

## CLASSROOM STUDIES

The following activities have been designed for use in the classroom. They cover various concepts in the biology and ecology of peregrine falcons, raptors in general, as well as exercise in math, science, geography and writing. They were designed to be adaptable to a broad range of age levels, and many of the activities or follow-up questions can easily be modified to meet specific objectives. Students can use this website, or links provided on this site, to obtain detailed information on peregrine falcons as an aid in completing the activities. Format includes an introduction followed by the activities and a series of follow-up questions.

### MIGRATION

*The following activity was developed around the story of a peregrine falcon presented in Focus on a Falcon by the National Fish and Wildlife Foundation.*

#### Introduction

On April 23<sup>rd</sup> biologists on the southern tip of Texas placed a transmitter on a peregrine falcon and tracked it to its nesting site in central Alaska. The falcon nested in Alaska on May 31<sup>st</sup> and stayed the summer, leaving on September 3<sup>rd</sup> to migrate south to its wintering grounds in Paraguay, South America. The falcon arrived on its wintering grounds on November 21<sup>st</sup>. A good source for maps is: <http://multimedia2.freac.fsu.edu/fga/maps.html>.

#### Migration North to Nest

1. Have your students plot, on a world map, the following locations: (A) The location where the falcon was tagged (southern tip of Texas) and (B) The falcon's nest site (central Alaska).
2. Have your students plot the following locations where the falcon was tracked during its migration north to nest: Kansas, U.S.; Montana, U.S.; British Columbia, Canada; Alaska, U.S. Then have the students draw the migratory path by connecting these locations from Texas north to Alaska.
3. Using the scale on the map, have the students calculate the distance between each of these stops.

#### Have your students answer the following:

- Name each of the states in the U.S. that the falcon traveled through on its journey north.
- How many total miles did the falcon travel to nest?
- How many days did it take the falcon to travel to its nesting site?
- What was the average number of miles the falcon traveled in a single day?
- Why do you think the falcon traveled to Alaska to nest? (hint: use the website to research nesting habitat and food.)

## **Migration South to the Wintering Grounds**

1. Have your students plot the falcon's wintering location (Paraguay, South America) on the world map.
2. Have your students plot the following locations where the falcon was tracked during its migration south to the wintering grounds: Alberta, Canada; Montana, U.S.; Arkansas, U.S.; Yucatan Peninsula, Mexico; Panama; Central America; Brazil, South America; Paraguay, South America. Then have the students draw the migratory path by connecting these locations from Alaska south to Paraguay.
3. Using the scale on the map have your students calculate the distance between each of these stops.

### **Have your students answer the following:**

- Name each of the states in the U.S. that the falcon traveled through on its journey south.
- How many total miles did the falcon travel to the wintering ground?
- How many days did it take the falcon to travel to its wintering ground?
- What was the average number of miles the falcon traveled in a single day?
- Why do you think the falcon traveled to South America to spend the winter?

### **Falcon's Journey**

1. Have your students calculate the total miles the falcon traveled during migrations.
2. Have your students write a story about the falcon's journey. Things that can be included are: What dangers did the falcon face? What did the falcon eat and how did it catch its food? Where did the falcon rest? What were some features of the states or countries that the falcon flew over? What other animals did the falcon encounter?

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### THERMALS

*The following activity was modified from The Science in Action Learning Series: Birds of Prey by the California Academy of Sciences.*

#### Introduction

Many birds of prey take advantage of warm air currents called "thermals" during flight. Thermals are created when the sun heats up areas of the ground causing the air above to rise. The birds utilize these rising air currents to effortlessly move upward without having to flap their wings.

#### Making a Thermal: a classroom demonstration

Have your class observe the effects of a thermal current by conducting the following demonstration at a table or counter in front of the class. You will need a hot plate and feathers (they should be downy like pillow down). Plug in the hot plate. Once the hot plate has heated up place your hand approximately 12" above the plate. You should feel heat rising. Hold a feather approximately 12" above the plate and let go. The feather should float or move around on the rising warm air.

#### Have your students answer the following:

- If hot air rises what do you think happens to cold air?
- What are some features on the landscape that you think would be good at giving off heat? Why? (hint: think of different colors, and surface ability to absorb and radiate heat.)
- Explain how a hot air balloon works.

