



Protecting Southwest Florida's unique natural environment and quality of life ... now and forever.

## Predators of the Sky

### Pre and Post-Program Activities

Grade Level: 6-8

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#### Next Generation Sunshine State Standards

- SC.6.N.1.2; SC.6.N.1.3; SC.6.N.2.2; SC.6.N.2.3; SC.6.N.3.1; SC.6.L.15.1
- SC.7.L.17.3; SC.7.L.17.2; SC.7.E.6.6; SC.7.L.15.3
- SC.8.N.4.1

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#### Program Overview

From tiny screech owls to majestic bald eagles, Southwest Florida is a vital habitat for many bird species – including raptors! Explore unique adaptations of birds of prey and discover the importance of each species in the ecosystem. Discuss human- introduced threats and how students can help make a difference in bird conservation.

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#### Learning Objectives Students will be able to:

1. Identify limiting factors in the local ecosystem and their impact on native populations of raptors.
2. Understand relationships among organisms, such as predation and competition.
3. Identify some of the impacts humans have had on raptors and other wildlife.
4. Understand how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.

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Conservancy of Southwest Florida has been awarded Charity Navigator's prestigious 4-Star top rating for good governance, sound fiscal management and commitment to accountability and transparency. Charity Navigator is America's largest and most respected independent evaluator of charities.

# **Pre-Program Activity 1: What is a Raptor?**

**Duration of Activity:** 40 minutes

**Materials:** “What is a Raptor?” worksheet (provided), pictures of several different birds including raptors (provided), paper, computer lab or library

## **Background:**

A bird of prey, or "raptor," is a general term that categorizes several unrelated but similar groups of predatory birds that occupy similar niches in the environment: Raptors have three main characteristics that differentiate them from other birds. These characteristics are:

- 1. Hooked Beaks:** The hooked upper beak allows them to break into their prey and tear off small, bite sized pieces.
- 2. Strong Feet and Talons:** The claws on their feet are also known as talons. Their sharp talons and strong feet capture and secure their prey.
- 3. Exceptionally Good Eyesight:** Raptors have large, well-developed eyes, which give them the ability to see great distances, eight to ten times better than humans.

North American raptor species vary greatly in size from one-third of a pound (kestrel) to 15 pounds (bald eagle). While raptors are carnivores, their diets vary depending on the size and species. Prey items range from insects and fish to mammals, reptiles, and birds.

Raptors play a unique role in the ecosystem because they are predators. Being at the top of the food chain, they help keep their biological community in balance by keeping their prey species' populations within the limits their habitats can sustain. Raptors also help us track the health of the ecosystem. In some cases, they collect contaminants such as pesticides passed on to them from their prey. By observing raptors, we can see how much pollution is in the environment and how it affects other wildlife and humans.

## **Types of Raptors:**

### **Diurnal (active during the day):**

Hawks: Broad wings and broad tail. Generally hunt from a perch and chase down prey (smaller mammals, birds) in a short burst of speed.

Vultures: Broad wings and broad tail. Soar on air thermals to search for food on ground (scavengers). Excellent sense of smell.

Eagles: Large wings, massive beak and heavy body. Generally found soaring in search of food (larger mammals, fish, other birds).

Falcons: Long, pointed wings and tail. Fast and agile and can dive upon food from great heights reaching incredible speeds. The Peregrine falcon, for example, can dive at speeds up to 200mph.

Kites: Generally slim and light bodied. Feed mostly on insects, reptiles, amphibians and small mammals. Are highly migratory.

Osprey: Long, angled wings and large bodies. Mainly fish eaters who plunge feet first into the water to grab prey and then use wings to push off the surface of the water.

**Nocturnal (active at night):**

Owls: Broad wings and tail and large head and eyes. Have excellent sight in low light conditions, great hearing and soft feathers for silent flight.

