands were eliminated and residential housing grew in its place. Curiously, white-tailed deer seemed to thrive in their new surroundings. Developers created suburban communities out of dairy farms, woodlands and cropland. Homeowners planted trees and shrubs to landscape their new homes. White-tailed deer found the excellent habitat created by backyard gardens and beautifully landscaped lawns just as desirable as the former agriculture and forest landscapes and quickly created nuisance issues for homeowners.

While the Maryland landscape was being transformed, Maryland's farmers began employing modern farming practices on the remaining agricultural lands across the state. Crop yields climbed due to advances in improved crop varieties and fertilization methods. These superior plants containing added nutrients were highly attractive to Maryland's deer herd and the damage to agricultural crops increased.



Ecological impacts from high deer densities were beginning to become apparent on the landscape. Over-browsing of the forest understory was significantly impacting plant diversity and forest regeneration, damaging habitats for many other species of wildlife. Healthy forests are a critical part of a functioning watershed for the Chesapeake Bay so high deer densities can have negative impacts on the water quality of this important natural resource.

Along with creating prime deer habitat, increased development in the suburbs and new homes in the rural areas of the state resulted in reduced hunting opportunities for deer. White-tailed deer population growth accelerated as hunting was eliminated or became more difficult. In response to the perceived safety issues of neighbors and other outdoor recreationists, many local public land managers closed suburban natural areas to hunting. These natural areas began to function just like the deer refuges of the 1920s. Deer herds protected from regulated hunting grew at rapid rates and exacerbated the problems associated with a population exceeding its cultural carrying capacity.



## Modern White-tailed Deer Management in Maryland

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As the white-tailed deer population grew, human-wildlife conflicts became more frequent. Problems associated with high deer populations include:

- Increased vehicle-deer collisions
- Increased incidence of Lyme Disease
- Increased damage to agricultural crops
- Increased density-dependent deer diseases
- Increased damage to residential areas and gardens
- Over-browsing forest understory



### Vehicle-Deer Collisions

Using its claims data, State Farm®, estimates 1.09 million collisions between deer and vehicles occurred in the U.S. between July 1, 2010 and June 30, 2011. Motorists in West Virginia are most likely to strike deer. In addition, November, during the rut, is the most common time that collisions occur. More than 18 % of all such collisions take place during November. From 2010 to 2011, State Farm estimated that over 34,000 deer-vehicle collisions will occur in Maryland.

Tips to avoid deer-vehicle collisions include:

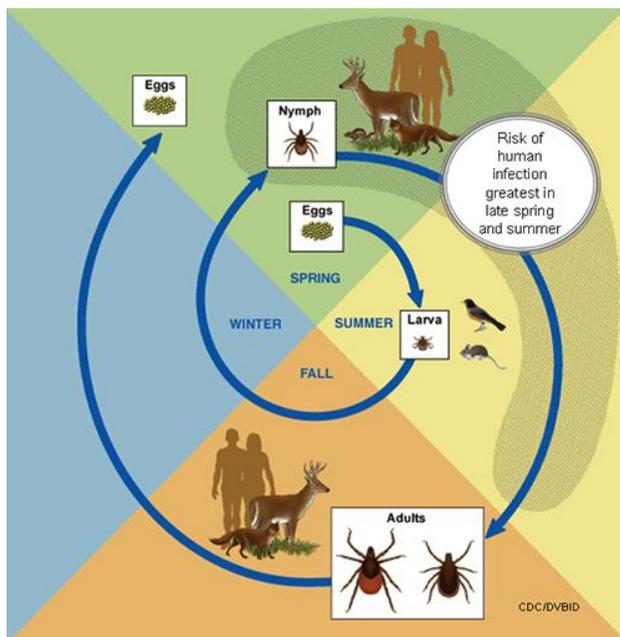
- Be aware of posted deer crossing signs as these are active crossing areas
- Remember that deer are most active between 6 and 9 p.m
- Use high beam headlights as much as possible at night to illuminate the areas from which deer will enter roadways
- Keep in mind that deer generally travel in herds – if you see one, there is a strong possibility others are nearby
- Do not rely on car-mounted deer whistles
- If a deer collision seems inevitable, attempting to swerve out of the way could cause you to lose control of your vehicle or place you in the path of an oncoming vehicle



## Lyme Disease

Lyme disease is an illness caused by a spirochete bacterium (*Borrelia burgdorferi*). This disease is transmitted to people and animals primarily by the bite of the black-legged tick, *Ixodes scapularis*. In 1975, Lyme disease was first recognized in the United States in children from Lyme, Connecticut. However, the bacterium that causes Lyme disease was not identified until 1982. Since then, Lyme disease has been reported with increasing frequency. The majority of cases occur along the east coast from Delaware to Massachusetts and the upper Midwest in Wisconsin and Minnesota. Lyme disease has now been reported from 49 states, including Maryland. It also has been reported in Washington D.C.

Once tick larva hatch, they seek out hosts such as small mammals or birds to feed upon. If the host is already infected with the Lyme disease spirochete from previous tick bites, then the larva will likely become infected as well. In this way, infected hosts in the wild (primarily white-footed mice) serve as spirochete reservoirs, infecting ticks that feed upon them. Larvae, after feeding, drop off their hosts and molt, or transform, into nymphs in the fall. The nymphs remain dormant throughout the winter and early spring. Once their activity resumes, the ticks seek out a new host to feed upon for 4-5 days. During this time, humans may serve as a host and people bitten by infected ticks may contract Lyme disease. After the ticks molt into adults, they look for larger mammalian hosts such as white-tailed deer to provide enough food (blood) to be able to reproduce. Mating may take place on or off the host. An abundance of deer increases the availability of reproductive hosts for ticks.



Graphic by: CDC

## **Agricultural Damage**

Agricultural crops damaged by deer can include row crops, orchards, nurseries and forestry operations. In 2011, the National Agricultural Statistics Service estimated that deer caused \$7.7 million dollars in agricultural damages in Maryland. To help alleviate these problems, MD Department of Natural Resources (MD DNR) allows farmers to apply for crop damage permits to harvest deer that may be affecting crops throughout the year.

## **Density-Dependent Diseases**

### Epizootic Hemorrhagic Disease (EHD)

Though not considered a classical density-dependent disease, epizootic hemorrhagic disease (EHD) transmission can be slightly higher with larger deer herds. In addition, large herds with reduced health (underweight, etc) are more susceptible to the disease.

EHD is transmitted by biting midges, commonly called gnats, in the genus *Culicoides*. Signs of the infection are greatly variable. Early signs of infection include respiratory distress, swelling of the head, neck or tongue and stupor. Deer may have open sores on the tongue and upper front dental pad. Deer that survive the initial infection may have reduced mobility related to lameness. Some of these deer may not live. Surviving deer show hooves with sloughing tissue.

