Radical Raptors

Program Purpose:
This program purpose is to introduce basic information about raptors. This includes information about what defines them, some of their special adaptations, why they are important in the ecosystem, and their past/present history with humans.

Length of Program: 1 hour

Age: Grades 1st-adult

Maximum Number of Participants:
35-40 (if taught in the nature center)
150 (if taught in the main lodge)

Objectives:
After completion of all activities, students will be able to:

- Name the three defining characteristics of all raptors
- List several different types of raptors
- Name 3 different adaptations that raptors possess
- Explain why they are important to have in the ecosystem
- Explain why and how they are protected

Wisconsin Standards:
B.8.15 Analyze how people impact their environment through resource use
F.8.2 Show how organisms have adapted structures to match their functions, providing means of encouraging individual and group survival within specific environments
F.8.7 Understand that an organism's behavior evolves through adaptation to its environment
F.8.8 Show through investigations how organisms both depend on and contribute to the balance or imbalance of populations and/or ecosystems, which in turn contribute to the total system of life on the planet

Preparation:
Before the class arrives:

- At least one hour before the class begins, place Beauty and Stella in their transporting boxes.
- If the class will be taught in the nature center, place the raptors (in their boxes) in the animal room and lock the door.
- Set up laptop computer and projector if using PowerPoint presentation.

Lesson Outline:
I. Introduction *(5 minutes)*
II. Defining Raptors *(10 minutes)*
III. Presenting Raptors *(20 minutes)*
IV. Raptor Protection *(10 minutes)*
V. Ecosystem Importance *(10 minutes)*
VI. Conclusion *(5 minutes)*

Materials:
Laptop computer
Projector
Screen
Portable raptor perch & Sheet
Stella
Beauty
Dress-up Raptor Wings
Radical Raptors Program Box:
- Raptor feet
- Pellets
- Pictures of raptors
- Rope
- Owl skull
- 2 softballs
- Mist bottle

Introduction:
Introduce yourself and the title of the class. Ask the students to raise their hand if they think they have seen a raptor before? (hold up pictures of raptors to give them an idea of what a raptor might be)

Tell them that today they will get a chance to see one up close and personal. Explain that you are also going to learn about their "tools of the trade" or adaptations that allow them to be the hunters of the sky. We are also going to learn how human's view of raptors has changed over the years and what we can do to help them out.

Ask the students to name the different types of raptors:
1. Hawks
2. Eagles
3. Osprey
4. Falcons
5. Owls

It is debatable whether Vultures are classified with Raptors. They have many of the same adaptations as raptors (long sharp talons, curved hooked beak) but they

have also been genetically linked to storks. Scientists are still trying to decide what category Vultures belong in.

The word raptor comes from the Latin word *rapere* which means "to seize" or "carry off". All raptors have common adaptations that help them to do these actions as birds of prey. Ask the students to visualize a robin and an eagle. Ask them what is different about an eagle that makes them raptors?

Dress-up Raptor
For each of the following Raptor adaptations, have a student volunteer "dress-up" by wearing the appropriate item.

1. All raptors have **long, sharp talons**. Many people think of raptor talons as "claws." Raptors will use their talons to catch, kill, hold, and carry their prey. What utensil do we use when we eat that is similar to how raptor's use their talons? A raptor's talons are similar to a fork that we use for holding and carrying food. Talons are the perfect lethal weapon. A bald eagle can exert 1,000 lbs of pressure with one foot. In comparison, a wolf's jaw can exert 1,000 lbs of pressure.
2. All raptors have a **curved, hooked beak**. What utensil can this adaptation be compared to? A raptor's curved hooked beak acts as a knife to tear food into smaller pieces. The raptors will force the hook of their beak into the prey, then using their feet hold the animal firmly in place, they pull back, ripping off a piece of flesh. As a mammal we have a special adaptation for this as well, our canine teeth.
3. All raptors have **keen eyesight**. It has been estimated that the eyesight of raptors is approximately eight times better than that of humans. This allows them to find their prey, even when they are very high up in the sky. It is said that they can see a mouse from a mile above.
4. Raptors also have **excellent hearing**. They make a range of noises and use their hearing as a means of communication. They also rely on it heavily for locating their prey, combined with their sharp vision.
5. Raptors have very **powerful flight**. A raptor needs to be able to fly very well in order to catch their prey in flight. To conserve energy raptors will find thermals (up drafts of warm air) that help them to soar in circles without even needing to flap their wings.
6. All raptors **eat meat** as their primary diet. The other adaptations allow them to do this. Ask the students what is the scientific name for animals that only eat meat (carnivore)?