**Directions:**

1. Students will learn what a raptor is and be able to identify a raptor. Students will also gain a better understanding of the special characteristics that raptors possess that distinguish them from other birds.
2. Discuss various types of raptors/birds of prey. Ask students to think of various characteristics that all birds of prey possess. Once students have brainstormed, go over the information in the background section.
3. **Highlight the three main characteristic of all raptors:**
  - a. **Hooked beaks**
  - b. **Strong feet and talons**
  - c. **Exceptionally good eyesight**

Next, play the short video (2 mins 8 seconds) about raptors:

<http://www.pbslearningmedia.org/resource/idptv11.sci.life.oate.d4kbop/birds-of-prey/>

4. Divide students into groups of three or four. Pass out the Raptor worksheet to each group.
5. Have students list the characteristics of raptors in the provided space on the worksheet. Students may include many things such as wings and feathers, but be sure they include the three key characteristics of a raptor. Have students read their characteristics out loud and have them put a star next to the 3 main characteristics that all raptors share.
6. Assign, or allow students to choose their own Florida raptor to study. Allow them time in the computer lab or library to research, filling out their worksheet as they go.

Summarize by playing the “Raptor or Not?” guessing game at the end. Birds pictured are named from top to bottom, left to right (Duck *NO*, Eagle *YES*, Robin *NO*, Vulture *YES*, Cardinal *NO*, Owl *YES*, Falcon *YES*, Woodpecker *NO*, Hawk *YES*, and Heron *NO*).



# What is a Raptor?



List 5 Characteristics of Raptors/Birds of Prey:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Choose a Florida raptor to research. I choose: \_\_\_\_\_

**Draw a Picture of Your Raptor Here:**  
(focus on characteristics such as wing & body shape)

Name 5 unique characteristics of your raptor:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

What kind of environment does your raptor live in? What is his or her habitat? Where does it nest?

What does your raptor eat? How does your raptor eat?

Name one fun fact that you learned about this bird:

# Raptor or Not?

*How do you know?*



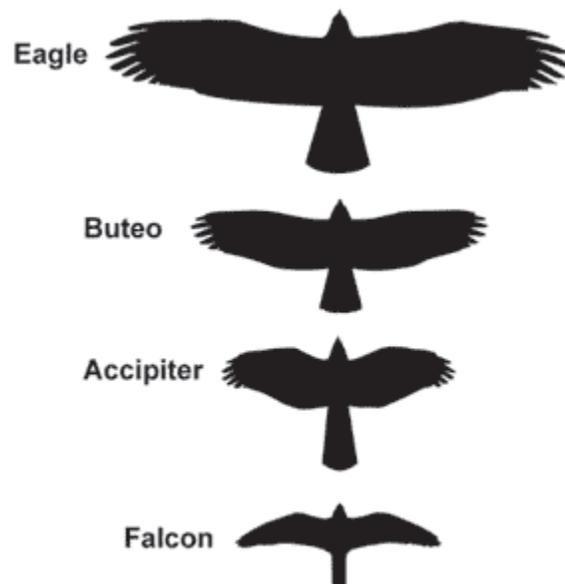
## Pre-Program Activity 2: Wing Shapes and Spans

**Duration of Activity:** 1 hour

### **Materials:**

- Open space (outside or in gym, if possible) to fly paper “raptors”
- Paper- 2 sheets per student.
- Copies of Paper Raptor Designs. Provided by Idaho Public Television-Activity: Wings: Shapes and Spans ([http://idahoptv.org/sciencetrek/topics/birds\\_of\\_pre/activity3.cfm](http://idahoptv.org/sciencetrek/topics/birds_of_pre/activity3.cfm))

**Background:** Flight is one of the most essential functions for raptor species. It allows them to hunt, travel, and evade possible predators. Different birds have different wing shapes, depending on their lifestyle and the animals they hunt. The shape of a bird’s wings help identify what it might hunt, where it might live, and how it might fly. Hawks are divided into two general groups, the **buteos** and the **accipiters**. Buteos are soaring hawks, and use broad, rounded wings to ride the winds while surveying the ground for prey. Eagles and vultures also have this wing shape. Accipiters have short, rounded wings and a long tail. These wings allow birds to make sharp, tight turns while weaving around trees in a forest while hunting songbirds. Falcon wings are long, narrow, and pointed, which reduces drag and allows them to reach speeds of over 100 miles per hour!

