FRIENDS OF KANANASKIS COUNTRY

The Raptor Edu-Kit Activity Guide

Friends of Kananaskis Country

Alberta

Acknowledgements

The development of The Raptor Edu-Kit was made possible through a partnership between the Friends of Kananaskis Country and the Alberta Ecotrust Foundation with the support of Alberta Environment.

The Raptor Edu-Kit was created by the Friends of Kananaskis Country and reviewed by Alberta Environment:

- Kananaskis Country and Fish Creek Provincial Park Environmental Education Programs
- Fisheries and Wildlife Management Division

Financial support was from the Alberta Ecotrust Foundation through a grant to the Friends of Kananaskis Country.

The Friends of Kananaskis Country
Suite 201, 800 Railway Avenue
Canmore, Alberta, T1W 1P1
ph: 403-678-5508
www.kananaskis.org

Table of Contents

The Big Picture

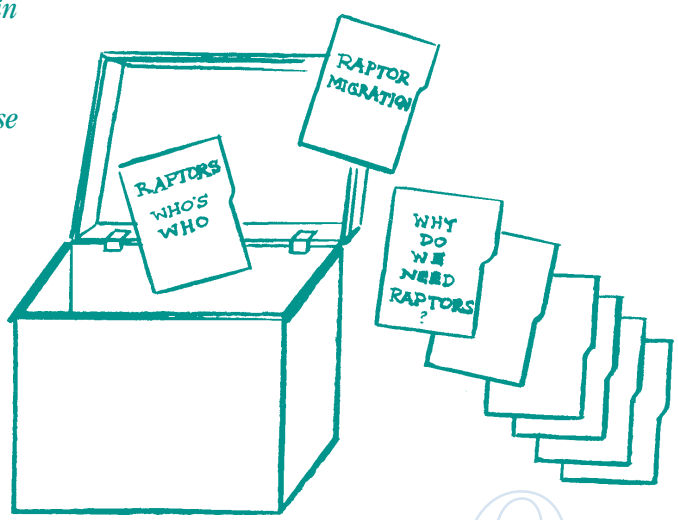
The *Raptor Edu-Kit Activity Guide* has been developed to assist educators in presenting Junior High School students with activities on raptors, including their adaptations to their environment, their ecology, and the factors which affect their survival. This guide is not designed as a comprehensive investigation of raptors, but rather it has been written to complement the Alberta Education curriculum and the mission and core business of Alberta Environment. The intent is to foster an interest and awareness in learning about a group of birds who's habits and beauty have long fascinated people, and who's health is an indicator of the health of the variety of habitats they occupy.

*In Alberta, birds of prey are protected by the Alberta Wildlife Act. This legislative act protects birds from being killed or harassed by man. However, the protection of individuals does not necessarily ensure the survival of a species. Like all wildlife, raptors require suitable habitat in which to nest and feed. When this habitat is removed, birds must try to find and occupy other suitable habitat that may already be occupied. Since a habitat can only support a certain number of birds, some will not survive. Urban, industrial, and agricultural developments are important causes of declines in populations of these species. (**Management of Large Hawks and Eagles**,* Alberta Enviroment, Fish and Wildlife Management Division.)

This guide contains information, activities, and study files which cover different aspects of raptors including: identification, adaptations for flight, migration, links in the food web, habitats, and their relationship with humans. Each activity includes background information, objectives, time required, materials, and instructions. As you know your class best, pick out the activities that most appropriately complement your needs.

Learning about raptors can involve many subjects including science, social studies, language arts, music, sociology, politics, mathematics, and physical education. While biology is important, our relationship with other species is strongly dictated by our culture and history. To focus only on biology will give students a limited understanding of the birds and the emotions they evoke.

We hope you and your class enjoy the Raptor Edu-kit.



At a Glance

Topic: The biology and ecology of raptors.

Program Level: Junior High

Staff Required: One teacher with one adult volunteer per 5-7 students during optional field study.

Time Required: Two 45-minute class periods for the introductory activities, the video, and the distribution of independent study files.

One 45-minute period and a homework assignment to complete independent study files.

One 45-minute period to share findings from the independent study files.

Two 45-minute periods to share the remainder of the independent study files and to identify an action strategy. The time required to implement the action strategy will vary.

One day for the optional field study.

Best Season: Most activities can be done indoors. The optional field study is most effective in the spring or fall.

The Raptor Edu-Kit Activity Guide is a teacher's activity guide and is developed to assist educators in introducing Junior High students to raptors and raptor ecology.

This student-directed program provides the opportunity for students to:

- examine their own attitudes and opinions about raptors
- study raptor biology and ecology
- identify the issues affecting raptors
- investigate at least one of these issues
- present their research findings
- compete an action plan and act upon it

This Acitivity Guide has been divided into four parts:

Part I: What is a Raptor?

In this part, students will find out what raptors are and what characteristics make them unique. Students will be asked to write down the thoughts and emotions that come to mind when they think about birds of prey. They will then be shown a video which will introduce them to the different groups or families of raptors with a description of their general characteristics. Afterwards, students will learn to identify specific characteristics of raptors and create their own 'raptor identification filed guide'.

Part II: Digging In and Finding Out

Students choose an independent study file and complete a research assignment. This guide contains nine *Independent Study Files*. The answers and background information for the teacher are provided. Teachers may want to assign three or more students to each file to engage everyone in this independent study component.

Part III: Presentations

Students present their research findings. Each study file includes a suggestion for presentations.

Part IV: Optional Field Study

Students will have the opportunity to visit either a natural area to see raptors in the wild or to a facility where raptors are bred or rehabilitated.

Part V: Action

Students will identify an issue related to raptors that interests them. The students then develop and follow an action strategy that will help raptor conservation either locally, provincially, nationally, or internationally.

Curriculum Tie-Ins

The following curriculum areas are addressed by the *Raptor Edu-Kit Activity Guide*:

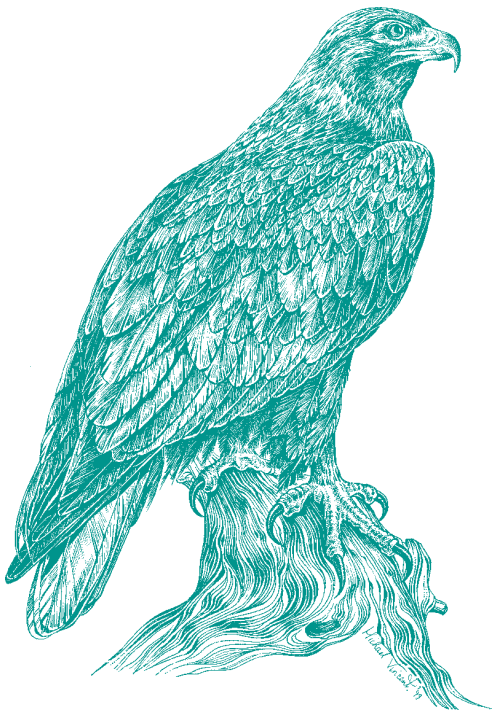
Division III Science

- Characteristics of Living Things
- Structures and Design
- Interactions and Environments
- Diversity of Living Things
- Environmental Quality

Division III Language Arts

The students will:

- explore verbal communications as an important function in the process of learning.
- communicate effectively in small group discussions.
- practice speaking easily and effective when presenting.
- practice active listening.
- practice appropriate listening strategies.
- practice effective visual communication.
- understand that visual communications possess distinctive elements and structures which may affect meaning.
- understand that appropriate organization and development of ideas are essential qualities of effective writing.
- develop a broad range of writing experiences.



