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The Game Commission is the state wildlife agency whose mission is to manage and protect wildlife and their habitats while promoting hunting and trapping for current and future generations.

This program is about the adaptations that some of Pennsylvania's bird and mammals have to help them survive in their environment.

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Let's begin by reviewing what a **habitat** is. A habitat is a place in the environment that provides an animal everything it needs to survive food, water, shelter, and space. **Can you name some different habitats?**

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This is a ruby-throated hummingbird. Their habitat is places like open woods and gardens. They can hover in place, suddenly fly backwards, sideways, or up and down. They drink nectar from flowers. They also eat sap, insects, and spiders. **What do you notice about this hummingbird?** The first thing I notice is its long, thin beak. Their long, thin beak is an **adaptation**.

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**Animals have body parts and behaviors suited for their lifestyle and habitat.** Animals have had to adapt over time to: survive in their habitats, to protect themselves, and to obtain food. An **adaptation** is a physical feature or behavior that helps a plant or animal survive in its **environment**. [The environment is the living and nonliving things surrounding the plant or animal.] **Physical features** are the way an animal looks. They may have fur or feathers, or a pattern or camouflage color, or a body part like a beak, antler, or claw to help them survive. A **behavior** is how the animal acts. They may be active at night (nocturnal) or burrow or hibernate (sleep through the winter) or migrate (move to another area).

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**How do you think the hummingbird's beak helps it survive in its environment?** The hummingbird's long narrow beak and tongue help it reach and sip nectar deep in tubular flowers. [It's an adaptation to help them get the food they need to survive.] Since hummingbird beaks are different from other bird beaks, this helps them get food sources that other birds cannot get [reduces competition for food].

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This is a gray fox. It is a mammal that is active at night [**nocturnal**]. It has salt and pepper and orange colored fur with a bushy tail that has a black stripe going down the tail and the tip of the tail is black. Their fur grows in thicker during the winter. They have sharp senses of sight, smell, and hearing. The gray fox is found in brushy areas-areas with shrubs and trees. [Also, swampy lands and rugged, mountainous terrain]. The gray fox will eat whatever is easiest to find [**omnivore**/ not dependent on a single source]. They feed on both plants and animal materials. Some of the things they eat are mice, rabbits, bird eggs, fruits and grasses. They are the only member of the dog [canine] family that can climb trees because they have semi-retractable claws. **Is their any parts of its body that are useful to catch the food it eats?** (claws to climb trees, eyes to see, ears to hear, color blends in with surrounding to sneak up on prey, etc.)

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The mallard duck is a bird that lives in ponds, lakes, and marshes. The male [drake] has a dark green head, white ring around its neck, and dark brown chest. It has a white belly, gray sides and brown back. The female [hen], has a tan head and a light brown body streaked with brown colors. Mallards have a brightly colored patch of feathers on their wing [**speculum**] it is purple with white stripes on the top and bottom of it. The male has a yellow bill [beak] and orange-red legs and feet. The female has orange feet

and an orange bill [beak] with dark spots. The males have brighter colors than females. Females have less bright colors and blend in with their surroundings- **camouflage**. Mallards do not have teeth. They have comb-like structures on their bill that look like teeth that strain insects and plants from the water. Mallards have webbed feet. They waterproof their feathers using a waxy substance that they produce from a gland at the base of their tail. **Are any parts of its body particularly useful for living where it does?** (bill to obtain food, webbed feet to swim, camouflage to nest etc.)

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Bald eagles are birds of **prey** that are active during the day (**diurnal**). They live near water like rivers where they can find their favorite food- fish. An adult [mature] bald eagle has white feathers on its head and tail and brown feathers on its body. Their legs are feathered halfway down. They have yellow feet with sharp **talons** and rough pads on the bottom of each foot. Their beak is large and hooked. (it starts out brown eventually turning yellow). Their wingspan is 6 to 8 feet, and they stand about 2 feet tall. Their eyesight is among the keenest in the animal world, five or six times sharper than a human's. **Are any parts of its body particularly useful to catch its food?** (good eyesight to see, talons to catch fish, etc.)

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Porcupines are slow-moving **nocturnal** mammals that live in forests. They are the second largest rodent in North America and have orange, sharp front teeth that never stop growing. They eat plants [**herbivore**] with an appetite for tree bark and salt. Porcupines cannot see or hear well, but they do have a good sense of smell. They have long, sharp claws with a pebbly texture to help them climb trees. They are dark in color and their back and tail is armored with as many as 30,000 quills; quills are loosely attached and shaped like a needle and used for **defense** [against **predators**]. Quills are specialized hair made of **keratin** that has a sharp barb on the end- like a fishhook. A porcupine cannot throw its quills. Porcupines can swim and their quills that are filled with air help keep them afloat. **Can you name two adaptations that porcupines have that help them survive in their habitat?** (quills for defense, claws to climb, etc.)