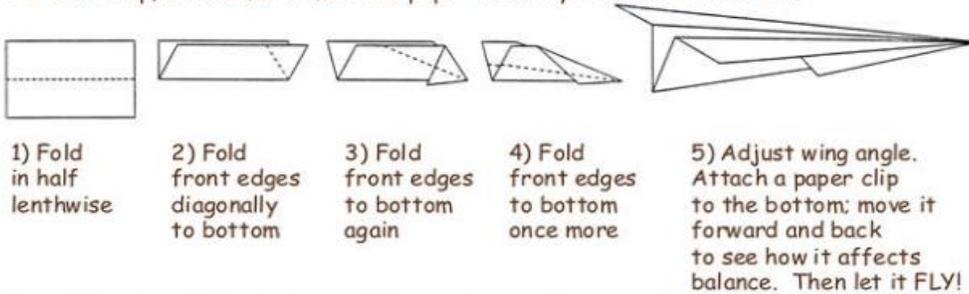


## Directions:

- 1) Provide each student 2 sheets of paper (One for the Falcon Glider, and one for the Eagle Glider).
- 2) Follow instructions for the creation of each glider. You may provide a copy of instructions to each student.
- 3) Take students to open area (field or gym, if possible). Test the Falcon Glider first, and then the Eagle Glider. Have them test a few times to see if a trend appears.
  - While flying their paper raptors, be sure to inform the students to observe the differences in flight between two differently shaped paper airplanes, such as speed, distance, and time aloft (in the air).
- 4) Discuss what the students observed, such as:
  - How far (distance) did your paper raptor fly?
  - How long (time) did your paper raptor fly?
  - Which glider type traveled further? Why?
  - Which glider type traveled more quickly? Why?
  - Describe the differences between the two flights.

### FALCON GLIDER

At each step, be careful to fold the paper toward you on the dotted line.



1) Fold in half lengthwise

2) Fold front edges diagonally to bottom

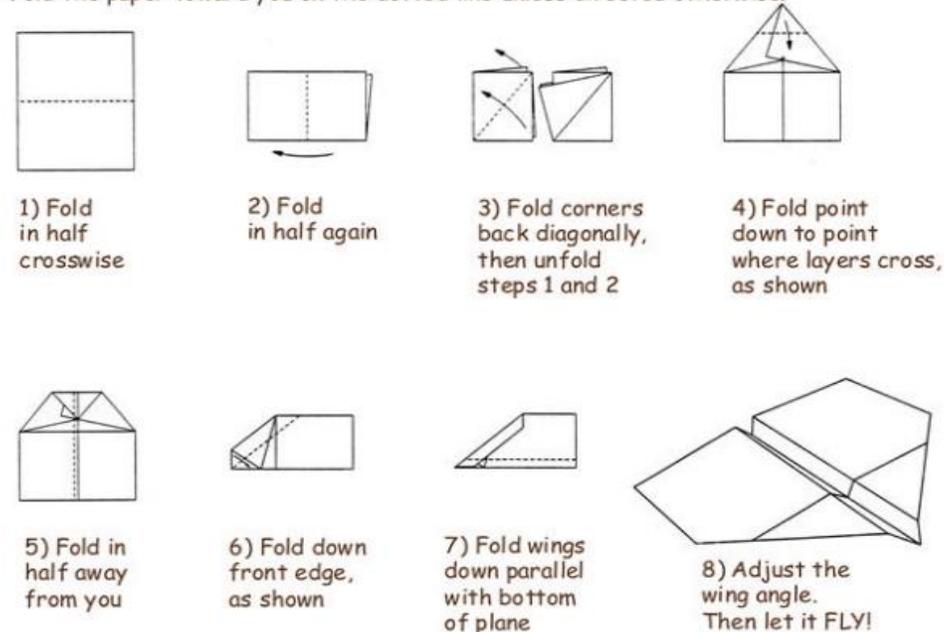
3) Fold front edges to bottom again

4) Fold front edges to bottom once more

5) Adjust wing angle. Attach a paper clip to the bottom; move it forward and back to see how it affects balance. Then let it FLY!

### EAGLE GLIDER

Fold the paper toward you on the dotted line unless directed otherwise.



1) Fold in half crosswise

2) Fold in half again

3) Fold corners back diagonally, then unfold steps 1 and 2

4) Fold point down to point where layers cross, as shown

5) Fold in half away from you

6) Fold down front edge, as shown

7) Fold wings down parallel with bottom of plane

8) Adjust the wing angle. Then let it FLY!