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### RAPTORS OR BIRDS OF PREY

#### Introduction

Falcons are considered to be "raptors" or "birds of prey" referring to the fact that they are carnivores that feed exclusively on other animals. Because of this, they are adapted to catch and kill prey. Other birds of prey include hawks, eagles, owls, vultures and kites. One of the distinguishing characteristics of falcons is the presence of a "notch" on their beak.

#### Raptor Identification

Print out copies of the peregrine falcon coloring page that can be found on this website. Provide a copy to each student and have them circle and label the following: (A) Hooked beak and (B) Talons. These are two of the primary characteristics that identify raptors. Have your students answer the following:

- Name three other animals that are carnivorous.
- Name one other raptor or bird of prey besides a falcon.
- Look closely at the falcon's beak. Do you notice anything unusual about it?

Next, print out pictures of the adult peregrine falcons from the website and pass these out to students and have them color in their falcon as accurately as possible.

#### Have your students answer the following:

- Are there any features of the peregrine falcon (colors, shape, etc.) that would help you in identifying this bird from others?

Finally, collect a series of photographs of different birds including raptors (owls, hawks etc.) and non-raptors (songbirds, ducks etc.) and have your students see if they can identify which are raptors and which are not. Photographs can be obtained by searching the web or from a variety of magazines. A good source for images and drawings is [www.fws.gov/educon.html](http://www.fws.gov/educon.html) (search the national image library link and the line drawings of wildlife link.)

**Have your students answer the following:**

- How were you able to tell the difference between the different birds?
- What were some features that all of the raptors had in common?
- What were some differences between the raptors?

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### THE SCIENCE OF SPEED

#### Introduction

Falcons are designed for speed. They have a stream-lined body with narrow, pointed wings (all adaptations that help reduce drag.) Falcons are considered to be the fastest of all birds. They can reach speeds of more than 175 miles per hour when diving for prey. The hunting dive is called a "stoop." The stoop is a near vertical dive achieved when the falcon tucks in its wings and plummets toward a bird flying below.

#### Falcon Gliders

*This glider design is from the Science Museum of Minnesota's Hunters of the Sky Educational Resource Guide.*

1. Using 8.5" x 11" paper have your students create "Falcon Gliders" based on the following design and instructions.
2. Have the students test fly the gliders by having them hold them above their head with their arms fully out-stretched and the glider pointing down at an approximately 45 degree angle. Have them test fly them several times observing the flight pattern each time (this design replicates a falcon's normal non-hunting flight.)
3. Now have the students modify the glider design by taping down or completely folding the wings against the body of the glider. Once they have completed this have them repeat the flight tests as above once again observing the flight pattern (this design replicates a falcon in a stoop dive where the wings are tucked against the body reducing drag and allowing the falcon to plummet rapidly.)

#### Have your students answer the following:

- Why do you think the glider dropped rapidly when the wings were tucked against the body?
- How would tucking the wings against the body help a falcon to hunt other birds?
- If you wanted to make your glider stay in the air longer how might you change the wings?

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### AMELIA'S AERIE

#### Introduction

Throughout North America, falcons nest on tall buildings and bridges. These structures are similar to their natural nesting habitat of cliffs and ledges. Amelia and her mate nest each year on a ledge along the 21<sup>st</sup> floor of the Traveler's Tower. This location, like a cliff ledge, provides safety from many predators, a great view of the surrounding environment that enables the adults to protect the nest and a great perch for hunting. A falcon nest is often referred to as an "aerie."

#### Amelia's Aerie

1. Provide each of your students with an 8.5" x 11" piece of blank paper, a pencil, a 12" ruler (has to have 1/4" markings), and a photograph of the Traveler's Tower (can be printed from the website).
2. Explain to the students that they are going to create a scale model of the Traveler's Tower and then locate Amelia's nest. Explain to them that the Tower has 34 floors and that in our model each floor is going to be 1/4" high. Show the students how to use the ruler to locate 1/4" and 1/2" increments.
3. Begin by having the students draw the base of the Tower by measuring 10 floors up from the bottom of the paper. Have them mark this and use their ruler to draw a 4" line across the paper from this point, finally using their ruler to connect the end of this line to the bottom of the paper creating a box (This level is the base of the Tower.)
4. Next have the students measure in 1/2" from each side on the top of the base, mark these spots and then count up 17 floors from the top of the base on each side from these points and mark these new points. Then have them draw lines from these points to the base. Finally have them connect the two points at the top of the new level. (This level ends in an observation area.)
5. Once again have the students measure 1/2" in from each side on the top of this new level and mark these points. Then have them measure up 7 floors on each side from these points and mark these new points. Then have them draw lines from these points to the level below. Finally have them connect the two points at the top of the new level. (This level ends at the cupola.)