Division III Mathematics

- Measuring and recording data.

Division III Social Studies

- Alberta Landscape, Heritage Geography.

Division III Physical Education

- Use acquired physical skills in a wide variety of game situations.
- Develop an appreciation and respect for the natural environment.

Part I: Activity I
What is a Raptor?

Summary
In this activity, students will find out what raptors are and what characteristics make them unique. Students will be asked to write down their thoughts and the emotions that come to mind when they think about birds of prey. They will then be shown a video which will introduce students to the different groups or families of raptors with a description of their general characteristics.

Time Required
45 minutes

Group Size
One class

Setting
Classroom

Objectives
Students will have the opportunity to:
- be introduced to the different types of raptors
- develop a curiosity to discover more about raptors
- identify their own feelings towards raptors

Materials
Raptor Edu-Kit
- posters of raptors
- *Birds of Prey: Their Biology and Ecology* video (20 minutes)
- tape of raptor calls

Other
- class set of small recipe cards or small pieces of paper 5" x 3" (12.5cm x 7.5cm)
- VCR and television
- tape recorder
- student notebooks

Background for Teachers
Raptors are birds that not only hunt for their food, eat meat, have hooked beaks, and fly well - they also seize and kill their prey with their feet which are called talons. Birds that process these traits are commonly called 'birds of prey'. Their name *raptor* comes from the Latin word *raptare,* which means to seize or grasp. Raptors can be found on every continent in the world except Antarctica.

Classification of Raptors

Scientists classify all plants and animals according to four criteria:

- anatomical features (physical features)
- physiology
- how they evolved
- in the case of animals, how they behave

All plants and animals are classified into kingdoms, orders, and families, and are further classified to *species*. Members of the same species share the same gene pool and are able to mate.

Raptors are classified into two orders. Day-flying raptors such as ospreys, vultures, eagles, and hawks belong to the order *Falconiformes*. Night-flying raptors or owls belong to the order *Strigiformes*. These two orders of raptors evolved independently. There are over 300 species belonging to the order Falconidae and over 130 species belonging to the order Strigiformes. Each order is further subdivided into families as follows:

ORDER: FALCONIFORMES (Fal-con-i-forms)

(Diurnal [die-er-nal] raptors [day-flying])

Family Cathartidae (Cath-ar-ti-day)
New World vultures and condors. The term *New World* refers to North and South America

Family Accipitridae (Axip-it-ri-day)
eagles, hawks (buteos), kites, buzzards, harriers, and Old World vultures. The term *Old World* refers to Europe, Asia, and Africa

Family Falconidae (Fal-con-i-day)
falcons and caracaras

Family Sagittariidae (Sajit-are-i-day)
secretary bird

Sub-Family Pandioninae (Pan-dee-on-i-nay)
osprey

ORDER: STRIGIFORMES (Strij-i-forms)

(nocturnal [noc-ter-nal] raptors [night flying])

Family Tytonidae (Tee-ton-i-day)
barn owls

Family Strigidae (Strij-i-day)
all other owl species

Instructions for the Teacher

1. Gather together the materials and equipment listed under *Materials*. Tape the posters of raptors on your classroom walls and set up a tape recorder with the tape of raptors calls. Review the video *Birds of Prey: Their Biology and Ecology*.

2. Introduce the students to the Raptor Edu-Kit. Ask the students if they know what a raptor is. If necessary, refer to raptors as birds of prey. Ask them what characteristics they think raptors have. Write their answers on the board under the heading *Raptor Characteristics*. Ask the students if they can think of any examples of raptors they may be familiar with. Write their answers on the board under the heading *Raptor Species.*

3. Give each student a recipe card or piece of paper. Ask them to write down five thoughts or emotions that come to mind when they think of raptors or birds of prey. Tell the students not to put their names on their cards. Collect the cards and save them for the group who will be working on the *Study File 7: Raptors in Our Culture.*

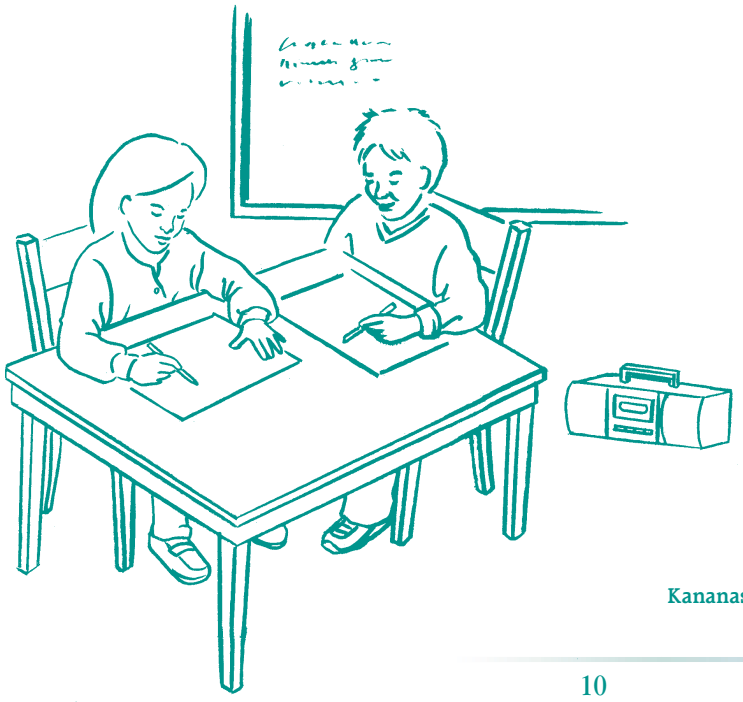
4. Show students the video *Birds of Prey: Their Biology and Ecology.* This video introduces students to the different groups or families of raptors with a description of their general characteristics.

5. After watching the video, ask the students what characteristics raptors have that are different then those already listed on the board.
   Raptors hunt for their food, eat meat, have hooked beaks, they fly well, and they kill with their feet. Their feet or talons enable them to grasp their food out of the air, out of the water, or off the ground.

6. Ask the students what other species of raptors they can now add to the list started on the board. Ask the students which of these species are likely to be found in their region?
   Answers will vary, but other species of raptors include ospreys, vultures, condors, secretary birds, eagles, hawks, kites, buzzards, harriers, falcons, and owls.

7. Play examples of raptor calls from the audio tape.

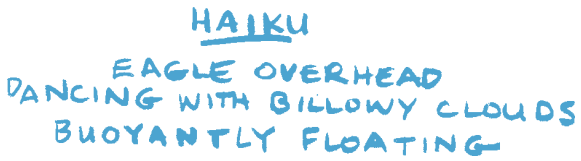
8. Using the words on the board, the words from the cards, and the sounds from the audio tape, have the students each write a poem. The poem form may be Haiku, cinquain, or free verse about raptors or about a specific species of raptor seen in the video.



A Haiku poem consists of a total of seventeen syllables written in three non-rhyming lines. It gives a brief glimpse and insight into the natural world.