MD DNR monitors EHD by looking for sloughing hoof tissue on deer harvested during firearm deer hunting season. EHD appears annually in Maryland with varying distribution and intensity. Typical white-tailed deer mortality rates are less than 25% and do not occur over large landscapes. To learn more about EHD in Maryland, then visit the MD DNR website ([www.dnr.maryland.gov](http://www.dnr.maryland.gov)).



Hoof sloughing and lesions on the upper palate are two signs of EHD

### Chronic Wasting Disease (CWD)

Chronic wasting disease (CWD) is a naturally occurring disease of the brain and nervous system in deer, elk and moose (cervids). It attacks the brain in cervids, producing small lesions which eventually result in death of the animal. The most common method of transmission is from direct contact between animals. Because of this, larger herds or unnaturally high concentrations of cervids in certain areas (due to feeding or captive animals) can lead to increased transmission rates.

The MD DNR has conducted targeted CWD surveillance since 1999 and began intensive surveillance in 2002. In February 2011, a deer harvested by a hunter in Allegany County in 2010 tested positive for CWD. Since the discovery of CWD in Maryland, a special CWD management zone and management plan have been implemented. Research on CWD is also ongoing. To learn more about CWD management in Maryland, then visit the MD DNR website.

### **Damage to Residential Areas and Gardens**

Deer frequently feed on flowers, fruits and vegetables and the buds and twigs of fruit trees and ornamental shrubs. In addition, during the rut, males will often rub their antlers on small trees and shrubs, damaging the bark. Frequently, deer are considered one of the worst pests in residential areas and gardens. As deer numbers have increased, damage problems to residential areas and gardens have also increased. To prevent these damages, homeowners are encouraged to landscape with less palatable plants (deer resistant) as well as use a number of non-lethal techniques discussed in the management techniques section.

### **Over-browsing Forest Understory**

Numerous studies have found that high deer populations in areas often correlate to reduced forest understory. In some highly browsed forests, tree seedlings and saplings are almost non-existent as well as palatable understory herbs. This creates a problem for forest regeneration as the next generation of trees is being suppressed by browsing deer. In addition, unpalatable species- both native and non-native- are increasing in abundance in some forests, causing changes to plant communities which can affect animal communities as well.



Photo by: Donald Outen

Due to these problems, the need for a comprehensive deer management plan in Maryland arose. By 1996, the Maryland Department of Natural Resources (MD DNR) coupled with the Wildlife Advisory Committee began working on a statewide deer management plan. Throughout the process of creating the plan, Maryland citizens were involved with decision making through public comment. A special group of interested citizens, known as the “Deer Planning Committee” also worked with MD DNR to draft a statewide deer management plan. As a result from public input, committee input and best available wildlife science, the **Maryland Comprehensive Deer Management Plan** was completed in 1998 and was updated in 2009.

The 1998 Maryland White-tailed Deer Plan contained four long-term management goals that still apply today:

1. Ensure the present and future well being of white-tailed deer and their habitat;
2. Maintain deer populations at levels necessary to ensure compatibility with human land uses and natural communities;
3. Encourage and promote the recreational use and enjoyment of the deer resource;
4. Inform and educate Maryland citizens concerning deer biology, management options and the impacts that deer have on landscapes and people.





## White-tailed Deer Management Techniques

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Deer commonly cause damage to commercial agricultural crops, commercial orchard and nursery stock, residential properties and gardens. To help reduce deer damage, various management techniques or combinations of techniques can be used.

Lethal deer management techniques kill deer. The most effective, large-scale management technique for deer population control in Maryland is carefully managed hunting which falls under lethal techniques. Non-lethal deer management techniques do not harm deer but can be useful in decreasing the amount of damage that deer can cause. These techniques are intended to supplement, not replace deer population management. The MD DNR advises individuals to try a combination of deer management techniques for the best results. The following pages briefly describe these various lethal deer and non-lethal management techniques. For more detailed information, please consult “An Evaluation of Deer Management Options” by the Northeast Deer Technical Committee

### Lethal Management Techniques

#### **Regulated Hunting**

Regulated hunting has been proven to be an effective deer population management tool. In addition, it has been shown to be the most efficient and least expensive technique for removing deer. Wildlife management agencies recognize deer hunting as the only effective, practical and flexible method available for regional deer population management, and therefore rely on it as their primary management tool. Through the use of regulated hunting, biologists strive to maintain deer populations at desirable levels or to adjust them in accordance with local biological and/or social needs. They do this by manipulating the size and sex composition of the harvest, season type, season timing, season length, number of permits and land-access policies.



Uncontrolled hunting during colonial times through the early 1900s, in conjunction with habitat losses, resulted in the near extermination of white-tailed deer in Maryland and other eastern states. After deer were relocated into vacant habitats across Maryland, regulated hunting played a major role in the rebound of deer populations. During the 1930s and 1940s only antlered deer were allowed to be taken, which left does to reproduce and provide new deer for vacant, adjacent habitat. As deer numbers grew, limited hunting of does became more widespread. The harvest of female deer is critical to population control today. Removing a sufficient number of does ensures that the next year's reproduction will be of appropriate magnitude and that the deer population

eventually will decline to more ecologically sound numbers. Currently, special hunts that prohibit the taking of antlered deer are used to increase the harvest of does on select public lands in Maryland.

In addition to population control, expenditures from hunters provide a significant boost to local economies. Deer hunting in Maryland has a fiscal impact of \$209 million dollars and provides for 3,250 jobs. All costs associated with managed hunting programs are borne through hunting licenses and associated fees.

There are an increasing number of sites in Maryland where regulated hunting is not an acceptable management option. These include either suburban communities or corporate or government properties. The application of regulated hunting programs in suburban communities is affected by (1) real or perceived safety concerns, (2) conflicting social attitudes and perceptions about wildlife and, (3) firearm-discharge ordinances. In contrast, deer populations on corporate or government properties often become overabundant because of liability or public-relations issues. As a result of the management conflicts in these situations, use of regulated hunting to reduce deer densities may not be the best approach. Regulated hunting, especially in urban areas, must be tightly controlled to ensure safety. Hunters with proper equipment and skills can effectively reduce populations as has been demonstrated on many public lands in Maryland.

### **Managing Deer Numbers through Sharpshooters**

The use of sharpshooters can be an effective means of controlling localized deer populations on a smaller scale. Sharpshooting has been implemented in several locations in Maryland. Approximately 1,000 deer are removed annually using this technique.

Employing qualified sharpshooters especially in suburban communities, on corporate campuses or on government properties may address safety concerns and other liability and public relations concerns that may exist. Use of non-traditional techniques such as sharpshooters to reduce deer densities has increased significantly in the last decade. The costs associated with sharpshooter operations are typically high. To be effective, qualified shooters with proper equipment must have ready access to deer which means that deer will have to be baited to a given area. Costs would be incurred for bait, shooter salaries and expenses for processing of the animal. Recent sharpshooter operations in several areas in the country have incurred costs from \$91 to \$260 per deer removed.