6. Once again have the students measure  $1/2$ " in from each side on the top of this new level and mark these points and then count up 2 floors from these points and mark new points. Then have them draw lines from these points to the level below. Finally have them connect the two points at the top of the new level. (This level is the beacon light.)
7. Next have the students draw a triangle  $1\ 1/2$ " on each side on the top of this last level to complete the tower.
8. Now have the students place their ruler alongside their tower and locate the 21<sup>st</sup> floor and have them mark this spot on the tower. This is the location of Amelia's nest box.

**Have your students answer the following:**

- How many inches up the tower is the falcon's nest box on your drawing?
- If each floor at the Traveler's Tower is 15.5 feet high, how high is Amelia's nest from the sidewalk?
- Traveler's Tower has 34 floors (not including the cupola and beacon.) How tall is the Tower?
- Why do you think the 21<sup>st</sup> floor of the tower is a good nest site for the falcons?

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## GRAPHING SUCCESS

### Introduction

Peregrine falcon populations declined during the 1950's and 1960's to the point where they were considered to be no longer breeding in the eastern U.S. by 1975. This decline was due to the effects of DDT and other pesticides on reproductive success. However, with the ban on DDT and success of re-introduction programs, the peregrine falcon has made a remarkable comeback in the eastern U.S.

### The Falcon's Comeback

Have your students use information from the table below to graph and analyze the comeback of the peregrine falcon in the eastern U.S. The table includes data collected as part of the falcon re-introduction effort.

*Table modified from Endangered Species Technical Bulletin V. XI (3), 1986.)*

Year	Nesting Pairs of Falcons	Number of Young Fledged
1980	3	4
1981	7	10
1982	10	12
1983	17	23
1984	27	30
1985	40	46

### Have your students answer the following:

- Would you say the increase in nesting pairs of falcons between 1980-1985 was gradual or rapid? Why?
- Approximately how many young did each falcon pair successfully produce? (1)
- What was the percent increase in number of nesting pairs between 1983 and 1984? (58.8%)
- What factors do you think might affect nesting success in any given year?

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### GRAPHING SIZE

#### Introduction

In most species of birds the male is larger than the female. However in the case of raptors, including falcons, the female is larger than the male. In fact, female falcons are on average one-third larger than males. Biologists believe that this size difference might allow females to capture larger prey.

#### Graphing Size

Have your students graph and analyze the information in the following table to deduce size differences among adult peregrine falcons.

Body Length (inches)	Sex
18.0	Male
16.0	Male
18.7	Female
18.8	Female
15.5	Male
20.1	Female
16.5	Male
18.3	Male
19.3	Female
19.5	Female

#### Have your students answer the following:

- What can you determine based on your graph comparing the size of male vs. female peregrine falcons?
- What was the average size of males? Females? Approximately how much larger were females?
- What other types of biological measurements might you take to back up these findings?
- What advantages might being larger have for female falcons?
- In humans, are adult males taller than females? (This can be turned into an extension activity by asking the students to get the height of their parents and have the class compile and analyze the data the following day.)

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### FOOD PYRAMID

#### Introduction

Falcons are predators that are at the top of the food chain or food pyramid. They rely on an abundance of other birds as their primary prey. The birds they feed on, in turn, rely on an abundance of insects as their food source. The insects rely on an abundance of plant life as their food source and the plants manufacture their food using the sun's energy through a process called photosynthesis. At each step, as you move up the food pyramid, a significant amount of energy is lost. Thus, there are typically fewer living organisms at each level. In simple terms, 10,000 plants might feed 1,000 insects, which feed 100 songbirds, which feed only 10 falcons.