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The striped skunk is a **nocturnal** mammal that lives in a variety of habitats from forests to fields. The striped skunk has mostly black fur with white stripes. Most of us recognize the black and white color of a skunk and many other animals do too. These colors are warning colors. Skunks spray a stinky musk to escape predators. Their spray comes from two glands near the base of their tail. Skunks can squirt a predator from 12 feet away. They usually only use that as a last resort, they often will stomp their front feet, lift their tail, and growl

to give a warning. They have long sharp front claws to help them dig up food. Striped skunks eat both plants and animal material [**omnivore**]. They eat insects, eggs, fruit, small rodents, and birds. **How does this animal protect itself?** (warning colors, sprays musk)

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River otters have many adaptations for living life in the water. They also live on land (**semi-aquatic**). They have long bodies and a long tail that is covered in brown fur. Their fur has two layers – short dense **underfur** and longer **guard hairs**. They also have a layer of fat to help keep them warm. They have short legs, and their feet are webbed. They are great swimmers. Otters have great hearing. They can see well above water, but even better underwater. They also have a great sense of smell. They have whiskers on their face to help them move around in dark waters. Otters live in waters that are not polluted; these clean waters provide them the food they eat like fish, crayfish, frogs, and turtles (**carnivore**). An otter is a fast, graceful swimmer. It can travel underwater a quarter-mile without coming up for air, dive 35 to 50 feet and, if necessary, stay submerged up to four minutes. While underwater, valve-like structures seal an otter's ears and nose, and its pulse rate drops, slowing blood and oxygen circulation and making possible long submersion. They are fast and great swimmers.

making it hard for predators to catch them. **Are any parts of its body particularly useful for living where it does?** (webbed feet, whiskers, thick fur, etc.)

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Beavers are North America's largest rodent! Beavers are nocturnal and live in streams, rivers, lakes and marshes. Beavers have poor eyesight but can hear and smell well. Beavers have strong, front teeth that never stop growing and are self sharpening. Beavers are brown and have two layers of fur, dense underfur covered with longer guard hairs. They also have deposits of body fat to keep them warm and allow them to remain in the water for many hours at a time. Beavers have glands that make oil that they use to rub in their fur to help keep them waterproof. Their front feet have long claws that help them dig, handle food, and build dams and lodges. They have webbed (skin between the toes) back feet to help them swim. The second claw from the outside on each hind foot is split

and is used for grooming and rubbing their oil in their fur. Beavers have a big tail shaped like a paddle with a scaly, leathery covering. Their tail helps them move through the water (acts like a propeller and rudder). They use their tail to warn other beavers of danger by slapping it on the water. They also use their tail for support on land. They have membrane valves that seal their ears and nostrils from water while underwater. Beavers are **herbivores** (only eat plants). Beavers cut down trees close to the water where they feel safe. They cut trees to reach the leaves at the top to eat them. They also eat other plants. After eating, the beaver gnaws the trees into pieces. The pieces are then used to build their dams. Beavers build dams to protect themselves from **predators** (other animals that eat them). Their dams make wetlands; wetlands are home to many other animals like frogs, ducks, and fish. For shelter, beavers build a home called a lodge, using sticks and mud. The inside of the lodge is called a den. They enter their lodge from underwater, but their den is above water and dry. **Beavers have many adaptations to help**

**them survive in their environment, can you name one or two?** (Strong, self sharpening teeth to chop down trees for food and shelter, webbed hind feet and a paddle shaped tail to help them be great swimmers, produce oils to help repel water, slaps tail to warn others of danger, builds dams and lodges for protection from predators, etc.)

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The screech-owl is a nocturnal bird of prey and the only small Pennsylvania owl with ear tufts. Ear tufts are not ears; they are tufts of feathers on their head. The Eastern screech owl comes in two color phases-gray or red (**dichromatic**). Their chest and belly are streaked. In Pennsylvania, the gray phase is more common than the red phase. Their color and pattern helps them blend in with their surroundings (**camouflage**). Screech owls and all owls have totally silent flight because of fringed flight feathers that muffle the sound of air as it passes through their feathers. They have large eyes packed with light gathering rods that improves their ability to see in the dark, but they can't see in color. They have eyes set forward on their heads for great depth perception (**binocular vision**) to help with hunting. Their eyes are fixed in the skull and can only look straight ahead. To look to the side, an owl moves its head, and some owls can twist their necks 270 degrees—almost all the way around.