## **Non-lethal Management Techniques**

Non-lethal deer management options can be effective in small areas or where deer numbers are not overly abundant, but they often are ineffective for managing larger landscapes or reducing a local deer population sufficiently to mitigate conflicts. For example, fencing can be effective for backyard gardens, and repellents may provide effective deterrents when applied to ornamental shrubs in a regular manner, but logistics and costs may limit their application on a large scale and neither will remove deer from the landscape.

### **Contraception and Sterilization**

In 2011, Maryland was the first state to approve birth control for deer. The approved birth control, GonaCon, has successfully kept some female deer infertile for up to 5 years in pen studies. During field studies in New Jersey and Maryland using free-ranging deer in semi-enclosed urban settings (partially fenced), the vaccine was 67-88% effective at preventing pregnancy the first year and 47-48% effective the second year. A second dose is recommended during year two to extend contraceptive effectiveness. Based on available data, it is unclear how often deer will need to be re-vaccinated to maintain infertility in subsequent years.

In addition to contraception, sterilization is another non-lethal option for controlling deer reproduction. However, both methods are time-consuming and costly, ranging from \$500-1000 per treated deer. Fertility control also has no short-term effect on population size, so pre or post treatment culling is essential for timely resolution of deer problems with fertility control agents.



### **Deer-Resistant Plants**

Deer have preferences for feeding on certain plant species. Some plants, both native and ornamental, used for landscaping are preferred as forage by deer. Additionally, landscaped plants are often more attractive to deer because they are fertilized and irrigated. There are some species of plants that deer avoid feeding on because they are less palatable. Though no plants are totally resistant to deer browsing, some are less palatable to deer and are less likely to receive heavy damage.

The following is an incomplete list of “deer-resistant” plants or plants that deer don’t normally prefer to eat. People experiencing deer browse damage to their landscape plantings may consider planting some of the species on this list as alternatives to plants

that deer prefer and often damage. When choosing “deer-resistant” plants, it is also important to avoid plants known to be invasive in Maryland such as barberry. Your local Maryland Cooperative Extension Service office can supply a complete list of unpalatable plant species for use as landscaping.

### ***Trees***

Allegheny Serviceberry - Bottlebrush Buckeye - Chinese Paper Birch - Colorado Blue Spruce - Douglas Fir - Downy Serviceberry - Shadbush -- Heritage Birch - Japanese Falsecypress - Japanese Cedar - Dragon Lady Holly - San Jose Holly - Douglas Fir - Paper Birch - European White Birch - Flowering Dogwood - Korean Dogwood - Japanese Flowering Cherry - English Hawthorne - European Beech - Honey Locust - Norway Spruce - White Spruce - Austrian Pine- Douglas Fir - American Holly - Sassafras - Shadbush - Pitch Pine - Red Pine - Scotch Pine



American holly is a deer resistant tree which provides berries for many birds

### ***Shrubs And Vines***

Paw paw - American Bittersweet - Red Osier Dogwood - Rose of Sharon - Drooping Leucothoe - Creeping Wintergreen - Caryopteris -Blueberry Elder - Japanese Plum-Yew -- Downy Serviceberry - Allegheny Serviceberry - Beautybush - Mountain Laurel - Chinese Holly - Spicebush - Lilac

### ***Flowers And Ferns***

Marigold - Coneflower - Toadflax - Lavender - Daffodil - Hyacinth - Royal Fern - Sensitive Fern - Wood Fern - Sage - Thyme - Yucca - Tansy - Buttercup - Scented Geranium - Oriental Poppy - Flowering Tobacco - Rose Champion - Sweet Alyssum Yarrow - Columbine - Monkshood - Snapdragon - Jack-in-the-pulpit - Snakeroot - Larkspur - Bleeding Heart - Foxglove - Mint - Lupine -Zinnias

### **Repellents and Fencing**

Repellents are a control method that can disrupt and reduce deer feeding behavior on planted materials. To be effective, repellents must be applied prior to anticipated periods of deer browsing. Contact repellents are placed directly on the plant and discourage feeding by producing an unpleasant taste.

Area repellents are placed in the vicinity of the vegetation and repel deer by an unpleasant odor. Repellents provide cost-effective protection when used in small areas, such as gardens, residential ornamentals, or small orchards. Larger applications for commercial operations have proven too costly, with irregular effectiveness. Research

conducted in New York’s Hudson Valley revealed that it costs approximately \$70/acre/year to implement an orchard spray program. Similar work conducted in Connecticut nurseries indicated that repellents (equipment and labor excluded) ranged from \$18/acre/year to \$396 per acre for a single application.

Repellents provide effective deer control when they are regularly applied to vegetation. However, rainfall often removes repellents from the vegetation, requiring periodic applications. Changing repellents every few years on each site has been demonstrated to improve repellent effectiveness. The potency of repellents may vary from year to year, and from neighborhood to neighborhood. When deer numbers approach biological carrying capacity, repellents may be totally ineffective. The table below details several popular deer repellents.

**Table 1. Popular Deer Repellents.**

ActiveIngredient	Mode of Action	Use on Edibles	Longevity	Trade Names
Salts/fatty acids of ammonia	Odor	Yes	Up to 4 weeks depending on the amount of rainfall	-Hinder -Deerbusters Deer and Rabbit Repellent
Garlic oil	Odor	Yes	Reapply after a heavy rain	-GD Deer and Insect Repellent -Garlic Barrier
Capsaicin Castor Oil	Taste	Yes	Up to 30 days depending on the amount of rainfall	-Miller’s Hot Sauce -Scoot Deer
Predator Urines	Odor	Not Directly	± 30 days	-Coyote, wolf urine—many products available
Fish and/or beef by-products	Odor/taste	Not within 8 weeks of consumption	± 30 days during dormant season, every 10 to 14 days during the growing season	-Bobbex -Deerbusters Plant Growth Stimulant
Putrescent egg-based products	Odor	No	1 to 3 months or more	-Deer Away BGR -Rejex -It Deer Chaser
Thiram fungicide-based products	Taste/odor	No	1 to 3 months or more	-Bonide Chew-Nott -Deerbusters Deer Repellent and Turf Fungicide -Shotgun Deer & Rabbit Repellent
Blood-based products	Taste/odor	No	1-3 months or more	-Plantskydd -Repellex
Denatonium benzoate or bitrex	Taste	No	1-3 months or more	-Tree Guard -Ropel, Repel
Egg, garlic, fish oil, hot pepper, bitrex or some combination	Taste/odor	No No No No No Yes Yes	1-3 months or more	-Deerbusters Deer I -Deer Stopper II -Deer Off -Bobbex -Liquid Fence -MGD Deer Repellent -Not Tonight Deer -Deer Blocker

Fences create a barrier between deer and the protected vegetation. In situations where deer pressure is moderate to high, or the value of the growing stock is high, physically excluding or deterring deer from growing areas using fencing may be a necessity. Many designs of electric and non-electric fences may be used. An effective deer fence may be an 8 foot-tall-barrier or a smaller, electric system. Barrier fences are more costly than

electric ones. However, electric fences are inappropriate where high human contact is likely. Regular inspection and maintenance of fences increase their effectiveness.