#### Building a food pyramid

The following numbers will have to be adjusted for class size. The example is based on a class of 24 students. Separate the class into 4 groups as follows: groups of 12, 8, 3 and 1 student. Have the groups sit on the floor, one group behind the other, in order of highest number of students to lowest number. When arranged they should roughly be in the shape of a pyramid. Explain to the class that each row represents a step in the food pyramid of a peregrine falcon. The first row (12 students) is the plant life, the second row (8 students) are the insects, the third row (3 students) are the songbirds and the fourth row (1 student) is the falcon. Further explain that you are the sun, the beginning of the food pyramid. Now distribute 100 popped kernels of popcorn to the students in the first row (12 students). Ask the students in the front row to eat 50 of the kernels of popcorn (each student would eat approximately 4 kernels). Now have them pass the remaining popcorn to the 8 students in the row behind them. The kernels consumed by the front row represent the energy lost when the insects fed on the plants. Now ask the second row (insects) to eat 40 kernels (roughly 5 per student) and pass on the remaining popcorn to the next row. Explain that the 40 kernels eaten by the insect's represents the energy lost when the songbirds fed on the insects. Now ask the third row (songbirds) to eat 9 kernels (roughly 3 per student) and pass on the remaining piece of popcorn to the next row. Explain that the 9 kernels lost represents the energy lost when the falcon fed on the songbirds. Finally have the last row (falcons) eat the remaining kernel.

**Have your students answer the following:**

- How many times more energy was there at the bottom of the food pyramid than at the top?
- Why can't there be more predators than prey?
- Are falcons the only predators that feed on songbirds?
- What do you think would happen to the numbers of falcons if a disease killed off many songbirds? Why?

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### BIOACCUMULATION: PESTICIDES IN THE FOOD CHAIN

#### Introduction

Although the energy available to a predator like a falcon decreases as you move up the food pyramid, unfortunately many toxic substances increase in concentration as you move up the pyramid. This process is often referred to as "bioaccumulation" and is the reason peregrine falcons were nearly wiped out due to the affects of pesticides in the 1950's and 1960's. Accumulated pesticides in the falcons affected their ability to produce calcium. This resulted in the shells of their eggs being too thin.

#### Pesticides in the food chain

The following numbers will have to be adjusted for class size. The example is based on a class of 24 students. Divide the class into 6 groups of 4 students each. Within each group designate each student as part of the food chain of the peregrine falcon (one student represents the plants, one the insects, one the songbirds, and one a falcon.) You can either provide the following materials to each group or have them create them as part of the activity. In each group, the plants should punch out 100 "dots" of paper\* using a hole punch and green construction paper. The insects should each be given a role of masking tape\* and asked to tear off 20 pieces approximately 2-3 inches in length. The birds should each be given 5 white socks and a magic maker and asked to draw eyes and a beak on the end of the sock like a hand puppet. The falcons should each be given a pillow case and a magic marker. Ask them to draw a beak, eyes and the falcons characteristic "black mask" on the end of the pillow case like an arm puppet.

Once the groups have completed the above tasks, explain to the students that the activity they will be doing demonstrates how pesticides can move up the food chain, concentrating in predators like falcons at the top of the food pyramid. Relate the story of DDT spraying in the 1950's and 60's and its impact on peregrine falcon populations. You can add some fun to this activity by asking your students to dress up in 1950's or 60's style the day before, but not telling them why you want them to do this. Begin the activity by explaining to the students that you will spray the crops with DDT to start the activity. Go around to each of the "plants" in the groups and lightly spray their crops (the paper dots) with a plant mister. Now ask the "insects" to have their 20 bugs consume the 100 plants by picking them up with their tape. Each of the 5 bugs should pick up 5 plants (to speed this along have the "plants" help out.) Now ask the "birds" to have their 5 songbirds eat the 20 bugs. They should do this by putting on each sock like a hand puppet, grabbing 4 bugs per sock then pulling their hand out of the sock while still gripping the bugs so that the bugs are contained inside the inverted socks (to speed this along have the "plants" and

“insects” help out.) Finally, have the “falcon” eat the 5 songbirds. They should do this by placing the pillowcase on their arm like an arm puppet and grabbing each of the songbirds, pulling their hand out of the pillowcase while still gripping the birds so that the birds are contained within the inverted pillowcase. At the end of the activity each group should have one pillowcase, containing 5 socks, each containing 20 strips of tape, each having 5 paper dots stuck to it.