Presenting the Raptors:
Now that you know what we should be looking for in a raptor, let's look at one close up.

There are several rules that the students must remember to follow while the birds are out. Ask the adults to help enforce these rules. If these rules cannot be followed then the birds will be put away immediately.

- When the raptors are out, everyone must remain quiet and still (ask the students to find a comfortable position right now).
- If you have a question or comment, you can raise your hand quietly. Do NOT shout or wave your hand dramatically in the air.
- It is okay to take pictures of the raptors, they do not mind a flash, but they do not like the "rewind noise" on disposable cameras. Get out any cameras (if they want to take pictures) and rewind them now. At the end of each raptor presentation, the instructor will tell the students when it is time to take pictures.
- While the raptors are out, they might do three things:
  - Bait (try to fly off the glove) – this means that she is uncomfortable on the glove or is trying to fly up to a higher spot
  - Rouse (fluff up the feathers and lay them down again) – this is an equivalent to a yawn in human body communication. This is compliment to the students that they are being quiet and she is comfortable being out with them
  - Go to the bathroom. Ask the students not to get excited and out of control about these things because they will happen.

Beauty

- Beauty is a Red-Tailed Hawk and came to Upham Woods in January 2000. She was given to Upham Woods by Northwoods Wildlife Center. Beauty was probably hatched in the spring of 1999. When she was approximately eight months old, a truck hit her. This accident left her blind in her left eye and also injured her left wing so that she cannot sustain flight for long distances. In the warm weather or when she flies a lot, her left wing will droop. Because of these injuries she would not survive in the wild and is considered non-releasable. This is why we have her.
- She gets her name from her red tail that can be seen when she soaring up in the sky.
- She is the most commonly found hawk in North America. They can be found from Mexico all the way up to Alaska. In winter, many of the northern birds move south, however, red-tailed hawks are seen as far north as Minnesota each winter.
- Ask the students if they think they have seen a red-tail hawk before? If so, where at? They are commonly seen by the road sitting in trees, on signs, or on telephone posts. Explain that they are not a forest bird, but prefer to be near a field or out in the open. They can also be seen soaring up on thermals high in the sky.
- In the wild, Beauty would eat mice (about 10-15 per day/70% of their diet) birds, rodents, snakes, and

other small mammals. In captivity, Beauty eats mice, rats, beef heart, and quail.
- In the raptor world female birds are usually larger than the males. Ask them why do they think that is? (need to hunt for food for themselves and raptors, defend the nest, etc.)
- Ask the students to show with their fingers how many pound Beauty weighs (approximately 3.75 pounds). In the raptor world the females are usually larger. Ask the students why they think that is? (guard the nest, protection)
- Ask for any questions about Beauty.
- Provide a picture opportunity of Beauty.
- Put Beauty away.

- The Red-tailed hawk call is a beautiful sound. Many times their call is used for a "voice over" for bald eagles in commercials because the bald eagle call isn't as beautiful sounding. Tell them to listen for a hawk call next time they are out on a hike.

Owl Adaptations
Owls are quite unique in the Raptor Family because they are the only bird that is nocturnal. What types of adaptations help them to be a hunter of the night?