The cost of an effective fence may pay for itself over a few years if used in orchards or nurseries. An analysis of a Maryland nursery found that deer caused about \$2,000 damage each year within a 5-acre tract. The cost of a hi-tensile fence would be about \$3,000 and would last for about 25 years. It is easy to see that the fence would more than pay for itself within a few years. Costs vary with types of fence and the level of deer pressure; higher deer pressure requires more expensive fences. Labor and material costs (excluding chargers) vary from \$.10 per linear foot for a single strand polywire electric fence to \$6 per linear foot for a woven wire fence.



Fenced In Deer by Shari Weinsheimer

There are distinct limitations on the applicability of fencing and repellent options. Repellents and fencing are most successful for smaller areas of cultivated vegetation such as small orchards and gardens. As the size of the acreage increases, repellents become less economical and properly installed fencing more economical. In the case of field crops, such as soybeans or corn, it is difficult to justify the economics of fencing. Application of repellents and/or fencing can only be justified economically when the financial gain yielded by protection is equal to or greater than the cost of implementation.

Neither technique has value in addressing concerns relating to wide-scale deer impacts on plant and animal communities. These techniques were designed to supplement, not replace deer population management.

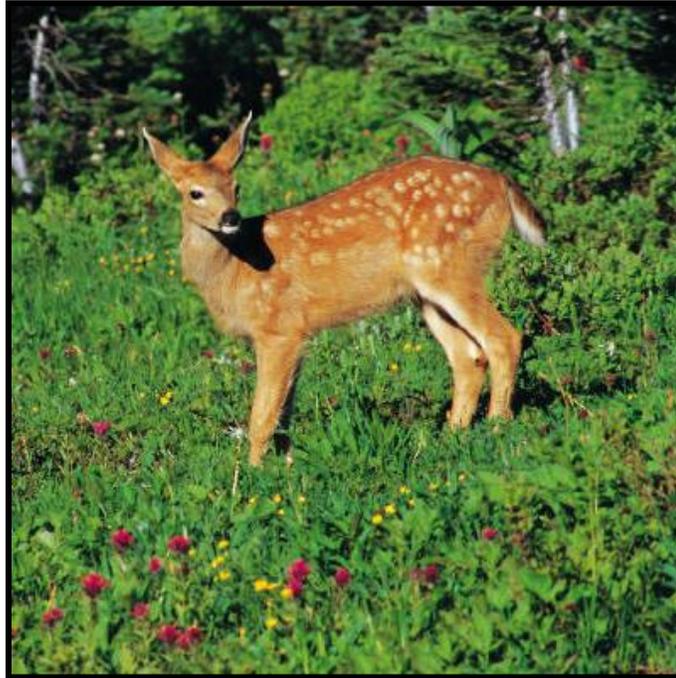
### **Ban on Long-Term Feeding**

Long-term feeding of deer should be discouraged. Supplemental feeding is a technique that is sometimes proposed as a method to decrease deer browsing damage. The concept is to feed deer on a year-round basis or provide an alternative planting or lure crop in an area that will attract deer away from the area where they are causing damage. This practice may have undesirable outcomes: it can lead to an increase in the overall health of adult deer temporarily but also can contribute to an unnaturally high concentration of deer, and can lead to increased deer damage problems.

Concentrating deer may also facilitate the spread of diseases between deer, cause the depletion of habitat, and may impact forest regeneration. In suburban and urban areas, feeding deer may also lead to an increase in vehicle strikes near the feeding area. Feeding deer can decrease their fear of humans, which may lead to dangerous deer-human interactions. Likewise, deer concentrated at feeding sites may also increase the risk of people contracting Lyme disease.

Therefore, municipalities experiencing deer problems may want to consider imposing restrictions on feeding deer or may want to ban the practice altogether.

# Section 3:



## *Activity Lesson Plans*

**Note:** Section 3 activities are primarily the Copyright of Project WILD through the Council for Environmental Education (CEE). These activities were reprinted with permission from CEE in the White-tailed Deer Education guide found in the education trunks. For access to these materials, please reserve the deer education trunk from your nearest facility or consider taking a Project WILD workshop.

Deer Trunk Reservations:

[http://dnr.maryland.gov/wildlife/Pages/Education/education\\_trunks.aspx](http://dnr.maryland.gov/wildlife/Pages/Education/education_trunks.aspx)

Maryland Project WILD:

<http://dnr.maryland.gov/wildlife/Pages/Education/ProjectWILD.aspx>

## Where is the Tooth Fairy? \*

**Grade Level:** 2-3

**Subjects:** Science, Environmental Science

**Skills:** analysis, description, evaluation, generalization, observation

*\*Adapted with permission from the Virginia Department of Game and Inland Fisheries*

[www.dgif.virginia.gov](http://www.dgif.virginia.gov)

**Objectives:** To compare life cycles of the Virginia White-tailed Deer and children through the loss and eruption of teeth; and to understand how scientists use teeth and other aging methods to learn about the life cycles of different species.

### **Materials:**

- Jawbones from white tailed deer
- Pictures of deer jawbones of various ages (included in activity)
- Tooth eruption chart for children (available from a dentist or online)

### **Background:**

All living organisms, both plant and animal, have a genetically predetermined life cycle. In plants; seeds grow, flower, produce seeds, and eventually die. Some plants such as corn, live one season, others such as an oak tree will live a couple of hundred years or more.

Animal life cycles vary in length also. For example; insects may live for a season, year or as long as 17 years such as the cicada. Mammals such as humans and elephants may live 70 or more years.

Animals may have a metamorphic life cycle as demonstrated in amphibians and some families of insects, such as butterflies, moths and beetles. In most animal species, young resemble their parents when born or hatched and do not go through a metamorphic change.

Scientists study life cycles of plants and animals to better understand the health and structure of a population. Knowing how many individuals are in each age class helps scientists make informed decisions needed to manage the population. When a particular age class is missing from a population it can affect the success of the population to survive over time.

For example, if most of the fish in a lake are older larger fish, with fewer smaller younger fish there may not be enough prey for the older fish. When this occurs, fishery biologists may provide additional cover for the smaller fish to hide so more will

survive, introduce younger fish into the population, remove some of the larger fish or a combination of these practices.