*\* you can substitute velcro strips for the tape and small felt pieces for the paper dots in this activity.*

**Have your students answer the following:**

- How many songbirds did the falcon have to eat to accumulate the amount of DDT sprayed on 100 plants?
- What would happen to a larger predator that ate a single peregrine falcon?

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### FALCON RECOVERY IN NORTH AMERICA

#### Introduction

Breeding populations of peregrine falcons have recovered throughout North America, including here in Connecticut. In fact, the peregrine falcon is no longer listed under the U.S. Endangered Species Act. However, many states including Connecticut, list the falcon as "endangered" or "threatened" on their state lists.

#### North American Recovery

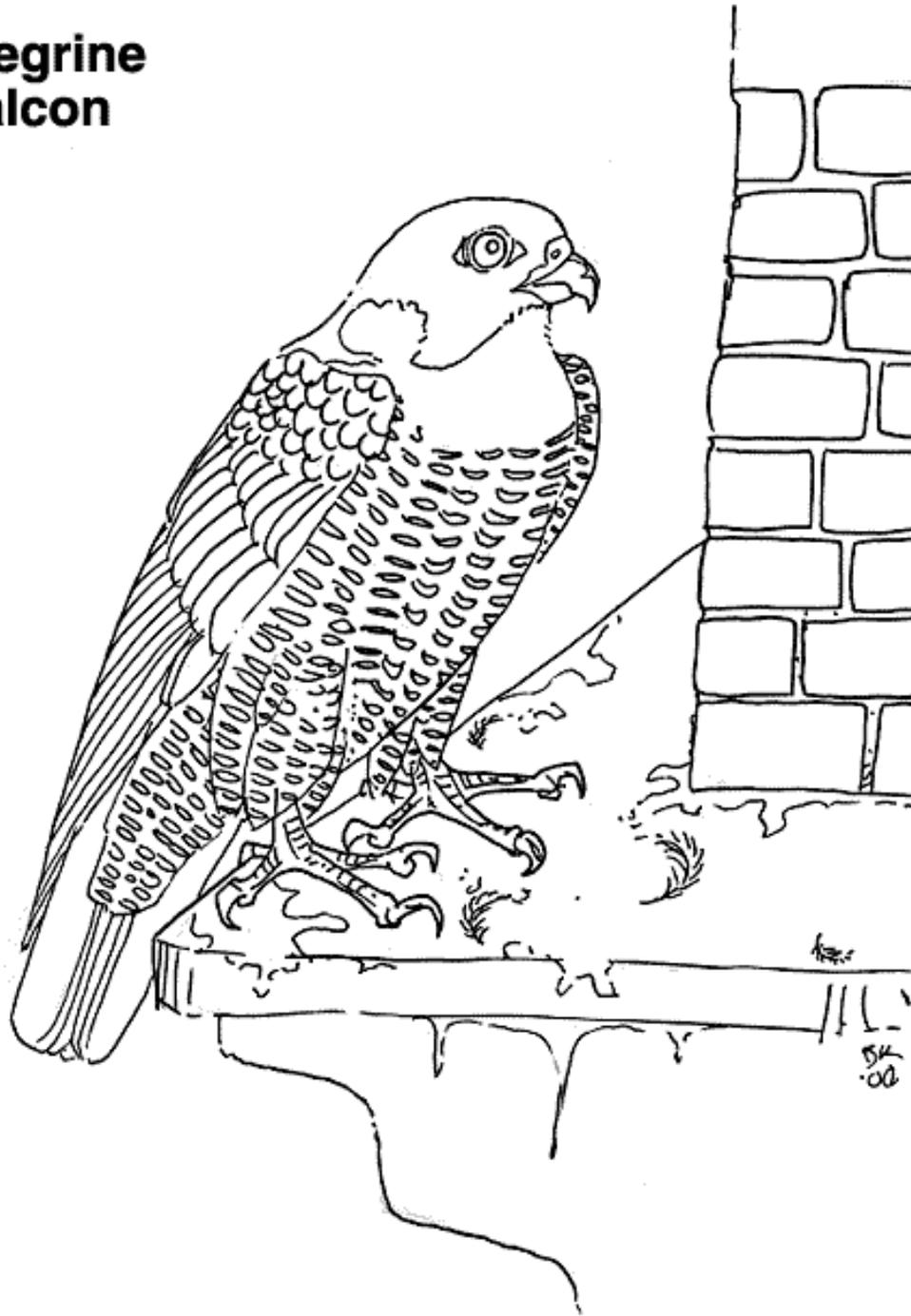
Have your students access the following website: <http://endangered.fws.gov/peregrin.html>. Once on the site they should access the following page: "1998 Peregrine Census." This will bring them to a map of North America indicating the number of breeding pairs of falcons by state.