Eyes: They have the best night vision of any creature on earth! Their big eyes help them to collect every bit of light available. If our eyes were as big as owl in relation to our head that they would be the size of softballs (hold the softballs up by your eyes). Studies have shown that owls can see in dim light at least thirty-five times, and perhaps even one hundred times better than human eyes. Even on the darkest nights, they can still see every leaf and twig.

They also have a third eyelid called a nictitating membrane that helps to keep the eye moist and protected from dirt, especially when the owl is flying.

Since owl eyes don't move in their sockets, they have to turn their heads in order to view things. An owl has fourteen neck-bones while people have only seven. Ask the kids to take a guess of how far an owl can turn their head? 270 degrees – Demonstrate this!

Hearing: Owls have very big ear openings on the skull (point this out) which helps them to hear better than most birds. An owl can hear a mouse stepping on a twig 75 feet away. Their ears are also located in different positions on each side of the head, which allows them to judge the distance and direction from which a sound comes (with older students you can talk about how their ears use triangulation to pinpoint their prey).

Facial Disk: This "satellite dish" shaped face allows the sound to be directed towards their ears. (Have the students try this by cupping their hands behind their ears)

Silent Flight/Feathers: Ask them why silent flight is important (they hunt at night, to sneak up on their pretty, and to hide themselves from predators). Their feathers are special that help to break up and scatter sound.

Have them fan their faces by their ears with their fingers closed together and then with their fingers far apart. Which one is a bit louder? Fingers open represents a "silent" owl feather. If we look at the edges of an owl feather, it is separated. With fingers closed it is more like a hawk feather. (This can also be demonstrated with the rope that is half frayed.)

An owl's feet are even covered with feathers to help reduce any sound it makes when it flies through the air. These feathers also serve another purpose though, which we will talk about when we bring Stella out.

Pellets:
Ask them if they have dissected an owl pellet before? Tell them that all raptors eject pellets, not just owls! All raptors, except owls, have a crop that stores excess food. The indigestible parts of the prey are formed into a pellet in the gizzard and regurgitated out the mouth. Most raptor pellets contain only the hair, feather, or exoskeletons of their prey, but owls cannot digest most of the bones, so their pellets also contain bones.

Stella

Stella is a Barred Owl and she came to Upham Woods in December 2001. We received her from the Raptor Education Group from Antigo, Wisconsin. She was probably hatched in the spring of 2000. During the spring of 2001 a car in northern Wisconsin hit her. She hurt her right wing and was brought to the rehabilitation center. Her caretakers thought that she would recover, but her wing had already started to heal and it healed incorrectly. She cannot sustain flight for long distances and therefore would not survive if she was released.
- Barred owls get their name from the bars that are seen on their feathers. They are owls that are found in the deep woods.
- Have them raise their hand if anyone has heard the phrase "wise-old owl" before. Because their eyes are so large, it doesn't leave much room in their skull for their brain. They are fabulous hunters, but when it comes to other things, they do not pick it up as quickly as other raptors.
- Ask the students if they think that Stella migrates by looking at her feet? (pass around the owl feet that are in the program box for large groups) They do not migrate, and they even lay their eggs in February!
- Stella is full-grown and weighs approximately 2 pounds.
- Ask for any questions about Stella.
- Provide a picture opportunity for Stella.

- Put Stella away.

If the program is in the Nature Center, put Stella back in the Animal Room so that you can play the owl calls on the computer.

A Barred Owl's call sounds like the words "Who cooks for you? Who cooks for you all?"

What other types of owls can be found in Wisconsin?
- A Great Horned Owl's call sounds like "Who's Awake? Me Too!".
- A Barn Owl is like a loud screech or scream.
- A Northern Saw-whet sounds like a rusty, squeaky wheel.
- And an Eastern Screech Owl sounds like a horse.

Raptor Protection:
Originally in the United States, raptors were viewed as murderers and thieves. They were accused of stealing and killing livestock (sheep, chickens, calves, etc.). One of nickname for the Red-tailed hawk was the chicken hawk. How do you think they got that name? (Red-tailed Hawks would sit on phone poles near farms, and farmers thought they were eating their chickens). In fact, raptors seldom prey upon domestic livestock.