Example:

Line 1 - five syllables
Eagle overhead
Line 2 - seven syllables
Dancing with billowy clouds
Line 3 - five syllables
Buoyantly floating



The format of a cinquain poem is:

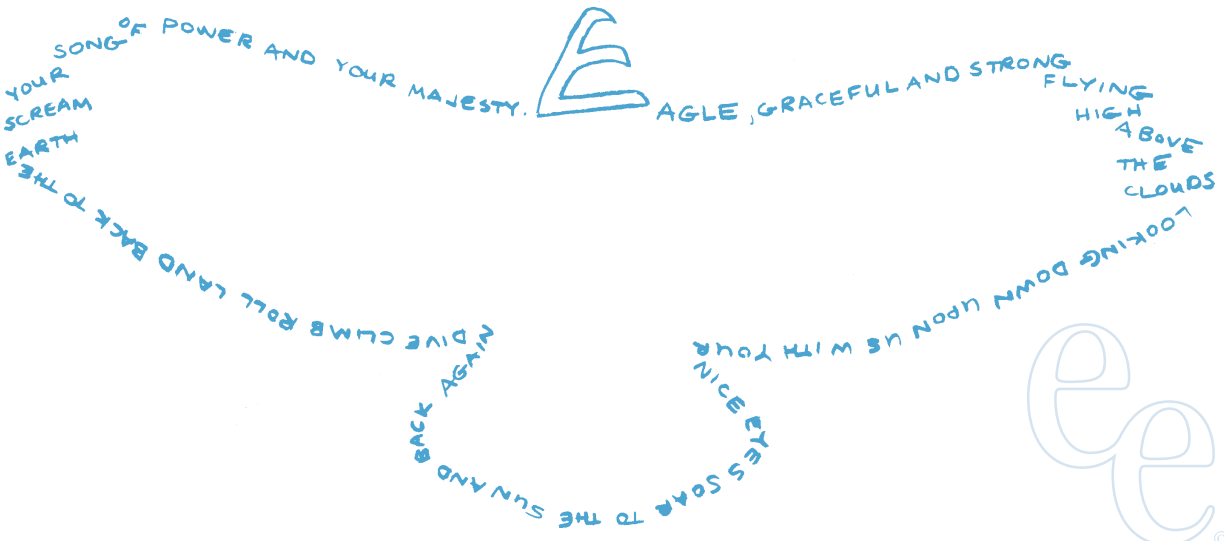
Example:
Line 1 - one word (the title)
Hawk
Line 2 - two words that describe the title
Sleek, graceful
Line 3 - three words that express an action
Soaring, searching, diving
Line 4 - two words that express a feeling
Feeling free
Line 5 - one word that is a synonym for the title
Raptor

Have students write their poems in their notebooks and share their poems with a friend or with the whole class.

9. Explain to the students that they will now have the opportunity to work in groups to find out more about raptors. Each group will complete an independent study file which covers an aspect of raptor biology and ecology.

10. Go to *Activity II - Identifying Raptors*

Encourage students to write other types of poetry such as the concrete poem below.



Part I: Activity II Identifying Raptors

Summary

In this activity, students learn some simple ways to identify birds of prey in the field. After describing four different raptors and their distinguishing characteristics, students are assigned one raptor each and must research their distinguishing characteristics for identification. At the conclusion of this activity, students will develop a class identification field guide for the 31 raptors found in Alberta.

Time Required

60 minutes

Group Size

One class

Setting

classroom

Materials

Raptor Edu-Kit

- Laminated colour picture of Bald Eagle (included in the Part I: Teacher Activity File)
- Class set of laminated and coloured page of four Alberta Raptors (included in the *Part I: Teacher Activity File*)

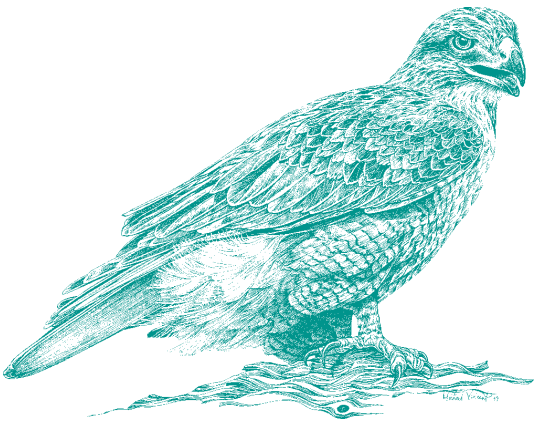
Other

- Paper and pens for each student

Background

Alberta is home to 31 species of raptors, and each have their own unique characteristics. Developing the knowledge necessary to identify these birds in the field is a life-long pursuit. Variables such as different stages of development, weather conditions, and fleeting glimpses sometimes can often leave even the most confident birder guessing. However, there are some species that are easy to recognize, and this will encourage a desire to learn and use more sophisticated methods of identification.

Identifying a raptor in the field for the first time is a wonderful experience. Use the activity on page 13 to give you a head start.



Instructions for the Teacher

1. Divide the class into pairs.

2. Have each student select an object in the classroom - *without revealing what it is to their partner.* Using a piece of paper and a pen, have each student write down three to five short phrases that describe the object that they have selected.

3. Have the students trade papers with each other and guess what object their partner selected, using the phrases on the page as a guide.

4. Most students will have correctly guessed their partners object. Inform the students "let's try the same technique to help us identify raptors". Bird books typically describe raptors in the following way:

Raptor	In Flight	Perching
Bald Eagle	Large, flat even wings	Large yellow bill, white head and tail

(Use the colour picture of the bald eagle to illustrate these characteristics)
In the next step, students will create a similar description in their own words.

5. Distribute one copy of the coloured drawings of raptors to each pair of students.

6. Instruct the students to chose any one of the four raptors on the *sheet without revealing what it is to their partner.* Have each student write down three to five short phrases that describe the raptor that they selected.

7. Have the students trade papers with each other and guess what raptor their partner selected, using the words on the page as a guide. Most students will correctly identify their partner's raptor. Emphasize that the skill of using descriptions that work best for you is a part of the sometimes difficult task of bird identification.

8. Assign 1 raptor to each student in the class from the inventory of 31 raptors found in Alberta on the next page.

9. Inform students that they will be using the resources from the Edu-Kit (information library, resource binder, or the Internet listings at the end of this guide) to research the identification characteristics for their raptor. Instruct the students to begin searching these resources (sharing them if necessary) to determine simple ways of identifying the raptor *when it is perching as well as in flight*.

10. Students should make an 8.5 x 11 photocopy of their raptor. Using this image, have student's label the distinguishing characteristics of their raptor such as:
    - colour on the head, wings, bill, tail, and chest
    - approximate size
    - other unique features

    This labelled diagram could then be placed into a binder and made into a booklet to create a *Student Field Guide for Raptors*. The guide could then be used on the optional field study later on in this unit of study.

11. As students become more confident in identifying raptor characteristics, encourage them to begin focusing on more advanced and reliable techniques for identification such as wing beat, plumage sequence, plumage variation, or wing profile - to name a few.