#### Have your students answer the following:

- How many total pairs of nesting peregrine falcons were there in North America in 1998?
- How many in the U.S.?
- What percentage of nesting pairs in the U.S. were found east of the Mississippi River?
- Which States had no nesting pairs of falcons?
- Have your students create a graph of numbers of nesting pairs in New England by state.
- How many nesting pairs were found in New England?
- Which New England State had the most nesting pairs?
- What natural features of Vermont and New Hampshire appeal to nesting falcons? Why?
- Do you think the numbers of nesting pairs of falcons will grow or decline? Why?
- In 1998 Connecticut had 1 pair of nesting falcons. How many pairs did Connecticut have in 2000?
- Using a blank map of the U.S. have your students color code the information from the 1998 census by the following four classes: (a) states with less than 25 nesting pairs, (b) states with 26-50 nesting pairs, (c) states with 51-100 nesting pairs, and (d) states with greater than 100 nesting pairs. A blank map of the U.S. with outlines of the states can be found at: <http://multimedia2.freac.fsu.edu/fga/maps.html>. Check the listings under "North America."

Peregrine Falcon Coloring Activity

**Peregrine  
Falcon**



## **Peregrine Falcon Fill-in the Blanks Activity**

### **Part I**

#### *The Peregrine Falcon, A Powerful Yet Vulnerable Bird*

Use the words below to fill in the blanks.

hallux  
raptors  
stoop talons  
DDT  
environment species  
insecticide  
food chain biomagnification  
extinction

Peregrine falcons are considered to be the fastest animal on earth. Their high flight speeds are part of the technique they use to capture prey. Falcons belong to a group of birds called \_\_\_\_\_. The presence of a sharp beak and \_\_\_\_\_ are what identifies a predatory bird as a Raptor. The talons are used to grab and hold on to prey. As the falcon grasps its prey it uses its \_\_\_\_\_ or hind toe to slash it. The falcon diet consists mainly of smaller birds. They eat about 0.25 pounds (80 to 100 grams) of food per day. To capture prey a falcon flies high into the sky then folds its wings and drops from above in a dive known as a \_\_\_\_\_. Falcons typically fly about 60 miles per hour (100 kilometers per hour) but stooping speeds can reach 200 miles per hour (340 kilometers per hour).

The flight speed of the peregrine falcon makes it seem to be a powerful \_\_\_\_\_. However, it, like any other living organism, is vulnerable to changes in the \_\_\_\_\_. When a species cannot change in response to its environment \_\_\_\_\_ can occur. A chemical known as DDT nearly caused the peregrine falcon to become extinct in North America.

DDT was used as an \_\_\_\_\_ in the 1940's. It was sprayed on crops to stop insects from eating plants. At the bottom of the food chain several insects dusted with DDT may have been eaten by several small birds. Then, the small birds may have been eaten by a peregrine falcon. The amount of DDT in all of the small birds and all of the insects would eventually accumulate in the falcon. This is a process known as \_\_\_\_\_. The chemical greatly affected the peregrine falcon because it is at the top of the \_\_\_\_\_.

## Peregrine Falcon Fill-in the Blanks Activity Part II

### *The Peregrine Falcon, A Powerful Yet Vulnerable Bird*

Use the words below to fill in the blanks.

banned  
hatching  
wild  
calcium  
incubates  
eggshells contaminants  
Mississippi  
scientists decreased  
reproduce

By the mid 1940's the number of peregrine falcons in North America \_\_\_\_\_ drastically and at least 300 known nesting sites were abandoned. By the 1960's \_\_\_\_\_ noticed that the population of peregrine falcons went from a few thousand to just a few hundred. They were believed to be extinct east of the \_\_\_\_\_ River where once 350 nesting pairs had existed. Scientists began to search for the cause of the decline.