The government even offered bounties in some states for killed raptors. That meant that for every dead raptor a person brought to the proper officials, they would receive a set amount of money. This drastically reduced the number of raptors and brought some raptor populations to the brink of extinction. Finally, the United States recognized the importance of raptors.

Today, the Federal Migratory Bird Protection Act and the Endangered Species Act protect raptors. These acts make it illegal to possess a raptor, dead or alive, including any part of a raptor. Could you keep a raptor in your home, like Upham Woods keeps Beauty and Stella? No, Upham Woods possesses federal and state permits that allow us to keep injured, non-releasable birds of prey for education.

Ecosystem Importance:
Ask the students why they think raptors are important?
- Ask them if they like cereal or bread? Tell them that raptors control the rodent population, which prevents huge losses of agricultural products every year.
- Ask them where raptors are at in the food chain (near the top)? Raptors are also extremely important in maintaining a healthy ecosystem with a proper balance of predators and prey.

Ask the students if they have any ideas on how they can help or protect raptors.

Here are some ideas you can share:

1. **Don't litter.** People throw trash along side the road that attracts rodents. This also attracts raptors that can get hit by vehicles.

2. **Get involved.** Conservation organizations, nature centers and environmental education centers like Upham Woods rely on financial or volunteer support to further their important missions. Remind the group leader(s) that it costs Upham Woods thousands of dollars each year to care for the raptors and that we accept donations for our raptor program.

3. **Get the lead out.** Lead poisoning from fishing tackle and lead ammunition is a major cause of death among bald eagles and loons. Trade in your lead tackle and ammunition for non-toxic alternatives.

4. **Slow the spread of West Nile virus.** West Nile virus is transmitted to birds, animals, and people by mosquitoes. Remove standing water on your property. Clean birdfeeders and baths regularly.

5. **Eliminate unnecessary pesticide use.** Some pesticides kill birds - songbirds, game birds, raptors, sea and shorebirds, among others. An estimated 672 million birds are directly exposed each year by pesticides on farms alone. According to the U.S. Fish and Wildlife Service, approximately 50 pesticides currently used in the United States have caused bird die-offs. Even the small amounts of pesticides individuals use on their lawns have a cumulative affect. Go natural and skip the pesticides.

6. **Use phosphorus-free dishwashing detergent.** The phosphorus in fertilizers and detergents end up in our waterways. This causes increased algae and weed growth, which chokes the system and decreases the oxygen supply needed by native plants and animals.

7. **Properly dispose of toxic chemicals (i.e. latex paint) and items containing mercury.** Mercury is a potent nerve toxin, which is increasingly found in our water, fish, and loons. The mercury content in wild fish makes it unsafe to eat fish caught in many lakes and oceans around the world.

8. **Grow native.** Exotic plants and animals are very harmful to many our native species, and are a major threat to many national parks and refuges. Plant native species in your own back yard.

9. **Protect native prairie.** The United States has only one percent of its tall grass prairie left. Prairies have the most threatened and endangered species. The

sharpest decline in North American songbirds is in the grassland nesting species

10. **Share what you know.** Share what you learn with others. Share your love of the natural world with a child to help insure that our wild spaces and the creatures that live there will be with us long into the future.

11. **Donate printer ink cartridges.** Show box and hand out plastic bags to collect cartridges. Proceeds go towards a raptor center in Minnesota.

Conclusion:
Review questions can be used at the end to once again reemphasize the knowledge covered in this lesson. You can also use the beach ball to do this. Raptors aren't just a pretty bird in the sky, they serve an important purpose in the ecosystem

References:

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Upham Woods 4-H Environmental Education Center. Red Tailed Hawk Program.