# Post-Program Activity 1: Bioaccumulation Game

**Duration of Activity:** 1 hour

Adapted from Project WILD K-12 Curriculum and Activity Guide: Hazardous

Links, Possible Solutions

**Materials:** white and colored drinking straws, pipe cleaners, or poker chips (30 pieces per student, with 2/3 white or plain and 1/3 colored), one paper bag per grasshopper (around 18-20), large space for students to move about

## **Background:**

This activity helps students recognize the possible consequences of pesticide accumulation within the environment, and students can discuss how to help control pesticide use.

Every living organism needs energy to survive. Some organisms, such as plants, are able to produce their own food through photosynthesis, and are called producers. Other organisms, though, must get their energy by consuming other organisms, and are thus called consumers. The feeding relationship within a community is referred to as a **food chain**- a sequence of living organisms in a community, which is based upon one member of the community eating another.

### Basic Food Chain



**Sun** → **Grass** → **Grasshopper** → **Mouse** → **Hawk**

**Pesticides** are chemical compounds used to control organisms identified as “pests”, such as grasshoppers or other insects. While pesticides are useful to humans when properly used, they can greatly harm the surrounding environment. Many pesticides can persist in the environment, and/or lead to the process of **bioaccumulation**- the accumulation of toxic substances within organisms in

increasingly higher concentrations at successive **trophic levels** (the feeding position of an organism within the food chain). The higher up on the food chain an animal is, the more toxins it will accumulate. These toxins can be pesticides, but also include mercury and other chemicals.

[A well-known example of bioaccumulation in the environment is with the insecticide dichlorodiphenyl- trichloroethane (DDT). This insecticide was applied to control insects that were damaging crops. In the 1970s, it was discovered that DDT was entering food chains with damaging results. Fish would eat insects sprayed with DDT; hawks, eagles, and pelicans would then eat those fish. The buildup of DDT within the birds' systems caused side effects such as thinning of the egg shells. The eggs would crack under the weight of the parents, and thus, no new birds were entering the population. Populations of these species began to crash, but thanks to various laws, the use of DDT is now prohibited in the United States. Unfortunately, DDT is not prohibited worldwide, and resident and migratory species within countries that still allow the use of DDT are still at risk.]

### **Directions:**

Retrieved from: [Project WILD K-12 Curriculum and Activity Guide: Hazardous Links, Possible Solutions.](#)

1. Students will discuss the term “food chain”, and learn how energy moves from one trophic level to another.
2. Divide the group into three teams: grasshoppers, shrews, and hawks. Try to have around three times as many shrews as hawks, and three times as many grasshoppers as shrews. For example, in a class of 26 students, there would be 2 “hawks”, 6 “shrews”, and 18 “grasshoppers”.
3. Distribute a small paper bag or other small container to each “grasshopper”. This container will represent the stomach of the animal.
4. With the students' eyes closed, or otherwise not watching, spread the white and colored straws (or material of choice) around a large open space.
5. Give the students the following instructions: the grasshoppers are the first to go looking for the food; the hawks and shrews are to sit quietly along the sidelines watching the grasshoppers. At a given signal, the grasshoppers are allowed to enter the area to collect as many food tokens as they can, placing the food tokens in their “stomachs”. Provide 30 seconds for the grasshoppers to gather their food. At the end of 30 seconds, the grasshoppers must stop collecting their food, and remain where they are.
6. Next, allow the shrews to hunt the grasshoppers, while the hawks remain on the sidelines. Provide 15- 60 seconds worth of hunting time, depending on the size of the space provided. For example, if in a large playing field, 60 seconds may be enough time, while if in a classroom, 15 seconds should be

enough. Each shrew should have time to catch one or more grasshoppers. Any grasshoppers caught must give its “stomach” full of food to the shrew and return to the sideline.

7. Next, allow 15-60 seconds (or whatever set time) for the hawks to hunt the shrews. Same rules follow. Any shrews still alive may hunt for grasshoppers. If a hawk catches a shrew, the hawk gets the “stomach” and the shrew returns to the sidelines. At the end of the designated time period, ask the students to gather with any food bags they have with them.
8. Ask any animals “consumed” to identify themselves. Ask the animals still alive to empty their food bags out onto the floor, where they can count the number of food pieces they have, separating the white and colored pieces.
9. Inform that a pesticide was sprayed on the crop the grasshoppers were eating in order to prevent loss or damage by grasshoppers. All multicolored food pieces represent the pesticide. All grasshoppers that were not eaten by shrews may now be considered dead if they have any multicolored food pieces. Any shrews with half or more of their food supply consisting of multicolored food pieces will also be considered dead due to chemical side effects. The hawk with the highest number of multicolored food pieces will not die. However, it has accumulated so much of the pesticide in its body that the shells of any eggs it produces will be so thin that the eggs will not hatch successfully. The other hawks are not visibly affected at this time.
10. Have the students discuss what they learned from the activity.