Owls have excellent hearing; they can hear even the slightest movement on the ground or even underground. Owl ears are located on the side of the owl's head, behind the eyes. Owls have a **facial disk** that acts like a radar or satellite dish guiding sound to the ears. Like all birds of prey, owls have sharp, powerful talons on each toe; their talons are used to catch their food (opposed to their beak). They have three talons in the front and one in back, The outer toe can move so it can have two toes in the front and two toes in the back to better grip its prey. Owls have a hooked beak. The screech owl eats a wide variety of food from insects to mice, to squirrels and rabbits. If their prey is small enough, they will swallow their prey whole. Owls cannot digest fur, bones, or feathers; these indigestible parts form into a pellet in the gizzard and hours later the owl regurgitates (spit up) it. **Are any parts of its body particularly useful for catching food? (silent flight, talons, large eyes, etc.)**

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The eastern coyote is nocturnal and belongs to the **canine** (dog) family. Coyotes are typically the color of a German Sheppard, but they may be blonde, red, or black in color. Their fur is thicker in the winter and thinner in the summer. They have a fluffy tail that they hold downward instead of curled up like many pet dogs. They have large pointed ears that stand up and a long-pointed nose. They have a good sense of smell- they can sniff food and detect territorial markings. They also see and hear well. Coyotes

are **generalists**, they live everywhere in Pennsylvania, even in cities like Pittsburgh and Philadelphia, but they prefer to live on the edges of forests and fields where they can find more food. Coyotes are **omnivores** (eating both plants and meat). They eat mice, rabbits, birds, insects, plants, and road-killed deer. They have flat teeth to grind up plants, and sharp teeth to eat meat. Coyotes may hunt by themselves or sometimes in packs. Coyotes use a variety of yips, barks and howls to communicate with each other. Coyotes can swim, run up to 35 mph and jump well. **Are any parts of its body particularly useful for living in Pennsylvania?** (thick winter fur, sharp and flat teeth to eat plants and meat, etc.)

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This is Pennsylvania's (and North America's) only **marsupial**. – the opossum! A marsupial is a mammal that carries its babies in a pouch. When the babies are born, they are as tiny as a honeybee and need to keep growing, so they quickly crawl to the pouch on their mother's belly where they will climb inside and continue to grow. Adult opossums are about the size of a cat, they have long, light gray fur on their body, white fur on their face, and black fur on their legs and feet. An opossum has a long, pointed snout with a pink nose. They have small, dark eyes and rounded, bare ears. Their tail has no fur on it, and it is scaly; their tail is adapted for grasping/wrapping around objects like a tree branch (**Prehensile**). Their back feet each have a special toe that our

other mammals don't have. It's a long toe (without a claw) that can grasp things, just like a thumb. Opossums are slow-moving animals. They climb putting their feet over feet and using their prehensile tail as a "fifth" leg. Opossums can live in a wide variety of habitats from wooded areas to farmlands. They are **omnivores** and will eat what they can find including insects, lizards, eggs, plants, garbage and flesh of dead animals (**carrion**). The opossum may growl, hiss, or run when it feels threatened, but its most common defense is to "play dead" when it feels threatened by a predator. Unlike our other mammals, opossums do not grow winter fur and the tips of their tail and ears often end up with frostbite. **Are any parts of its body particularly useful for living where it does?** (prehensile tail and hind feet with opposable thumbs to help it climb).

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Deer are one of the most common and well-known mammals of Pennsylvania. They are most active at dawn and dusk (**crepuscular**). Deer are at home in a forest, but they thrive as an "**edge species**". An edge is where two different habitats come together such as a forest and field. During the winter, deer grow a winter coat with long, hollow hairs that help keep them warm. When deer sense danger they run with their tail sticking up in the air, which shows white fur, this is a sign for other deer to alert them of possible danger nearby. They may also communicate danger by stomping their feet or grunting. Their white tail

gives them their name “white-tailed deer”. Deer can run up to 30 mph, they are good jumpers, and their hollow hair helps them swim well. Deer are a **prey** animal. Their eyes are located on the side of their head to help them see all around them. Their eyes are particularly adapted as motion detectors. Their keen senses of smell and hearing help them to detect danger. Deer have **hooves** that can be used as weapons. The males grow new antlers each year in the spring; antlers can help deer defend themselves. Deer only eat plants (**herbivore**) and primarily eat twigs, leaves, fruits, and bark of trees and shrubs (**browse**). They have a **ruminant** (four-chambered) stomach. They can chew their food quickly, storing partially chewed food for later chewing and digestion. Deer do not have upper front teeth (**incisors**), so they rip twigs and stems; their flat cheek teeth help grind up the plants.