Zoobooks. Owls. Ranger Rick

Appendix A
Wisconsin Raptors

Hawks
- Broad-winged hawk (spring, summer)
- Red-shouldered hawk (threatened species -all year)
- Red-tailed hawk (all year)
- Rough-legged hawk (winter)
- Sharp-shinned hawk (all year)
- Coopers hawk (all year)
- Northern goshawk (all year)
- Northern harrier (all year)

Eagles
- Golden eagle (rare to see - winter)
- Bald eagle (all year)

Osprey (summer)

Falcons
- American kestrel (all year)
- Peregrine falcon (endangered – all year)
- Merlin falcon (all year)
- Gyrfalcon (winter)

Owls
- Barred owl (all year)
- Boreal owl (winter)
- Eastern screech owl (all year)
- Great gray owl (all year)
- Great-horned owl (all year)
- Long-eared owl (all year)
- Northern saw-whet (all year)
- Northern hawk owl (winter)
- Short-eared owl (all year)
- Snowy owl (winter)
- Barn owl (endangered – all year)

Appendix C
Glossary

Accipiter – a type of hawk with short, rounded wings and a long tail, that dwells in woodland and preys on smaller birds caught on the wing. North America has three species of accipiters: the Northern Goshawk, Cooper's Hawk, and Sharp-shinned Hawk.

Adaptation – a change in a living thing that better fits it for survival in its environment.

Aerial hunting – a hunting method in which a raptor is already airborne when it begins pursuit of its intended prey.

Binocular vision – a way of seeing using both eyes looking straight ahead that results in a three-dimensional view produced by overlap of vision.

Brood – the baby birds that hatch from a clutch of eggs.

Buteo – a type of hawk with broad wings and short tail, that soars and often preys on rodents. There are 12 species in North America. Such as the Red-tailed Hawk, Red-shouldered Hawk, Swainson's Hawk, Ferruginous Hawk, Rough-legged Hawk and Broad-winged Hawk.

Carnivore – a flesh-eating animal, usually a predator.

Carrion – a dead animal or rotting flesh used as food by some animals such as vultures.

Clutch – the eggs laid by a female bird in one nesting period.

Cones – cells in the eye that work best in strong light and are used to see color and form sharp images.

Falcon – a long-winged bird of prey specializing in taking other birds in mid-air. There are seven species in North America.

Fledgling – a young bird that has left the nest and is still dependent on the parent birds.

Hawking – the act of catching prey in flight

Hover – to fly in one place by beating the wings and spreading the tail.

Kettle – term used to describe a "flock" of raptors, usually during migration.

Mantling – standing over a fresh kill with wings spread, to hide and protect it.

Nictitating membrane – inner or third eyelid in birds, reptiles, and some mammals that helps to keep the eye moist and clean. To nictitate means to wink.

Pellet – a round mass of tightly packed, indigestible material such as fur, feathers and bones formed in the stomach of many different kinds of birds and regurgitated several hours after eating.

Preening – the grooming action of a bird in which individual feathers are drawn through the bill to restore neatness and waterproofing. The bill is rubbed across the oil (uropygial) gland, located on the top region of the tail, and supplies waterproofing oil for the feathers.

Rousing – cleansing action of a bird in which all contour feathers are elevated, wings and tail are held loosely, and the bird vigorously shakes itself.

Roost – to settle for rest or sleep, a place where birds rest or sleep.

Talon – the long, sharp, curved claw of a bird of prey

Thermal – a rising column of warm air.

Appendix D

Raptor Quote

"He clasps the crag with crooked hands; Close
to the sun in lonely lands, Ring'd with the azure
world he stands. The wrinkled sea beneath him
crawls; He watches from his mountain walls
And like a thunderbolt he falls."

- Alfred, Lord Tennyson, "The Eagle"

WI Standards
Life and Environmental Science
Characteristics of an organism
F.4.1
Life Cycles of an organism
F.4.3

Structure and Function in Living Things
F.8.2

Populations and Ecosystems
F.8.8