For many fish species, age can be determined by examining the growth rings on a scale, similar to counting the rings on a tree. Mammals are frequently aged by examining their teeth. For some species, such as the black bear, scientists will pull and then cut a tooth using a special saw so they can examine the “rings” under a microscope. In deer species, teeth erupt at certain ages and will wear down at known rates. This activity compares the growth of teeth in white-tailed deer with that of children.

White-tailed deer teeth erupt and are lost at known ages based on data collected during deer harvest or hunting season. The jawbones are collected to determine the age structure of the local herd of deer as a management tool.

Fawns are born with their incisors (front teeth) in place. A deer’s lower jaw has 8 incisor-like teeth: 6 incisors and 2 incisiform canines that are used to bite and tear the plants they feed on. Deer have no upper incisors. By 4 weeks of age, two premolars are present and by 10 weeks the third premolar has erupted.

Deer have their first permanent molar by 7 months and second molar by 13 months. By 20 months all the deer’s “adult” or permanent teeth are in place. This pattern of tooth eruption and wear is used to determine the age structure within a herd of deer. Children’s teeth erupt more slowly beginning at 8-12 months. There are 20 primary or “baby” teeth that will erupt in the first 3 years of life and begin to be replaced around the age of 6 years. The primary teeth hold spaces for the adult teeth that are forming in the jaw. It is important that children take care of these teeth and eat healthy so that the “adult” teeth are also healthy.

The front incisors are usually the first teeth lost by children. Deer are born with 4 of their incisors; these and the other incisors are replaced by the time the deer is 11 months old.

**Procedure:**

1. On the black board create a table to track the loss of teeth by students. You may need to identify each tooth and what it is called. Share with students a tooth development chart and show what ages they can expect to lose other teeth. Explain this is part of their life cycle and all humans loose teeth. Create a graph showing how many students have lost their teeth, how many have been replaced and how many are currently loose. Discuss what it feels like when one is growing in, how they lost it, even the importance of eating healthy to have nice teeth. See sample chart below.

	Tooth	# lost	# replaced	# currently loose
<b>Upper Teeth</b>	Central incisors			
	Lateral incisor (left)			
	Lateral incisor (right)			
<b>Lower Teeth</b>	Lateral incisor (left)			
	Lateral incisor (right)			
	Central incisors			

<b>Human Primary Teeth Development Chart</b>			
	Tooth	When tooth emerges	When tooth falls out
<b>Upper Teeth</b>	Central incisor	8 to 12 months	6 to 7 years
	Lateral incisor	9 to 13 months	7 to 8 years
	Canine (cuspid)	16 to 22 months	10 to 12 years
	First molar	13 to 19 months	9 to 11 years
	Second molar	25 to 33 months	10 to 12 years
<b>Lower Teeth</b>	Second molar	23 to 31 months	10 to 12 years
	First molar	14 to 18 months	9 to 11 years
	Canine (cuspid)	17 to 23 months	9 to 12 years
	Lateral incisor	10 to 16 months	7 to 8 years
	Central incisor	6 to 10 months	6 to 7 years

2. Ask students what other animals may lose teeth as they grow or the teeth change as the animal grows. Many may mention their pets especially the sharp teeth of puppies and kittens. Puppy and kitten teeth also fall out but this usually happens while the animal is eating and the teeth are swallowed. A local vet may be willing to provide information on domestic pets and maybe visit the class.
3. Share the jawbones of White-tailed Deer and make observations about the teeth without naming the animal. They may notice the distance between the front incisors and the molars and think that teeth are missing. Point out that there are no "holes" for teeth between the incisors or molars so none are missing. Discuss what the animal may have eaten, some may recognize that the canines are missing and know the jaw is from an herbivore.
4. Ask if they notice any difference between the number and shape of the molars in the jawbones, you may need to tell them that all the jawbones are from the same species. Have the students count the molars in each jaw bone and make inferences as to which animal is older. Since deer wear out their teeth you can see the dentine lines widen as the deer ages in the photos.
5. Show the students a picture of a fawn and adult deer. Discuss foods that the deer

may eat. Ask how they think the deer eat, especially since they don't have upper incisors. When students lose their front incisors, can they eat an apple? Deer have a hard pallet and when they bite into an apple or a bush they use the pallet to help hold the food and tear. If possible, look along the edge of a field where deer may be feeding. Close examination will show that the plants tips have been torn not cleanly cut indicating a deer was feeding in the area.

**Extension:**

1. Have students draw the life cycle of their family pet showing significant changes in the animal's life. For example, dogs often turn gray as they age.

# Section 4:



## *Additional Activities*



## White-tailed Deer Quiz

1. What is the only deer native to Maryland?
2. What is a female deer called?
3. What is a young deer called?
4. What color spots does a young deer have on its sides?
5. Deer are strong swimmers.
  - a. True
  - b. False
6. Name some different foods that deer like to eat.
7. What are the four components of a habitat?
8. White-tailed deer shed their antlers every year.
  - a. True
  - b. False
9. Deer can run up to 35 miles per hour.
  - a. True
  - b. False
10. Deer eat landowner's flowers, shrubs and garden vegetables.
  - a. True
  - b. False

