RAPTOR STUDY

TYPE: MOSTLY INDOOR
GRADE: 3-7
TIME: 1½ - 2 Hours

OBJECTIVE

Students will be able to: 1) describe characteristics common to raptors; 2) describe some special adaptations of raptors; 3) name some of New Jersey's raptors; 4) discuss the implications of raptor eradication.

METHOD

Students participate in an interactive classroom demonstration of raptor characteristics and adaptations, test their eagle eyes, compare their wingspan to New Jersey raptors, describe one raptor in detail and , time permitting, search for raptors in the field.

MATERIALS

- wing span chart
- taxidermies (raptors & rail)
- pictures to color
- paper & pencil
- raptor tape/ tape player
- raptor pictures/posters
- raptor charts and posters
- yard stick
- owl cone
- crayons/colored pencils
- raptor family descriptions

PREPARATION

Place the raptor posters on the walls around the room. Put up the wing span chart. Place the coloring pictures around the outside tables with the raptor family name sign (Buteo, Falcon, etc.) visible. Post the raptor family descriptions up around the room. Put crayons, pencils and raptor photos on the tables.

PROCEDURE

1. Explain to the students that they are going to learn about a specific group of animals called "raptors". Do they know what raptors are? Define raptors (birds of prey). Explain that there are eight different families of raptors found in New Jersey. If you were to go looking for them, you may be able to tell which family they belong to by their flight patterns.

2. Demonstrate, using the flight patterns of five of the raptor families along with information on how they fly, their regular habitats and their preferred food.

Buteo	Broad tail, broad long wings, soars above open spaces, eats mainly rats, mice, and other rodents.
Accipiter	Long narrow tail, short rounded wings, flies swiftly in woodlands and forests, eats mainly birds.

Falcon	Long tails, pointed wings (streamlined), mainly open country, eat birds, rodents, insects.
Harrier	Slim long tails, slim long wings in a "V", low languid flight, usually over marshes, eats rodents.
Vulture	Broad tails, broad wings in a "V", soars high, often in circles, eats carrion.
	Apply "Raptor Rap" using first five. The last three groups can be mentioned afterwards.
Osprey	Broad tails, long narrow wings in an "M" shape, soars like a gull near shorelines, feeds exclusively on fish.
Eagle	Broad tails, broad flat wings with incredible span, glides and soars along waterways and open country in hunt of fish, waterfowl and small mammals (habitats vary depending on species.)
Owl	Broad rounded wings, silent and swift (mothlike), woodlands, thickets, marshlands, primarily nocturnal feeding on small mammals, rodents, snakes, etc.

3. Show students the photos (magazine cut-outs) of various raptors. Ask them to compare their pictures with others at their table. What characteristics do all these birds have in common. List characteristics on board. (Sharp beaks, strong talons) Define "raptor" once more.

4. Ask students: What do they eat? How do they get their food? What other special adaptations do these birds need to help them be good hunters? Address each student answer in turn. Below is a list, although the order in which you address them is flexible.

Eyesight (nocturnal): Ask students to close one eye and put their hand over it. With the other eye, they should stare directly at the lights. Explain cones and rods ("Cones" are predominant in the retinas of diurnal species. Day and color vision are mediated through the cones. Night vision is carried out through the operation of "rods". Rods are very sensitive and help vision in low light levels). Which is more important to have if you're a night hunter? Explain that we all have cones and rods in our eyes. In the daytime, our cones are more active, in the dark, our rods become more active. Once the students have held their positions for a good few minutes, turn the lights off, tell them to look at an object or area with the eye that had been staring at the light, then quickly cover that eye and look at the same spot with the eye that had been closed. The eye will have adapted to night vision, i.e. the rods will have become more activated. Explain that nocturnal animals would have even greater ability to see in the dark.

Hearing in Owls (Triangulation): Show the barn owl and the facial discs which capture and focus the sound. Explain that most owls' ears are different sizes and located at different places on the sides of their heads (not symmetrical like ours). The right ear is usually the longest and there can be a 50% difference in the size of each ear. The asymmetry of the ears means that the sound window, or the hearing on one side of the head is the mirror image of that on the other, except that the right one is displaced 10-15 degrees higher. In practice this means that if a sound source (e.g. mouse) moves away from the line of sight while the owl remains stationary, the reception in one ear will decrease with extreme rapidity while it will do so more slowly in the other. The owl will turn its head to equalize the sound signals, thus placing the mouse directly in front of it (in its line of vision).

