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Whitetail Deer Ecology

DESCRIPTION:

Students will have the opportunity to investigate into the fascinating world of the whitetail deer (*Odocoileus virginianus*). This short session will cover the evolution, life history, behavior, reproduction, predation, and conservation of this large herbivore.

OBJECTIVES:

1. Students will gain an understanding of how whitetails have evolved to occupy their current niche in North and Central America.
2. Students will follow the whitetail through each season to facilitate an understanding of some of the deer's basic life history characteristics including reproduction and predation.
3. Students will track and observe a free-ranging population of whitetails, taking notes on the behavior of the species.
4. Students will explore the role whitetails play in our natural system and the best management plan that will ensure the conservation of both the deer and the natural system that supports them.

MATERIALS NEEDED:

Whitetail Evolution Chart

Whitetail Deer Facts Sheet

Pencils

Clipboards

Data Sheets

Family Tree of the Mammals

Preserved Specimens (leg, antlers, head, jaws, and fawns)

Range map of whitetails

Illustration of Ruminant's Stomach

Whitetail Deer Natural History Sheet

PROCEDURES:

1. Ask students if they know where whitetail deer came from. Draw out the concept of natural selection and evolution, and show the students how scientists think whitetails came into being using the evolution chart provided. Use the preserved deer leg and foot to illustrate that the whitetail belongs to a group of other animals called ungulates and ask them to name some other ungulates.
2. Ask the students what they know about whitetails. Use the information provided by the students to create a picture of the ecological niche this species occupies (i.e. where they live, what they eat, who eats them, etc.). Visiting teachers should refer to the laminated information sheet provided with the lesson entitled *Whitetail Deer Facts*. Try to integrate all the facts on the sheet into the points that the students bring up, using the preserved specimens when appropriate

3. Tell the students that they will be tracking one or more whitetails in the field and ask them how this could be accomplished (e.g. looking for tracks, scat, browsed shrubs, etc.). While looking for the deer, point out twigs from trees and shrubs that show the effects of browsing and show the students the *browse line* that is apparent in certain sections of the forest. Look for the characteristic hoof prints that are made in snow or soft soil. Lastly, point out deer scat that can be found along their trails and feeding areas. Ask the students what they might learn from analyzing the scat.
4. After the whitetail/student observations return to the original meeting place Ask the students to hypothesize what the encounter might have been like in each of the other three seasons. Use this information and the preserved specimens to create a picture of the life history characteristics of this species (see the information sheet entitled *Whitetail Deer NaturalHistory*).

SUMMARY/CONCLUSION:

Conclude with a discussion of the conservation of this species and have the students identify the major characteristics of a viable management plan for this species in New Jersey.

ADDITIONAL/ALTERNATE ACTIVITIES:

The main goal of this session is for students to briefly investigate one wildlife species and identify a management plan that will ensure its survival within the natural systems that support our survival on the planet. If time permits:

1. Have the students identify other wildlife species that play a key role in maintaining a healthy nature system. Draw out the connections between all these species by drawing a food web and food pyramid on the chalk board. and/or
2. Play the population simulation game "Oh Deer."

CLASSROOM ACTIVITIES:

Have the students select other mammals that live in the forested areas of the northeast and report on the life history of these species. Have the students identify the components of the habitat that are crucial to the survival of the species. Ask the students to construct a management plan to ensure the species survival.

Bibliography

Bauer, Erwin A. *Whitetails: Behavior, Ecology and Conservation*. Minnesota, Voyageur Press, Inc., 1993.

Whitetail Deer Fact Sheet

1. Whitetail deer are **mammals** (class: Mammalia). Mammals have hair, give birth to live young which they nourish through milk-secreting glands. Other mammalian characteristics worth noting include movable eyelids, fleshy external ears, and diphyodont teeth (milk teeth replaced by a permanent set of teeth).
2. Whitetails are members of the *order* of mammals known as **Artiodactyla** (even-toed hoofed mammals: swine, camels, deer, hippopotamuses, antelope, cattle, sheep, and goats. Contrast with the order Perissodactyla which are odd-toed hoofed mammals like the horses, asses, zebras, tapirs and rhinoceroses). Both orders are often called ungulates (L., *ungula*, hoof) or hoofed mammals, and deer are further classified (along with sheep, cattle, giraffes and others) in the suborder Ruminantia.
3. Whitetails, like all ungulates, are strictly herbivores and have **teeth that are adapted for chewing**. Herbaceous or plant material contains **cellulose** which is resistant to digestion (see below).
4. Belonging a group of ungulates known as **ruminants** (suborder Ruminantia), deer have a large 4-chambered stomach. When feeding, plant material travels down the esophagus to the **rumen**, where it is partially broken down and formed into small balls of **cud**. The cud is then returned to the mouth for chewing (chewing the cud, or rumination). After re-swallowing, food passes to the reticulum, omasum and abomasum for final digestion (see illustration of ruminant's stomach). This long and convoluted digestive process enables ruminates to extract most of the nutrition available in the herbaceous food they eat.
5. Four subspecies of whitetails make up most of the North American population. The northern whitetail in our area is among the largest and is classified as ***Odocoileus virginianus borealis***. The smallest is the Florida Key deer (*O. virginianus clavium*) which is no bigger than a collie. The differentiation of the whitetails into subspecies is a current topic of debate among taxonomists and no everyone is in agreement. In fact, due to live-trapping and translocation of many subspecies back and forth across the country most whitetails today are simply generic whitetails.
6. Numbering between **twenty and twenty-five million individuals** in the early 1990's, whitetails are by far the most abundant large mammal in the New World, perhaps on all the earth – living in deserts and wetlands, mountains and prairies, and in intense cold and terrible heat.
7. Whitetails evolved from a pig-like ancestor and are among the immigrants that wandered eastward over a land bridge that connected Asia to Alaska **fifteen million years ago**.
8. Adult Whitetails can weigh **50 to 400 lbs**. Females breed at 18 months (rarely at 6 months) mate from November to February and have a 6 1/2 month gestation period