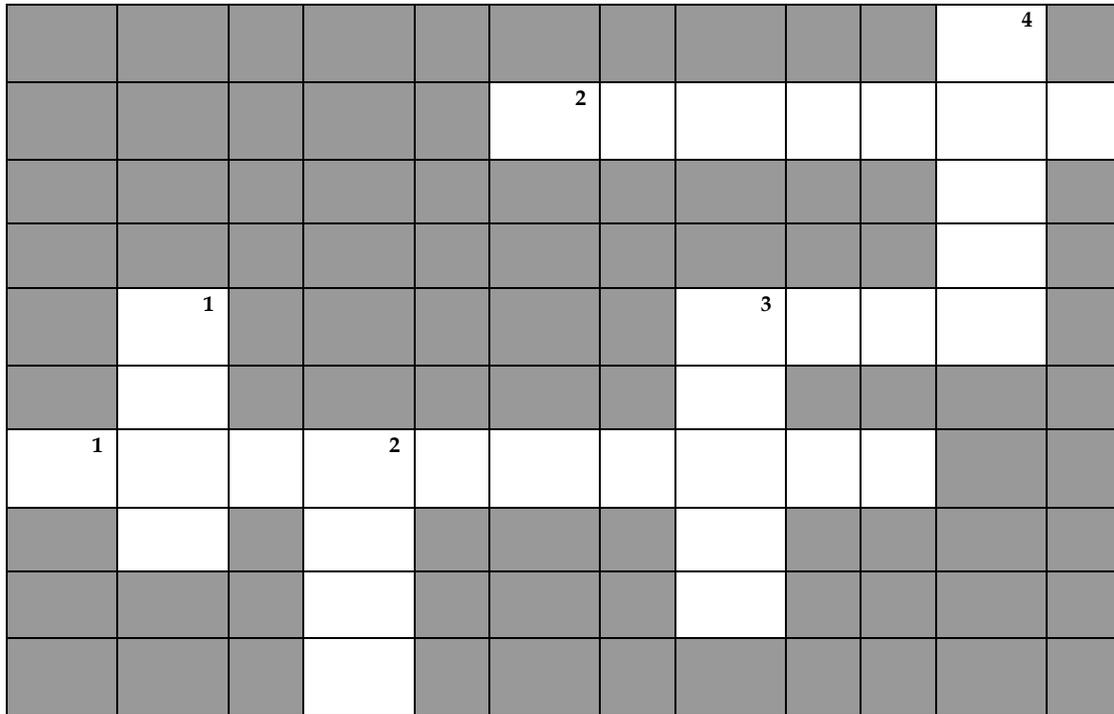


## White-tailed Deer Quiz Answers

1. What is the only deer native to Maryland?  
**The White-tailed deer.**
2. What is a female deer called? **Doe.**
3. What is a young deer called? **Fawn.**
4. What color spots does a young deer have on its sides? **White.**
5. Deer are strong swimmers.  
a. **True**      b. False
6. Name some different foods that deer like to eat. **Leaves, acorns, berries, nuts, grasses, soybeans, twigs and corn.**
7. What are the four components of a habitat? **Food, water, shelter and space.**
8. White-tailed deer shed their antlers every year.  
a. **True**      b. False
9. Deer can run up to 35 miles per hour.  
a. **True**      b. False
10. Deer eat landowner's flowers, shrubs and garden vegetables.  
a. **True**      b. False



## White-tailed Deer Crossword Puzzle



### ACROSS

- Deer are \_\_\_\_\_, which means they eat plants.
- A male deer normally has \_\_\_\_\_ on top of his head.
- A baby deer is called a \_\_\_\_\_.

### DOWN

- Berries, twigs, nuts, and leaves are all part of a deer's \_\_\_\_\_.
- A male deer is called a \_\_\_\_\_.
- White tailed deer are normally found in the \_\_\_\_\_.
- A white tailed deer's coat is normally the color \_\_\_\_\_.

### Word List

Antlers	Herbivores	Buck	Forest
Fawn	Brown	Diet	



## White-tailed Deer Crossword Puzzle Answers

										<sup>4</sup> B	
					<sup>2</sup> A	N	T	L	E	R	S
										O	
										W	
	<sup>1</sup> D						<sup>3</sup> F	A	W	N	
	I						O				
<sup>1</sup> H	E	R	<sup>2</sup> B	I	V	O	R	E	S		
	T		U				E				
			C				S				
			K				T				

### ACROSS

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- A male deer normally has \_\_\_\_\_ on top of his head.
- A baby deer is called a \_\_\_\_\_.

### DOWN

- Berries, twigs, nuts, and leaves are all part of a deer's \_\_\_\_\_.
- A male deer is called a \_\_\_\_\_.
- White tailed deer are normally found in the \_\_\_\_\_.
- A white tailed deer's coat is normally the color \_\_\_\_\_.

### Word List

Antlers  
Fawn

Herbivores  
Brown

Buck  
Diet

Forest



## White-tailed Deer Word Search

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

### Word List

ANTLERS

FOREST

BUCK

MAMMAL

BROWN

NOCTURNAL

HERBIVORES

VEGETATION

DIET

FAWN



## White-tailed Deer Word Search Answers

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

### Word List

ANTLERS

FOREST

BUCK

MAMMAL

BROWN

NOCTURNAL

HERBIVORES

VEGETATION

DIET

FAWN



## White-tailed Deer Fill-in-the-Blank

1. A female deer is called a \_\_\_\_\_.
2. A white tailed deer's coat is normally the color of \_\_\_\_\_.
3. Baby deer have \_\_\_\_\_ on their backs.
4. A male deer normally has \_\_\_\_\_ on top of his head.
5. Deer are \_\_\_\_\_, which means they are plant eating mammals.
6. Deer are classified as \_\_\_\_\_, which are characterized by having fur/hair, wean their young with milk, give live birth, and are warm blooded.
7. A male deer is called a \_\_\_\_\_.
8. White tailed deer are \_\_\_\_\_, which means they are active at night.
9. Baby deer are called \_\_\_\_\_.

### WORD LIST

Antlers	Herbivores	Mammal
Brown	Doe	Nocturnal
Buck	Fawns	White spots



## White-tailed Deer Fill-in-the-Blank Answers

1. A female deer is called a DOE.
2. A white tailed deer's coat is normally the color of BROWN.
3. Baby deer have WHITE SPOTS on their backs.
4. A male deer normally has ANTLERS on top of his head.
5. Deer are HERBIVORES, which means they are plant eating mammals.
6. Deer are classified as MAMMALS, which are characterized by having fur/hair, wean their young with milk, give live birth, and are warm blooded.
7. A male deer is called a BUCK.
8. White tailed deer are NOCTURNAL, which means they are active at night.
9. Baby deer are called FAWNS.

### WORD LIST

Antlers

Herbivores

Mammal

Brown

Doe

Nocturnal

Buck

Fawns

White spots

# Deer Music and Movement

## Little Deer Poem

Out in the forest,  
early in the morning.  
See the little deer  
prancing to and fro  
First, she eats some leaves  
then, she eats some berries.  
*Munch, munch, crunch, crunch*  
Off she goes!



## Forest

*(To the tune of "Did you ever see a Lassie")*  
If you're ever in the forest  
The forest, the forest  
If you're ever in the forest  
You might see some deer.  
With antlers on one;  
Another one might run.  
If you're ever in the forest,  
You might see some deer.

## Act Like a Deer

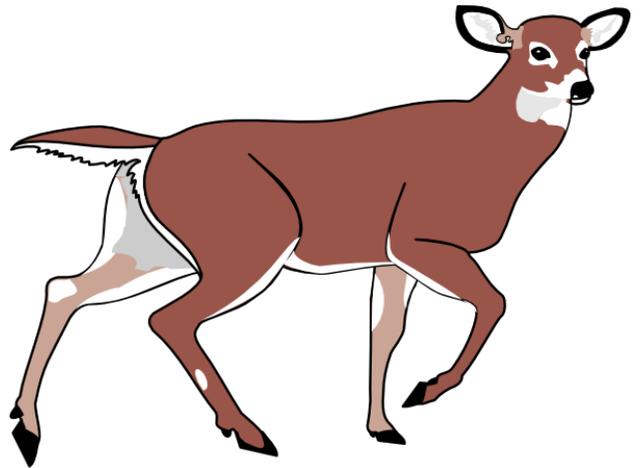
Deer use a variety of non-verbal techniques to communicate. Teach your students about non-verbal communication and have them act out the following alarm displays that deer use.