**Can you name two physical adaptations that deer have? (fur to keep warm and cool, ruminant stomach, antlers, hooves, flat molars, etc.)**



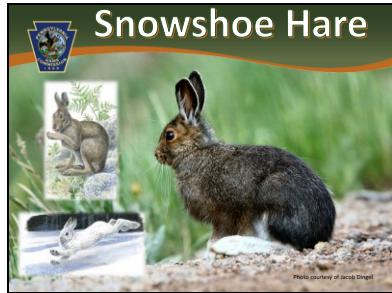
Bats are the only mammal that can fly! They are nocturnal and sleep (**roost**) upside down in hollow trees, caves, or rock crevices. Sleeping upside-down and holding on with their feet leaves their wings free to take off in flight whenever they need to. All Pennsylvania bats eat insects. Their wings are thin membranes of skin stretched from front to their back legs, and from their back legs to their tail. Their eyes are small, but their ears are large and well-developed. Bats can see quite well but unique adaptations help them fly and catch prey (insects) in total darkness. While in flight, bats utter a series of high-pitched squeaks which echo off nearby objects – bushes, fences, branches, insects – and bounce back to the bat's ears (**echolocation**). While in flight, a bat may use the skin between its legs to scoop a small insect out of the air and transfer it to its mouth. The little brown bat makes several feeding flights each night and can catch 1,200 insects per hour. In fall, winter, and early spring, insects are not readily available to bats, so three species of our bats **migrate** south, and our other six bats **hibernate** underground, usually in caves. Throughout winter, they eat nothing, surviving by slowly burning fat accumulated during summer. A hibernating bat's body temperature drops close to the air temperature; respiration and heartbeat slow; and certain changes occur in the blood. **Can you name a behavioral adaptation of bats?** (they migrate or hibernate, are nocturnal).



One of the largest, and among the most secretive animals living in Pennsylvania is the black bear! Black bears live in forests and are **crepuscular** (active at dawn dusk). Black bears weigh between 140 to 400 pounds, with rare bears weighing more than 800 pounds. Most Pennsylvania bears are black, although a few are a cinnamon color. Their muzzle is brown, and they will often have a white "v" on their chest. Bears walk in a shuffling, flat-footed manner. Each foot has five toes, each with a curved claw. Their top speed is 30 mph over short distances. Black bears climb easily and swim well. Black bears have a great sense of smell, but their vision is poor. Hearing is believed to be like that of humans. They occasionally growl, "woof," or click their teeth together when threatened, and females communicate with their cubs using low grunts that signal cubs to climb a tree when danger is near or to descend after it has passed. Bears find food mainly by scent. They are **omnivores** with a large part of their diet being plants. Common foods are fruits, acorns and nuts, amphibians, reptiles, small mammals, fish, **carrión** and garbage. Bears hibernate during the winter when there is not a lot of food available to them. They hibernate in hollow trees, rock crevices, large holes in the ground, and even in an open nest on the ground. During hibernation, bears are alert and capable of fleeing or defending the den. Cubs are born during hibernation. **How do bears survive in their environment?** (finds food by scent, eat an omnivorous diet,

hibernates when there is not enough food, etc.)

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Let's hop into our last mammal that we are going to talk about-the snowshoe hare or sometimes referred to as the varying hare. It is nocturnal and lives in forests with conifers and escape cover, such as rhododendron and mountain laurel. Hares also live in swamps. Snowshoe hares are related to rabbits, but they are not a rabbit. During the summer, a snowshoe hare is brown, but as the days get shorter in the fall, it triggers a change in the hare and their fur changes from brown fur to white fur. This helps them blend in with their surroundings (**camouflage**). Their name comes from their huge, furry hind feet, which helps them travel over deep snow. Snowshoes have excellent hearing and big ears to catch sounds. Their eyes are located on the sides of their head giving them a good view of their surroundings. If a hare feels threatened by a predator, it can burst into a fast run. It can race up to 30 mph over ground or snow, leap 10 feet in one jump, and swim if it is forced into water. Hares will circle when they are being chased. Hares sleep during the day in a form usually under a branch, in tall weeds, or

shrubs hidden from predators. During the summer, hares eat plants like clovers and dandelions and during the winter they feed on twigs and bark. Deep snow can be a benefit to the hare allowing them to reach foods that are higher up off the ground. **Are there any parts of its body that are particularly useful to hide or escape from predators?** (camouflage fur, big, furry feet). **This is a great opportunity to discuss climate change- what happens when a hare has a white coat and the habitat around it is brown or vice versa?**

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All plants and animals have adaptations to help them survive in their environment. Today, we learned about physical and behavioral adaptations that some of our birds and mammals have. Can you name some of those adaptations? (fur, sharp claws, camouflage, antlers, wings, good senses, hibernation, migration, nocturnal, diurnal, etc.) These adaptations help the animal survive in its habitat, find food, and/ or defend itself. **Does anyone have any questions?**

**Extension:** Discuss adaptations of other classes of animals-fish, amphibians, reptiles, and insects.