To demonstrate to the students, have two students placed at different points in the room. They are each an owl "ear". Ask them to close their eyes and hold out one finger pointed at you. Ask them to follow the sound you will make by pointing their fingers. When you stop, ask the class to observe the triangle made by the lines (direction of the pointing fingers). They come together at the point where the prey is. Draw on board. This phenomenon is known as "triangulation".

Eyesight (telescopic): Have a volunteer student go to the back of the room. In the front of the room, hold up a piece of paper with one word written, as small as you can write, in the middle. Ask the student to walk towards you and stop when they can read the word. Measure this distance. If this person had the eyesight of an eagle, they would have been able to read this word from 10X this distance. Ask the students why this is a necessary adaptation for these birds. (good eyesight to spot prey from high up) Note that a hawk can see a mouse from two miles away (equivalent to humans reading a newspaper a mile away).

Peripheral vision: Put the king rail on the floor and show the students the positioning of the birds eyes and the field of vision that this bird has. (It can see all the way to the back of its head with both eyes) Ask why this is a good adaptation for this ground dwelling bird. Show the students an owl and ask them what's different about the position of its eyes. Using a student volunteer and the owl cone, show them the small field of vision that the owl has. Can the owl see behind while its head is forward? What adaptation does an owl have to help it see behind? (Can rotate its neck to see behind it) Have the students test their own field of vision by spreading their arms back and slowly bring them forward until they can see their hands. That's their own field of vision.

Ask the students why it is more important for the owl to have both eyes closer together and facing forward, but don't tell them the answer, show them with the next demonstration.

Binocular vision: Have a volunteer student help you with this demonstration. Facing the student, hold a pencil vertically at waist-height. Ask student to cover

one eye and then quickly place their finger directly on the tip of the pencil, without hesitating. The student will fail! After a couple more tries, have them repeat with both eyes open. This demonstrates the effect, called binocular vision, of both eyes seeing the same point. Ask students to get a partner and try this out. Discuss the adaptive advantages of binocular vision in hunters. (Pin-point position of prey).

5. Summarize adaptations of raptors for hunting.

6. List New Jersey raptor families on the board. (**vultures, owls, eagles, harrier, osprey, buteos, accipiters, and falcons**). You may also want to reinforce the "Raptor Rap" at this point.

7. Explain to the students that these birds are all different sizes and that they are going to find out which raptor they "Measure up" to. With the teacher's help, they should position themselves on the wing-span chart with their heads exactly on the middle line. They should spread their wings and match their wing span to one of the raptors. Next, they should identify, from the key on the chart, which kind of raptor they are. They should then find the picture of their raptor (black and white photocopies) and color them according to the posters and charts around the room. They should also find out about their raptor from information on the sheet, From printed information in the room, and from what they have learned in this lesson. Make a list on the board of the types of information they should be seeking (What kind of raptor, preferred habitat, preferred food, wintering grounds, breeding grounds etc.).

8. Pick one child from every raptor presented and ask them to say a little about their bird. Accompany this presentation with the sound of the bird on the audio tape.

9. Discuss the ecological consequences of removing raptors from the food chain.

10. Go outside with binoculars and search for some wild examples of raptors.

VOCABULARY

accipiter, adaptation, binocular vision, buteos, cones, diurnal, eagle, falcon, harrier, nocturnal, osprey, owl, peripheral vision, predator, prey, raptor, rods, triangulation, vulture, and wingspan.

BIBLIOGRAPHY

Sparks, J. and Soper, T. (1979) Owls, Their Natural and Unnatural History. Taplinger Publishing Company, New York.

RECOMMENDED READING

Above citation

NJ Raptor Trust Information Sheets

Bent, Arthur C. (1961) Life Histories of North American Birds of Prey, Part One and Two. Dover Publications, Inc., New York.

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