- **Foot Stomp** - Slowly lift one foot at a time and stomp your foot on the ground. This is used to warn others.
- **Head Bob** - Bob your head up and down. This is used to warn others.
- **Tail Flag** - A whole arm wave with the white or colored handkerchief in hand. This is used to warn others.
- **All Clear** - A quick hand wave with a white or other color handkerchief. This is used to tell other deer that everything is ok.

## White-tailed Deer

The white-tailed deer is easy to recognize by its bright white tail. White-tailed deer are found throughout North America and throughout all of Maryland.

Usually, only the males, also known as bucks, grow antlers. These antlers are shed each winter. White-tailed deer eat nuts, berries, twigs, buds and leaves.



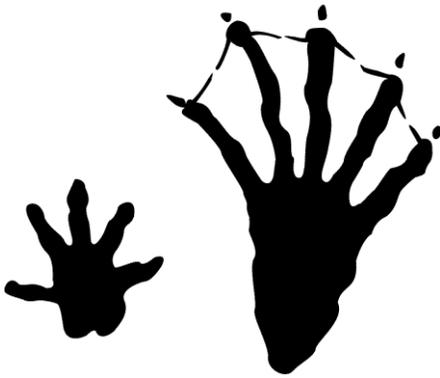
White-tailed deer are fast runners and great jumpers. White-tailed deer can run up to thirty five miles per hour and can jump up to eight feet in the air! Bucks frequently fight during the mating season. They use their antlers and hooves to fight. Female deer, called does, give birth to one to three fawns in the spring. The fawns are covered in white spots that disappear in six months.

### Read and Learn

1. What are white-tailed deer recognized by? \_\_\_\_\_
2. Only bucks grow \_\_\_\_\_.
3. What do deer eat? \_\_\_\_\_
4. How is a fawn colored? \_\_\_\_\_

# What Animals Made These Tracks?

Look at the tracks below and write down the name of the animal that made them!



B \_ \_ \_ r



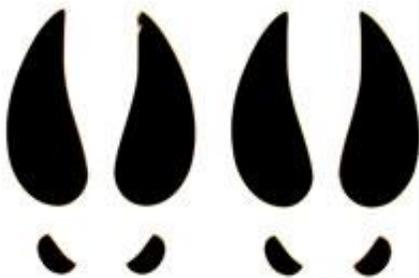
O \_ \_ \_ \_ m



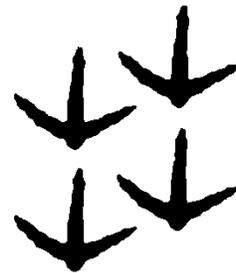
S \_ \_ \_ k



R \_ \_ \_ \_ n



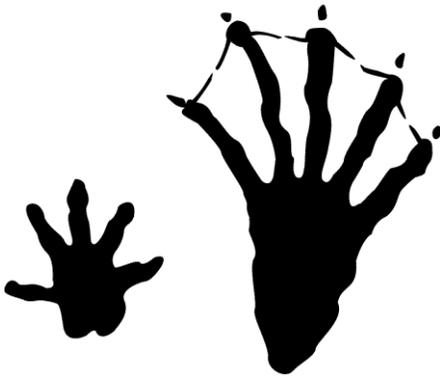
W \_ \_ \_ e - T \_ \_ \_ \_ d  
D \_ \_ r



W \_ \_ d T \_ \_ \_ \_ y

## What Animals Made These Tracks? (Answers)

Look at the tracks below and write down the name of the animal that made them!



**Beaver**



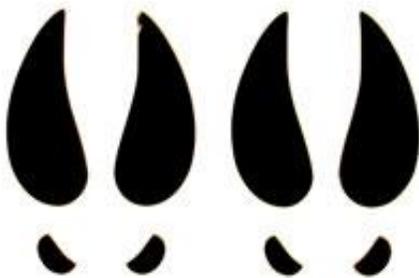
**Opossum**



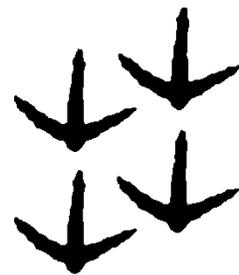
**Skunk**



**Raccoon**



**White- Tailed Deer**



**Wild Turkey**

## Deer Crafts

### Make a "Buckskin" Map

At one time, some Native Americans would draw maps on tanned buckskin. You can use paper bags to simulate buckskin.

**Materials:** Paper bag (like a grocery bag), scissors, black marker or pen

**Procedure:** Cut out a square piece of the bag and then proceed to crumple it up, rub it in your hands, stomp on it and crumple it some more. After working the bag, smooth it out and then gently rip off the edges to give it a jagged, uneven look. Once your "buckskin" canvas is complete, then draw a map on it.

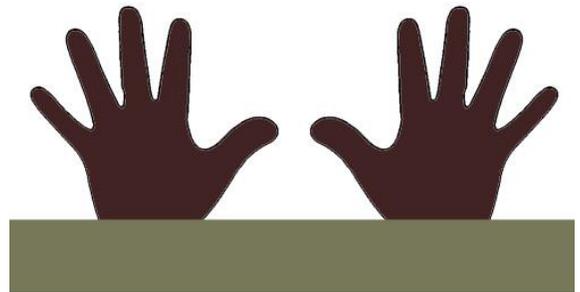


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### Deer Antler Headbands

**Materials:** Construction paper, scissors, glue

**Procedure:** Help children trace their hands on construction paper. Cut out the hands. Make a headband out of construction paper or cardstock. Glue the hands to the headband.