12. Proceed to Part II: *Digging In and Finding Out.*

Raptors Found In Alberta

Eagles
Bald Eagle
Golden Eagle

Hawks
Broad-winged hawk
Cooper's hawk
Ferruginous hawk
Northern harrier
Northern Goshawk
Red-tailed hawk
Rough-legged hawk
Sharp-shinned hawk
Swainson's hawk

Falcons
American Kestrel
Gyrfalcon
Merlin
Peregrine falcon
Prairie falcon

Owls
Barn owl
Barred owl
Boreal owl
Burrowing owl
Eastern Screech owl
Great Horned owl
Great Gray owl
Long-eared owl
Northern Hawk owl
Northern Pigmy owl
Northern Saw-Whet owl
Short-eared owl
Snowy owl

Other raptors in their own family
Osprey
Turkey Vulture

Part II - Digging in and Finding Out

Summary

In Part II, groups of students are given one of nine independent study files which cover a specific aspect of raptor biology, ecology, natural history and conservation. Each study file provides students with background information, instructions, a sharing activity, suggested references, and worksheets. The study files are printed on white paper. Worksheets or other materials that students plan to write on will need to be photocopied - please do not write on the originals. The answer sheets, printed on blue paper, are also included and should be removed by the teacher before the study files are assigned. Teachers may want to assign three or more students for each file to engage everyone in these independent studies.

Time Required

- 45 minutes in class and approximately one hour homework time to complete the independent study files
- Two 45 minute classes to share the findings from the independent study files

Group Size

Individuals or small groups depending on class size

Setting

Classroom

Objectives

Students will have the opportunity to:

- study the biology and ecology of raptors
- increase their knowledge and understanding of some of the issues affecting raptor survival
- present their research findings to the rest of the class

Materials

Raptor Edu-Kit

- One photocopy of the student independent study files for each student or group of students, depending on class size
- Supplementary materials as listed in each study file - most of these materials can be found in the Edu-Kit that accompanies this activity guide
- The video: *Twixt Heaven and Earth* (48 minutes) - the abridged version that is also included in this kit is 18 minutes long

Other

- VCR and television to view video

Background for Teachers

The video in Part I introduced students to the different families of raptors and their general characteristics. The students now have the opportunity to delve deeper into a particular aspect of raptor biology, ecology, natural history, and related issues. Using the resource materials included with the kit, students can find the necessary information to answer the questions posed in their study files. Through *Digging in and Finding Out*, students move from what is written in books to what is happening to raptors in their habitat areas.

Instructions for the Teacher

1. Preview the video *Twixt Heaven and Earth*. An abridged version of the video has been provided for teachers with time constraints. Explain that the video is about a well respected biologist named Dr. Stuart Houston who has spent the last fifty years studying the Swainson's Hawk in Saskatchewan. He is concerned about their declining numbers and their low breeding success rate. He is working with other biologists in North and South America to find out what is causing this drop in population.

2. Photocopy one duplicate of the student independent study files for each group of students. These pages are printed on white paper. The blue sheets are the teacher's answer sheets and are found in a seperate answer file - these can be set aside until each group has completed their research, then given to the students to use for self-correction.

3. Once the study files are photocopied, divide the class into groups and assign each group one of the files for further investigation. After each student or group of students has received their files, go through the files with them so they understand that each file includes:
   - a summary
   - a list of contents
   - a list of Edu-Kit materials (these are included in the kit)
   - background information
   - instructions
   - a suggested sharing activity
   - suggested references (included in the kit)
   - worksheets
   - some files may include additional materials to help students complete the instructions

4. Instruct the students to read the *Background Information* in their own study file and complete the activities described under *Instructions*. The worksheets and charts included in their files are to be completed with the help of the materials found in the Edu-Kit.

   Explain that the activities in each study file are different. Once they have completed their instructions, they are then responsible for presenting their findings to the rest of the class. A suggestion for a presentation is included in each file.

5. Explain that the knowledge and understanding they will gain through their research and the presentation of their findings will help them develop and implement an action strategy for the conservation of raptors

6. Give the class 10-20 minutes to read through the *Background Information* provided in their study files and then show the video *Twixt Heaven and Earth*. Introduce it by explaining that it is about a scientist named Dr. Houston who has devoted his life to studying raptors, particularly the Swainson's Hawk. The first part of the video covers his research. The video then describes some of the new findings of Dr. Houston and his team of researchers. Ask them to think about how the video relates to the topic in their study file.

7. Allow students some time in class to work on their study files. Assign homework for them to complete their files.

Summary of Student Independent Study Files Edu-Kit Materials

File 1: Raptor Who's Who

Students will identify the different families of raptors found world-wide, their characteristics, and some representative species of each family.

- Photographs and drawings of the different species of raptors found in the world
- Overhead transparency of *Raptor Wingspans*
- Cassette tape of raptor calls
- Reference Materials

File 2: Adaptations for Flight

Students will discover how birds are adapted for flight. They will also look at some of the adaptations of raptors for flight which help them with their specific hunting techniques. They will also compare the design of bird wings to those of aircraft and discover the advantages and disadvantages of being able to fly.

- Sample hawk, falcon, and owl feathers
- Silhouettes of a hawk, falcon, and owl in flight
- The book: *Advanced Paper Airplane Construction*
- Reference Materials

File 3: Raptor Migration

Students will gain an understanding of why some raptors migrate, as well as examine the advantages and disadvantages of migration.

- Map of North and South America showing the migration route of the Swainson's Hawk.
- Reference Materials

File 4: Links in the Food Web

Students will have the opportunity to identify some prey species of raptors and to discover the role of raptors in the food chain.

- Large ball of twine
- 1 set of food wed cards and binder clips (attached)
- Reference Materials

File 5: Bioaccumulation: It Adds Up

Students will learn about some of the risks associated with being at the top of the food chain.

- thirty small (30 ml) yogurt containers
- three large (900 ml) yogurt containers
- Reference Materials

File 6: Habitats at Risk

Students will identify the habitats used by raptors and some of the challenges they face in sharing their home with humans.

- 5 transparency maps
- Reference Materials

File 7: Raptors in Our Culture

Students will have the opportunity to discover some of the ways people have viewed raptors in their stories, legends, music, art, and religion. They will also have the opportunity to discover the feelings of their classmates on raptors after they have learned more about them.

- Reference Materials

File 8: Living With Raptors

Students will have the opportunity to identify the economic, ecological, scientific, ethical, and spiritual importance of raptors.

- Reference Materials

File 9: What is Being Done to Protect Raptors?

Students will find out what steps are being taken to protect raptors through research, rehabilitation, and education.

- Binder containing information on agencies involved with raptors and habitat conservation
- Reference Materials

Student Independent Study Files

File 1: Raptor Who's Who

File Summary

This is an opportunity to identify the different families of raptors found world-wide, their characteristics, and some representative species from each family. You will also identify raptors which may be at risk in Alberta.

File Contents

- Background Information
- Instructions
- Presentation Activity
- Suggested References
- *A Comparison of Raptor Families Chart*
- *A Comparison of Raptor Families Answer Sheet* (see your teacher)

Materials

Raptor Edu-Kit

- Overhead transparency of *Raptor Wingspans*
- Cassette tape of raptor calls

Other

- Cassette tape recorder

Background Information

Raptors are birds of prey which hunt for their food, eat meat, have hooked beaks, and fly well. Raptors also seize and kill their prey with their feet which are called talons. Their name *raptor,* comes from the Latin word *raptare* which means to seize or grasp.

Raptors can be found on every continent in the world except Antarctica. Raptors are classified into two orders as shown below. Day-flying raptors such as ospreys, vultures, eagles, and hawks, belong to the order *Falconidae*. Night-flying raptors or owls belong to the order *Strigiformes*. Each order is further subdivided into families. On the next page you will find a *Classification of Raptors* chart. Note that under each Latin family name are some examples of the types of birds found in that family.