Possible questions for discussion:

- a. How can toxic substances enter the food chain?
- b. What is bioaccumulation?
- c. What are some other toxins that could possibly accumulate within the environment, and how might animals within those environments be affected?
- d. What are ways we can prevent or reduce the accumulation of such toxins within various ecosystems?

### **Additional Resources:**

Videos demonstrating egg strength, and the effect DDT had on raptors:

**Egg strength test.** Demonstrating how much weight an egg can hold. (Note: total weight amount will be mentioned at the end if the weight number can't be seen during the video.) <https://www.youtube.com/watch?v=nn5s6aSccfw>

**Normal Egg vs. DDT Egg** <https://www.youtube.com/watch?v=QTV3XFHzvT4>

## **Post-Program Activity 2: Career Critters**

**Duration of Activity:** 30 to 45 minutes

**Adapted from the Project WILD Curriculum Guide**

**Materials:** student worksheet (provided), scissors

**Background:** This lesson focuses on animal niches in their environment. Birds are a natural form of rodent and pest control. Their niche in their ecosystem varies depending on their diet. 50% of birds eat exclusively insects, so they help control insect populations. The red-bellied woodpecker is a specialized insectivore that can use its beak to eat insects that have burrowed into trees. Small raptors like the American kestrel mainly feed on insects and smaller rodents like mice. Peregrine falcons use their speed and agility to catch other birds like pigeons. Red-tailed hawks are much larger than Kestrels and Peregrine falcons, and can catch larger prey such as large rodents and small mammals.

### **Directions:**

1. Print out enough worksheets for every student to have one. Have students individually read and cut out each Ecosystem and Bird (in strips).
2. Allow students time to match each bird to the niche that it plays in the ecosystem. Have them think about each birds' habitat/environment to serve as a clue as to what it eats.
3. Come together as a class to review the correct answers.

Correct Answers:

Ecosystem 1: Peregrine falcon

Ecosystem 2: Red-tailed hawk

Ecosystem 3: American Kestrel

Ecosystem 4: Red-bellied woodpecker

**(see below for worksheet)**

## Student Worksheet

### **Ecosystem #1**

There are many pigeons in urban downtown. They nest on ledges and buildings. Their droppings make certain areas really dirty, and the pigeons can carry diseases. Which bird helps control pigeon populations?

### **Ecosystem #2**

Farmers store large amounts of grain and hay on their farms. Mice can be found eating the grain and often become a nuisance. Traps are time consuming and rodenticides may poison other animals by mistake or contaminate the grain and hay. Which bird eats mice other small mammals?

### **Ecosystem #3**

Ranches with cattle and horses attract flies, grasshoppers, and other pests. The flies are a nuisance to both the animals and the humans that care for them. Which bird consumes insects?

### **Ecosystem #4**

Trees in forests can become damaged by bark beetle foraging. The beetles burrow into the tree and begin to eat the layers of wood inside. Beetle activity like this can begin to kill the trees. Which bird helps control beetle populations?



#### **Red-tailed Hawk**

The red tailed hawk is a larger hawk with broad, rounded wings and relatively short tails. These hawks can be found in a variety of habitats, from woodlands to open prairie.



#### **American Kestrel**

American Kestrels are small raptors and are North America's smallest falcons. They rest in tree cavities or man-made structures above semi-open clearings. Kestrels can also be seen hovering over fields if there is no adequate perch.



#### **Red-bellied Woodpecker**

Woodpeckers live in forests and forage in dead or sick trees for insects that have buried themselves in the bark. They also use their beaks to create holes for nesting.



**Peregrine Falcon** The peregrine falcon is a raptor that can travel at great speeds. It is an agile bird with long, pointed wings and a long tail. It is an opportunistic hunter and prefers to rest in high places so it can dive toward unsuspecting prey.