(pregnancy).

WHITETAIL DEER NATURAL HISTORY

(*Odocoileus virginianus*)



Mammals evolved from a common mammal-like reptile (therapsid) at the end of the Triassic period about 200 million years ago. Deer evolved from a pig-like ancestor about 30 million years ago and are members of an *order* of mammals known as Artiodactyla, which contains about 40 different species today. These are *even-toed* hoofed mammals that include swine, camels, deer, hippopotamuses, antelope, cattle, sheep, and goats. In contrast the order Perissodactyla consist of *odd-toed* hoofed mammals like the horses, asses, zebras, tapirs and rhinoceroses. Both orders are often called ungulates (L., *ungula*, hoof) or hoofed mammals, and are strictly herbivores having teeth that are well adapted for chewing.

Whitetails are further classified, along with sheep, cattle, giraffes and some others, into the suborder Ruminantia, referring to their distinctive digestive physiology (see below) and into the family Cervidae.

Whitetails were among the immigrants that wandered eastward over a land bridge that connected Asia to Alaska some fifteen million years ago. Four subspecies of whitetails make up *most* of the North American population. In New Jersey, a subspecies known as the northern whitetail (*Odocoileus virginianus borealis*) is among the largest while the smallest subspecies is the Florida Key deer (*O. virginianus clavium*) which is no bigger than a collie. The differentiation of the whitetails into subspecies is currently topic of debate among taxonomists and not everyone is in agreement. In fact, due to live-trapping and translocation of many subspecies back and forth across the country, most whitetails today are simply generic whitetails. These graceful creatures are resilient and adaptable, living in a variety of habitats from deserts to wetlands, mountains to prairies, and in intense cold and terrible heat.

Historically, this species did not occur in large numbers beyond the eastern

seaboard until the clearing of land by native Americans and later by European settlers for agricultural purposes. Prior to that time, most of the eastern United States and Canada was covered by vast, unbroken tracts of forests. As the forests were burned and logged to make room for agricultural practices, ideal deer habitat was created: openings and edges of deciduous and mixed forests, the early successional stages of these forests, brushy fields, and wooded farmlands, together with mature coniferous stands that provide winter shelter. Today, numbering between twenty and twenty-five million individuals, whitetails are by far the most abundant large mammal in the New World, and perhaps, on the entire planet.

Food and Feeding

Whitetails are adaptable but selective herbivores, grazing and browsing the most nutritious plants and plant parts available. They have a tough, cartilaginous pad in place of the upper incisors and the six lower incisors and two canines work against the pad to crush and strip woody stems and twigs from their source. This feeding behavior causes ragged or frayed edges on the deer-browsed woody plants.

Whitetails will stand on their hind legs in order to reach desirable plants. This manner of feeding creates a noticeable browse line that may extend to a height of 6 feet. At moderate to high densities selective feeding by whitetails may alter the species composition of regenerating forests by eliminating some trees and shrubs. Thus the impact of this herbivore's feeding behavior may have a long-lasting effect on the composition of the forest.

Whitetails are **ruminants** are strictly herbivores, have **teeth that are adapted for chewing** plant material, and a large 4-chambered stomach. Feeding specializations include a four-part stomach containing protozoans and bacteria that aid in digesting cellulose

When feeding, plant material travels down the esophagus to the **rumen**, where it is partially broken down and formed into small balls of **cud**. The cud is then returned to the mouth for chewing (chewing the cud, or rumination). After re-swallowing, food passes to the reticulum, omasum and abomasum for final digestion (see illustration of ruminant's stomach). This long and convoluted digestive process enables ruminates to extract most of the nutrition available in the herbaceous food they eat.

Antlers

Antlers are found in males of all deer species, with the exception of caribou (or reindeer), in which both male and females have antlers. Reindeer, by the way, are domesticated caribou and have large bodies and short legs compared to wild caribou.

In all deer species, male antlers are deciduous, meaning they are shed each year. Occasionally, antlers may occur in one out of every 1,000 white-tailed does (female deer) and typically are retained for life, remain in velvet, and are unbranched.

Velvet (hairy skin, well supplied with nerves and blood vessels) covers and nourishes the growing antlers. In autumn, when the antlers are fully grown, the velvet dies and is rubbed off. This is when the males are ready to mate. Antlers are used as weapons against rival males and predators and as display organs to intimidate rivals and lure females. Increase in antler size, symmetry and complexity varies with age, health and diet.