Classification of Raptors

Scientists classify all plants and animals according to four criteria:

- anatomical features (physical features)
- physiology
- how they evolved
- in the case of animals, how they behave

All plants and animals are classified into kingdoms, orders, and families, and are further classified to *species*. Members of the same species share the same gene pool and are able to mate.

Raptors are classified into two orders. Day-flying raptors such as ospreys, vultures, eagles, and hawks belong to the order *Falconiformes*. Night-flying raptors or owls belong to the order *Strigiformes*. These two orders of raptors evolved independently. There are over 300 species belonging to the order Falconidae and over 130 species belonging to the order Strigiformes. Each order is further subdivided into families as follows:

ORDER: FALCONIFORMES (Fal-con-i-forms)
(Diurnal [die-er-nal] raptors [day-flying])

Family Cathartidae (Cath-ar-ti-day)
New World vultures and condors. The term *New World* refers to North and South America

Family Accipitridae (Axip-it-ri-day)
eagles, hawks (buteos), kites, buzzards, harriers, and Old World vultures. The term *Old World* refers to Europe, Asia, and Africa

Family Falconidae (Fal-con-i-day)
falcons and caracaras

Family Sagittariidae (Sajit-are-i-day)
secretary bird

Sub-Family Pandioninae (Pan-dee-on-i-nay)
osprey

ORDER: STRIGIFORMES (Strij-i-forms)
(nocturnal [noc-ter-nal] raptors [night flying])

Family Tytonidae (Tee-ton-i-day)
barn owls

Family Strigidae (Strij-i-day)
all other owl species

Instructions

1. Read the *Background Information* provided. Using this information and the resource books listed under *Suggested References*, complete the *Comparison of Raptor Families Chart* found in this file.

2. Listen to the tape of raptor calls.

3. With the help of your teacher, project the overhead transparency of the *Raptor Wingspans* on the wall so the measurements are to scale. Compare your arm-span with the wingspans of the birds on the overhead. This will give you an idea of the wingspan of some of these birds when they are in flight.

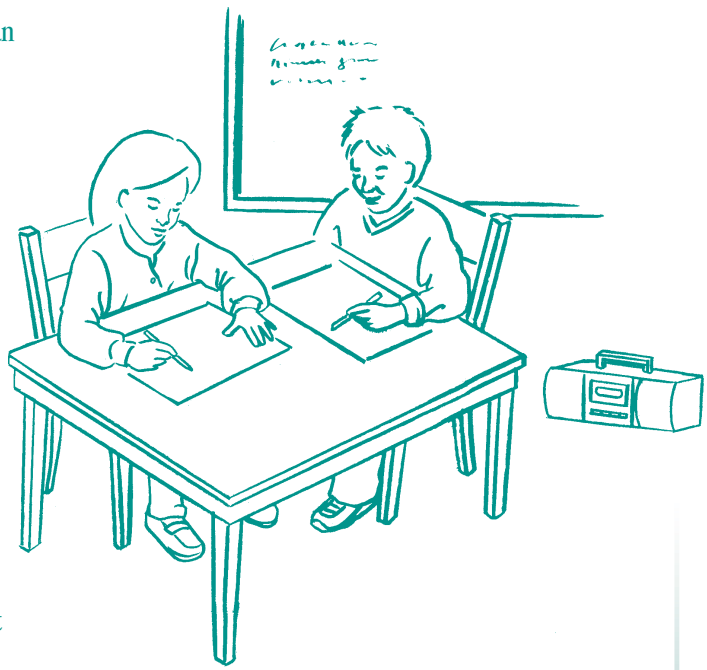
4. Visit the Alberta Environment Status of Wildlife website (www.gov.ab.ca/env/fw/status/index.html) and determine the current classification of raptors at risk in Alberta.

   Alberta uses the following classification to identify the status of all wildlife in Alberta:

Red	Species considered to be **at risk**
Blue	Species that **may be at risk**
Yellow A	Sensitive species that are not currently believed to be at risk but **may require special management** because of concern for their long-term declines.
Yellow B	Sensitive species that are not currently believed to be at risk but **may require special management** because they are naturally rare or are associated with deteriorating habitats.

   Which raptors are considered to be **at risk?** Why do you think these particular raptors are at risk? Record these species for use with your presentation.

5. Follow the suggested *Presentation Activity* format to ensure that you are prepared to present your findings to the rest of the class.



Presentation Activity

1. Upon completion of the independent study files, each group of students will be given up to twenty minutes to present their findings to the rest of the class. Your group is responsible for the information contained in this file. Prepare a short and informative presentation for the rest of the class.

2. Here is a suggestion for your presentation on *Raptor Who's Who*:

    a) Introduce each of the families of raptors by naming each family, showing photographs of representative members of each family as found in the reference materials provided, and describing one distinguishing characteristic you found interesting about each family. Play two or three sample calls from the tape of raptor calls.

    b) With the help of your teacher, project the overhead of the *Raptor Wingspans* on the wall so the measurements are to scale. Invite all the students in the class to compare their arm-span with the wingspans of the birds on the overhead. This will give the class an idea of the wingspan of some of these birds.

    c) Explain the Alberta Status of Wildlife classification system (for example what does the Red, Blue, Yellow A and Yellow B list mean) and indicate which raptors are considered to be **at risk** in Alberta**.**

Suggested References

(these can be found in the kit)

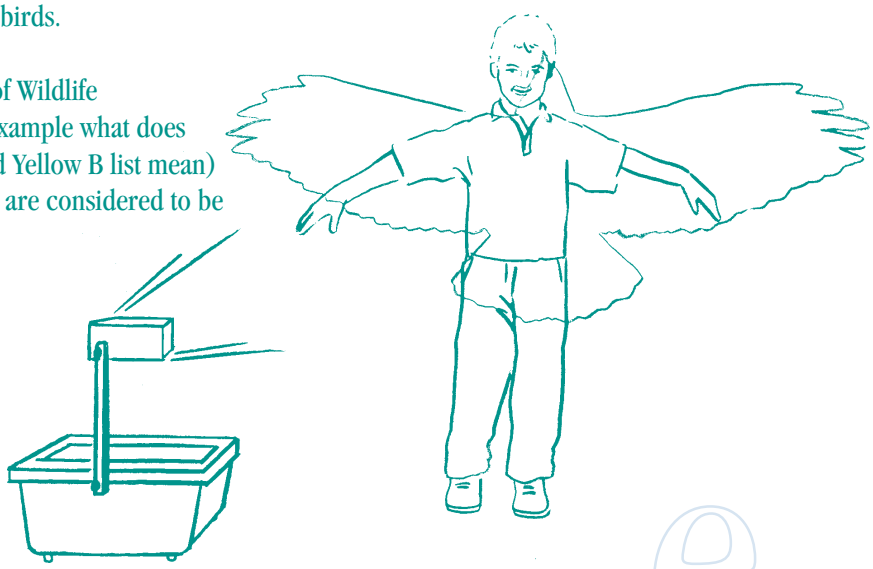
Fisher, Chris and John Acorn. **Birds of Alberta**. Edmonton: Lone Pine Publishing, 1998.

Hendrickson, John. **Raptors, Birds of Prey**. Vancouver: Raincoast Books, 1992.