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### Deer Puppet

**Materials:** Construction paper, scissors, glue, googly eyes, pom-pom

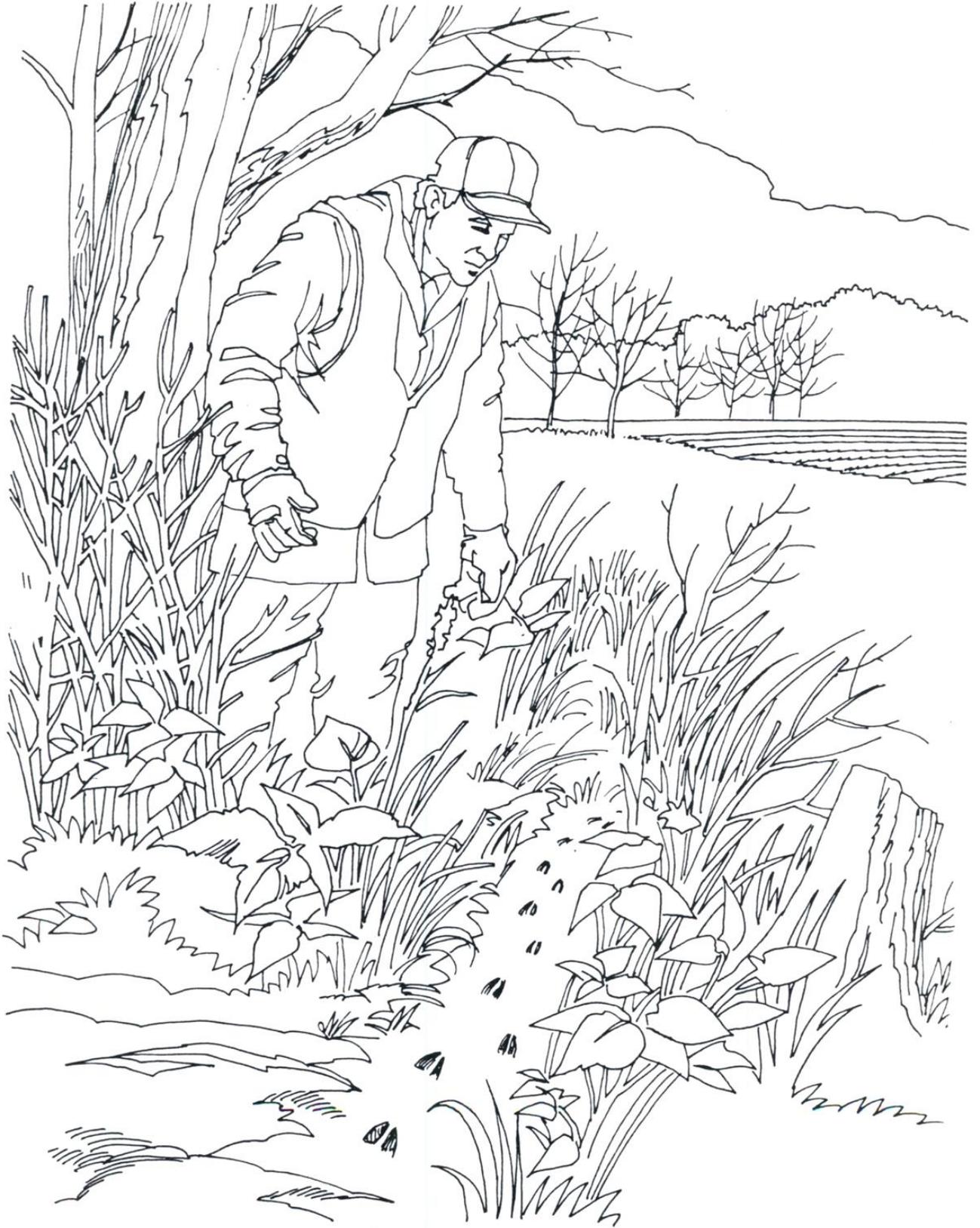
**Procedure:** Help children trace their hands on construction paper. Cut out the hands. Glue hands to back of paper bag. Either draw or glue googly eyes on front of bag. Draw or glue pom-pom nose below eyes. Help kids cut oval out of white construction paper and glue to middle of bag.



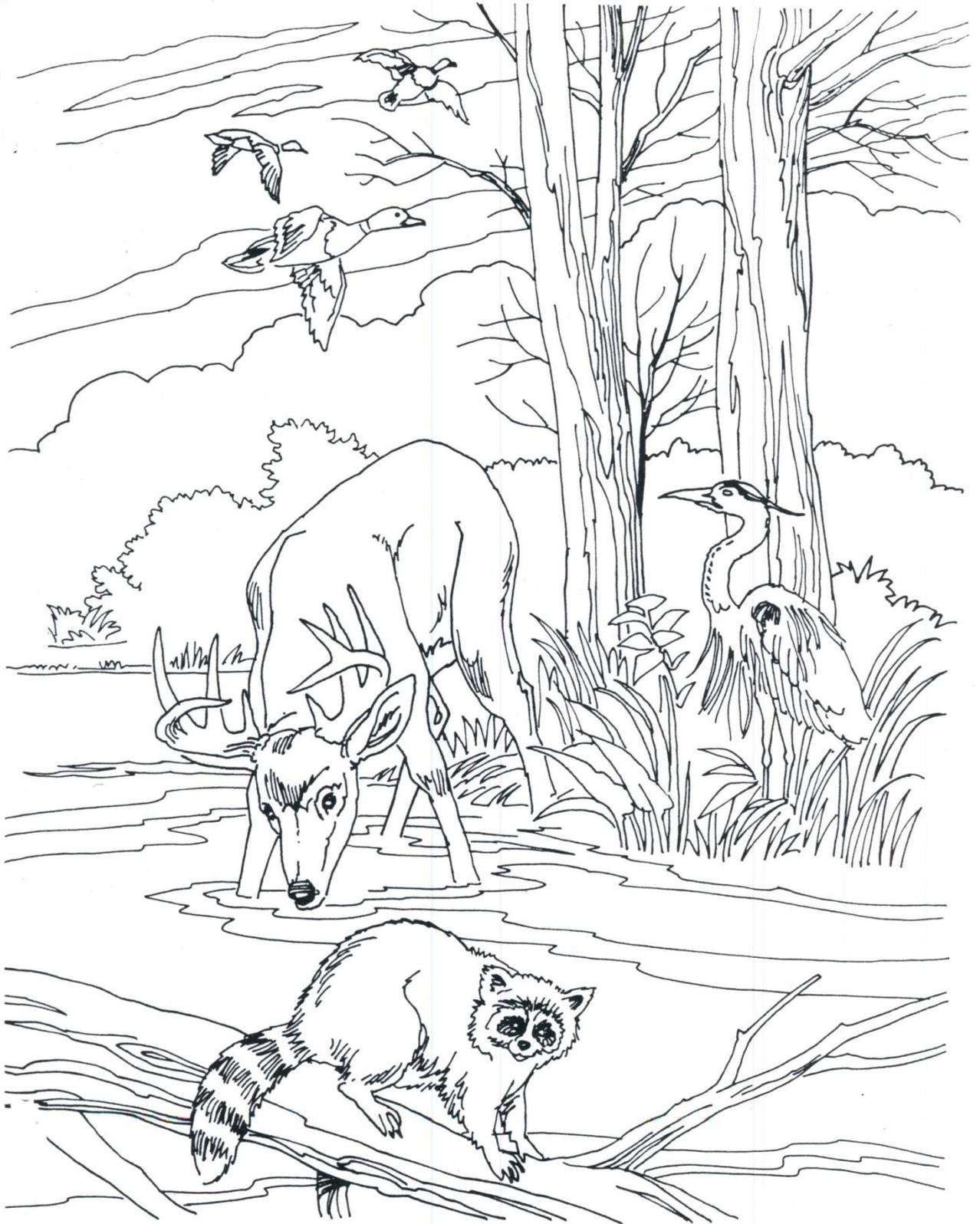


**Connect  
the Dots**









# Help the Hunter Find the Buck