Researchers found that many of the birds had large amounts of DDT in their bodies. The peregrine falcon's position at the top of the food chain makes it appear to be a powerful bird. However, this position causes it to be vulnerable to \_\_\_\_\_. Although this contaminant does not kill them, it can interrupt the production of eggs and the \_\_\_\_\_ of chicks. DDT breaks down the enzyme that makes \_\_\_\_\_ harden. This prevents calcium from being used in the making of \_\_\_\_\_. Since the eggshells lack calcium they are weak and crumble easily. Either the female bird does not lay eggs or the eggs are weak and crush when the mother \_\_\_\_\_ them. This results in the inability to \_\_\_\_\_.

In 1972, as a result of scientists' findings, most uses of DDT were \_\_\_\_\_ in the United States. However, it could have been too late for the peregrine falcon. In 1972, the peregrine falcon was placed on the \_\_\_\_\_ species list. A law known as the Endangered Species Act calls for the design of a recovery strategy and an attempt is made to help the species return to a thriving state. It was up to scientists to develop a plan to increase the population of peregrine falcons in the \_\_\_\_\_.

## NESTING PEREGRINE FALCONS WORD SEARCH ACTIVITY

*Find the words written in capital letters. Words can be found forwards, backwards, up or down.*

1. A PEREGRINE FALCON is a bird of prey and can be found throughout the world.
2. The male peregrine falcon or TIERCEL weighs about 675 grams (1.5 pounds) while the female weighs about 900 grains (2 pounds).
3. Peregrine falcons are MONOGAMOUS and mate for life.
4. Falcons do not build nests with twigs, they create a SCRAPE or depression in soil, sand or gravel in which to lay eggs.
5. A falcon nest, known as an aerie, or EYRIE, is usually built on a cliff overlooking a river, lake or coastline.
6. The female falcon INCUBATES the eggs while the male hunts and brings her food.
7. An EYAS is a falcon chick, also fed by the male parent.
8. The chick uses a structure called an EGG TOOTH to crack through the egg when it is time to hatch.

E	P	A	O	W	P	F	N	U	C	N	I	P	F	I	E	R	O	E	P
E	E	I	S	E	C	E	I	A	S	M	N	A	U	O	N	O	E	I	E
A	R	L	P	D	S	N	E	R	E	E	G	R	G	B	M	I	O	N	R
E	E	G	O	W	G	I	Y	S	N	N	I	N	C	U	T	E	T	T	A
N	G	T	O	O	N	E	R	U	W	F	A	L	C	O	A	T	W	N	R
B	R	R	Y	N	I	R	I	O	O	P	E	I	T	N	Y	M	E	R	C
A	I	C	E	L	O	S	Y	M	M	R	O	N	O	G	A	I	T	D	L
T	N	E	I	R	Y	E	O	A	U	I	H	O	S	C	S	H	M	G	A
E	E	S	S	C	R	T	C	G	M	N	T	I	E	R	C	E	L	L	F
S	F	S	R	Y	E	A	L	O	U	T	O	A	E	A	P	M	A	D	L
L	A	C	E	R	E	B	A	N	L	I	O	B	R	M	A	O	G	P	E
C	L	R	I	E	I	U	N	O	E	M	T	U	U	E	B	U	G	N	D
O	C	T	G	G	E	C	S	M	C	T	G	C	M	O	N	S	A	T	G
A	O	E	R	E	P	N	S	O	C	H	G	I	M	T	S	A	Y	E	L
T	N	I	R	P	M	I	R	I	E	R	E	I	R	N	P	G	U	R	I
L	S	N	T	P	F	T	M	S	E	I	E	F	S	W	S	G	N	I	N
O	P	M	I	E	O	T	E	E	O	G	B	E	A	O	N	I	O	L	G
E	E	C	P	G	R	D	E	L	F	H	T	O	O	D	R	I	I	E	S
C	M	B	E	R	Y	E	G	L	I	N	G	S	L	E	P	A	R	C	S
E	G	P	F	F	L	E	D	G	I	N	G	T	M	M	O	U	S	I	P