Holroyd, Geoff., Shukster, Ivan., Keith Diane., Hunt, Laurie. **A Landowner's Guide: Prairie Raptors.** Canadian Wildlife Service, Edmonton. 1995.

National Geographic. **Field Guide to the Birds of North America**. Washington: National Geographic Society, 1999.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. Toronto: Stoddart Publishing Co. Limited, 1997. (Eyewitness Books).



A Comparison of Raptor Families

Student Copy

FAMILY	EXAMPLE SPECIES	APPEARANCE IN FLIGHT	HABITAT	FOOD	ALBERTA SPECIES
Family Cathartidae (Cath-ar-ti-day)					
Family Accipitridae (Axip-it-ri-day)					
Sub-Family Pandioninae (Pan-dee-on-i-nay)					
Family Falconidae (Fal-con-i-day)					
Family Sagittariidae (Sajit-are-i-day)					
Family Tytonidae (Tee-ton-i-day)					
Family Strigidae (Strij-i-day)					

A Comparison of Raptor Families

Teacher Copy

FAMILY	EXAMPLE SPECIES	APPEARANCE IN FLIGHT	HABITAT	FOOD	ALBERTA SPECIES
Family Cathartidae (Cath-ar-ti-day)	*New World vultures and condors*	*Broad wings, small head*	*Found in open country. Lay their eggs in a sheltered spot such as a cliff ledge or cave.*	*Vultures and condors are scavengers and eat carrion (dead animals).*	*Turkey Vulture*
Family Accipitridae (Axip-it-ri-day)	*Eagles, hawks, kites, buzzards, harriers, and Old World vultures*	*Low flying with short, rounded wings and long tails*	*Habitat varies. Different species can be found in woodlands, coniferous forests, or mountains.*	*Diet varies and may include small mammals, birds, carrion, and insects.*	*Eleven species live in Alberta including the Golden and Bald Eagles, Cooper's Hawk, Northern Goshawk, and the Red-tailed Hawk.*
Sub-Family Pandioninae (Pan-dee-on-i-nay)	*Osprey*	*Long, narrow wings, bent at the wrist, wings slightly arched in flight.*	*Nests near fresh or salt water.*	*Eats fish.*	*The Osprey is the only species in this family in the world.*
Family Falconidae (Fal-con-i-day)	*Falcons and caracaras*	*Long wings, bent at the wrist, wings narrow and pointed*	*Found in open country, near cliffs, open woods, and in cities.*	*Diet varies. May eat small mammals, reptiles, or birds.*	*Five species found in Alberta including the American Kestrel, Merlin, Gyrfalcon, Prairie and Peregrine Falcons.*
Family Sagittariidae (Sajit-are-i-day)	*Secretary Bird*	*They fly and soar with long legs and necks outstretched. They mostly walk.*	*They live in Africa south of the Sahara where there are grasslands, desert edges, farmland.*	*They walk through grass, find prey and stamp on it. Eat snakes, insects, small animals, and birds.*	*Not found in Alberta.*
Family Tytonidae (Tee-ton-i-day)	*Barn Owls*	*Large head, short necks, broad, rounded wings. Fly at night.*	*Roosts and nests in dark cavities in city and farm buildings, cliffs, trees.*	*Hunt for rats, mice and birds.*	*One record of a Barn Owl found dead in Alberta.*
Family Strigidae (Strij-i-day)	*All other owl species*	*Large head, short necks, broad, rounded wings. Most species fly at night.*	*Their habitats vary. Some are found in open country, others are found living in thick woods.*	*Hunt for small mammals and birds, the size depends on the size of the owl.*	*Eleven species are found in Alberta, these include: Great Horned, Barred, Pygmy and Boreal Owls.*

File 2: Adaptations for Flight

File Summary

In this activity, you will discover how birds are adapted for flight. You will also look at some of the adaptations of raptors which help them with their specific hunting techniques. Finally, you will compare the design of bird wings to those of aircraft and discover the advantages and disadvantages of being able to fly.

File Contents

- Background Information
- Instructions
- Presentation Activity
- Suggested References
- *Raptor Wing and Feather Identification Worksheet*
- *Raptor Wing and Feather Identification Answer Sheet* (see your teacher)
- *Advantages and Disadvantages to Flight Answer Sheet* (see your teacher)

Materials

Raptor Edu-Kit

- sample of hawk, falcon, and owl feathers
- silhouettes of a hawk, falcon, and owl in flight
- three magnifiers
- book: *Advanced Paper Aircraft Construction* by Campbell Morris

Background Information

Raptors are well adapted for flight. The following adaptations make it possible for them to fly:

- The larger bones in a bird's body are hollow except for struts that run across the inside to give them strength. Otherwise, the bones are filled with air to make them light.
- The skeleton is strong to support powerful muscles, yet flexible for flying.
- A number of bones are fused together to give the support needed for the flight muscles.
- Feathers are strong, light, and waterproof. Different types of feathers serve different purposes. Some feathers serve to keep the bird warm. The feathers on the bird's body help give the bird its streamlined shape. Primary and secondary flight feathers on the wings vary in shape to improve the airflow over the wing to give the bird lift.

- Wings are thicker in the front, tapering to a thin point at the back. The bottom surface of the wing is flatter than the top surface of the wing which is curved. This wing shape is called an aerofoil. As a bird moves through the air, the air has to move faster and further to get over the bulging top surface of the wing. When this happens, the air pressure on that top wing surface lowers. The air moves more slowly past the bottom surface so the air pressure stays the same. Although the air pressure is only a little bit higher on the bottom surface, it is enough to push up on the wing and give the bird lift. When a bird flaps its wings and tilts them forward or back, it can go up, down, and forward as needed. Not only are wings shaped like aerofoils, but each flight feather is too. Birds can control each feather to make its flight more efficient.
- Tail feathers are used for steering and braking.
- Birds have a high metabolic rate (ability to release energy) which is fuelled by an efficient respiratory (breathing) system. This gives birds the energy they need for long flights.

Instructions

1. Read the *Background Information* to find out the features that make bird flight possible. Look at the pictures of the bones, muscles, and body shape of raptors shown in the book *Eagle and Birds of Prey* (pages 20 - 25 and 32 - 33) included with the kit, to help you better understand the raptors' adaptations to flight.

2. Raptors are some of the best flyers in the bird world. The shape of a raptor's wing, tail, and feathers vary from species to species, depending on the bird's habitat or hunting technique. You have been provided with silhouettes and feathers from a hawk, a falcon, and an owl in the kit. Use the magnifiers to closely examine the feathers. Are there any differences between the species?

   Complete the *Raptor Wing and Feather Identification Worksheet* provided. On the worksheet, you are asked to draw a small sketch of each silhouette and each feather. Beside the sketch, write the name of the kind of bird you think the silhouette belongs to (hawk, falcon, or owl). Write a list of three features you have observed on each silhouette and feather and describe how you think each of these features would assist this kind of bird in its flight and hunting. Features to look for include the shape, size, length, and width of the wings, tails, and feathers. Use the background information and references materials provided to help you.

3. You now have the opportunity to experiment with two different paper airplanes to determine how wing shape affects flying. The book *Advanced Paper Aircraft Construction* has been provided for you. Carefully follow the instructions for the *Super Wing* (pages 8 and 9) and the *Simple Stunt Plane* (pages 32 and 33). Go into the hallway, the gym, or outside where there are no other people around. Test your paper airplanes. How do they fly? How far do they fly? What happens if you throw them gently, hard, by the tail, by the nose, or by the wing? As you test the planes, decide which type of bird (hawk, owl, or falcon) the planes best imitate.

4. There are many advantages and disadvantages of flight. On the back of the *Raptor Wing and Feather Identification Worksheet* list three advantages and three disadvantages of flight for birds. Then write another list of three advantages and three disadvantages of airplane flight for people.

5. Follow the suggested *Presentation Activity* format to ensure that you are prepared to present your findings to the rest of the class.

Presentation Activity

1. Upon completion of the independent study files, each group of students will be given up to twenty minutes to present their findings to the rest of the class. Your group is responsible for the information contained in this file. Prepare a short and informative presentation for the rest of the class.

2. The following is a suggestion for your presentation on the *Adaptations for Flight*.
   a) Briefly describe the aerodynamics of flight using the paper airplanes as props to help you.

   b) Explain how birds are adapted for flight and how they move their wings and wing feathers, tails and tail feathers as they fly to help them steer and brake.

   c) Pass around the sample feathers asking students to look for the differences in the feathers.

   d) Explain that birds have differently shaped feathers depending on their needs for flying, feeding, etc.

   e) Describe some of the advantages and disadvantages of flight for birds and humans.

Suggested References

(these can be found in the kit)

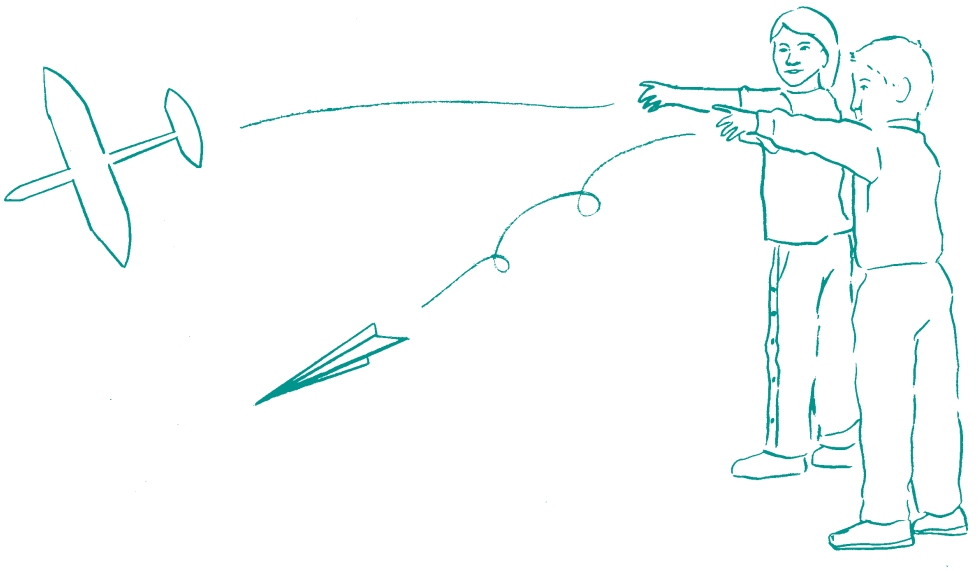
Fisher, Chris and John Acorn. **Birds of Alberta**. Edmonton: Lone Pine Publishing, 1998.

Francis, Neil. **Paper Airplanes and Other Super Flyers**. Toronto: Kids Can Press, 1996.

Kalman, Bobbie (ed.). **How Birds Fly**. Niagara-on-the-Lake: Crabtree Publishing Company, 1998.

National Geographic. **Field Guide to the Birds of North America**. Washington: National Geographic Society, 1999.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. Toronto: Stoddart Publishing Co. Limited, 1997. (Eyewitness Books)



Raptor Wing and Feather Identification Worksheet

Match the wing silhouettes and feathers of the owl, hawk and falcon provided by your teacher. Complete the following questions.

Raptor Silhouette and Feather #1

Type of Raptor: _____

List three features you observe on the wing silhouette and feather that you think would assist this kind of bird with its flight and hunting.

1.

2.

3.

Draw a sketch of the wing silhouette and feather provided:

Raptor Silhouette and Feather #2

Type of Raptor: _____

List three features you observe on the wing silhouette and feather that you think would assist this kind of bird with its flight and hunting.

1.

2.

3.

Draw a sketch of the wing silhouette and feather provided:

Raptor Silhouette and Feather #3

Type of Raptor: _____

List three features you observe on the wing silhouette and feather that you think would assist this kind of bird with its flight and hunting.

1.

2.

3.

Draw a sketch of the wing silhouette and feather provided:

Raptor Wing and Feather Identification Answer Sheet

Match the wing silhouettes and feathers of the owl, hawk and falcon provided by your teacher. Complete the following questions.

Raptor Silhouette and Feather #1
Type of Raptor: *Hawk*
List three features you observe on the wing silhouette and feather that you think would assist this kind of bird with its flight and hunting.

Hawks have short, rounded wings for quick turns when chasing prey. Shorter wings can be flapped faster for greater maneuverability. Short wings are also an adaptation for flying in forests and woodlands. Feathers are different shapes to improve the airflow over the wing.

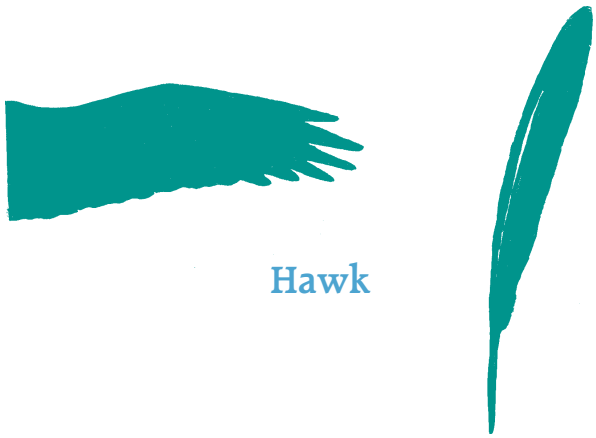
Raptor Silhouette and Feather #2
Type of Raptor: *Falcon*
List three features you observe on the wing silhouette and feather that you think would assist this kind of bird with its flight and hunting.

Falcons are streamlined with long, narrow, pointed wings. Their shape allows them to stoop (or dive) to strike their prey in mid-air. Falcons also have large heads and relatively short tails which means they are not as maneuverable as hawks. Their tails narrow at the tips.

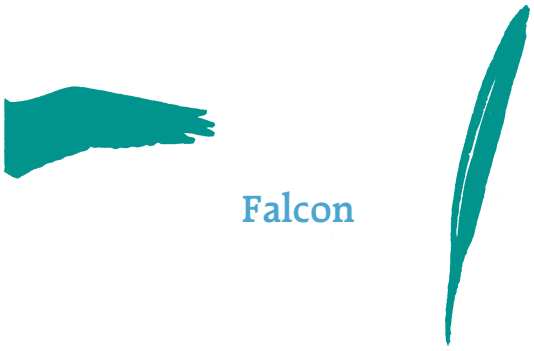
Raptor Silhouette and Feather #3
Type of Raptor: *Owl*
List three features you observe on the wing silhouette and feather that you think would assist this kind of bird with its flight and hunting.

Owls have short, rounded wings which allow them to take off quickly and make quick turns when chasing prey. The leading edge of the owl's flight feathers are serrated like a comb. This feature deadens the sound of their wing beats so their prey can't hear them coming.

Wing and Feather Silhouettes of Raptors



Hawk



Falcon

Owl

Advantages and Disadvantages to Flight

(To be answered on the back of Raptor Wing and Feather Identification Worksheet)

Advantages to Flight for Birds

Some advantages to flight for birds include:

- *Increases the distances that can be travelled.*
- *Provides opportunities to colonize new regions such as islands, that are difficult to get to by land and sea.*
- *It takes less energy and time to reach a destination by flying than by walking.*
- *Flight provides a means of escaping predators or other dangers such as floods and forest fires.*
- *Flight provides a means of locating and seizing prey.*
- *Flight allows for migration which permits the birds to extend their range and occupy additional habitats.*
- *Flight is an efficient way to cover large areas in search of prey.*

Advantages to Flight for Humans

Some advantages to flight for people include:

- *Increases the distances that can be travelled.*
- *Provides opportunities to reach areas which are difficult to get to by land and sea.*
- *It takes less time to reach a destination by flying than by walking.*

Disadvantages to Flight for Birds

Some disadvantages to flight for birds include:

- *During flight, birds can hit human objects and structures in flight such as airplanes, high voltage wires, and buildings.*
- *Poor weather and high winds can affect the ability of a bird to fly.*
- *Flight allows birds to travel greater distances but it also increases the number of hazards the birds come in contact with such as buildings, towers, pollution, habitat removal, disease, and predation.*

Disadvantages to Flight for Humans

Some disadvantages to flight for people include:

- *Planes can hit objects such as birds.*
- *Poor weather such as high winds and ice can affect the ability of planes to fly.*
- *Planes use large amounts of fuel.*
- *The emissions generated by planes contribute to global warming.*
- *Planes sometimes crash.*

File 3:
Raptor Migration

File Summary

This is an opportunity to gain an understanding of why some raptors migrate as well as to examine the advantages and disadvantages of migration.

File Contents

- Background Information
- Instructions
- Presenting Activity
- Suggested References
- *Advantages and Disadvantages of Migration Worksheet*
- *Advantages and Disadvantages of Migration Answer Sheet* (see your teacher)

Materials

Raptor Edu-Kit

- Video: *Eagle Man* - optional (10 minutes)
- Large detailed map of *The Migration Route of the Swainson's Hawk*

Background Information

Migration is the seasonal movement from one region or climate to another for feeding or breeding. In the spring, birds move from their wintering places to their summering or nesting places, and in the fall, they move from their nesting grounds to their wintering places. In North America, birds travel from north to south in winter. Some raptors migrate great distances from their summer ranges in the north to their winter ranges in the south. The Swainson's Hawk, for example, is thought to be the longest migrant in the North American hawk family.

Swainson's hawks fly south to Argentina, a round trip of 17,600 - 27,200 km which is more than half- way around the world. Some raptors only migrate short distances, while others, including many species of owls, don't migrate at all. Bald Eagles, for example, will stay where they are if they have access to open water. However, if the water freezes over, they will fly south or to the nearest coastline. No one is sure how birds navigate during migration, but it is thought that they use a combination of the sun, the wind, the earth's magnetic field, and the landscape below to guide them.

It is thought that the migration of birds (and other animals) is regulated by hormones which in turn are influenced by changes in the hours of sunlight and temperature. Migration is also a response to the fact that many of the prey species that raptors feed on go into hibernation in winter. This means that the birds' food supply is no longer available, and so they must fly elsewhere to get food. They return north in the spring to areas where there is a greater availability of food and where the days are longer in which to gather food for their young. Migration is a behaviour that increases the chances of survival for both the adults and young.

At the end of the breeding season, migrating birds begin to accumulate large amounts of fat under their skin. This fat will give them the energy they need to fly non-stop during the different stages of their migratory journey. The birds will stop at staging or rest areas along the way where they will eat to replenish their fat reserves in preparation for the next part of the journey. Many birds arrive at staging areas exhausted and emaciated. These rest stops are crucial as otherwise birds would not be able to make their annual migrations.

Migrating birds can be exposed to a variety of natural hazards along their routes and at their destinations. A variety of natural hazards and human activities can stop migration, injure, or kill a bird.

Natural hazards include:

- poor weather (high winds, fog, and extreme cold)
- fire

Human activities include:

- extensive logging
- agriculture
- misuse of chemicals
- aircraft
- disturbance of wildlands
- shooting
- high voltage power lines
- high rise buildings
- communication towers

Instructions

1. Read the *Background Information* provided. Watch the video *Eagle Man* (optional - this video explores a scientists' study of eagle migration).

2. On the large map of North and South America provided in the Edu-Kit, there is an arrow showing the migration route of the Swainson's Hawk. Your task is to choose a province in Canada, a state in the United States, a country in Central American, and a country in South America that the line crosses and find out what activities take place in each of those places which could affect the success of the Swainson's Hawk reaching its destination in Argentina. Remember, while there are a variety of human activities taking place along the route that could harm the hawk, there are also a lot of efforts being made to help the hawks and other birds make their migratory journey safely.

3. From the viewpoint of either a scientist tracking the migration of the Swainson's Hawk or the hawk itself, write a story of the migration from Canada to Argentina, describing the route and highlighting the hazards or sanctuaries (safe places) found along the way. Your final story will give readers a clear picture of what a tremendous feat it is for a bird to complete its migratory journey, as well as the advantages and disadvantages of migration.

4. Using the background information provided, as well as the information you gathered while writing your journal, complete the *Advantages and Disadvantages of Migration Worksheet*.

5. Follow the suggested *Presenting Activity* format to ensure that you are prepared to present your findings to the rest of the class.

Presentation Activity

1. Upon completion of the independent study files, each group of students will be given up to twenty minutes to present their findings to the rest of the class. Your group is responsible for the information contained in this file. Prepare a short, informative presentation for the rest of the class.

2. The following is a suggestion for your presentation on *Raptor Migration*.
   a) Show the students the map of North and South America which shows the migration route of the Swainson's Hawk.

   b) Take turns and read your story about this migration.

   c) Describe some of the advantages and disadvantages of migration.

Suggested References

(these can be found in the kit)

Fisher, Chris and John Acorn. **Birds of Alberta**. Edmonton: Lone Pine Publishing, 1998.

National Geographic. **Field Guide to the Birds of North America**. Washington: National Geographic Society, 1999.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. Toronto: Stoddart Publishing Co. Limited, 1997. (Eyewitness Books)

Advantages and Disadvantages of Migration Worksheet

Using the *Background Information* and the suggested references to help you, write a list of three advantages and three disadvantages of migration.

Advantages of Migration

1.

2.

3.

Disadvantages of Migration

1.

2.

3.

Advantages and Disadvantages of Migration Answer Sheet

Using the *Background Information* and the suggested references to help you, write a list of three advantages and three disadvantages of migration.

Advantages of Migration

1. *In the fall, when many prey species go into hibernation, birds can migrate south to areas where food is more plentiful.*

2. *In spring, birds return to areas in the north where food is available once more and where the days are longer. This allows the adult birds more time to gather food for their young.*

3. *Migration allows birds to escape the severe conditions of winter.*

Disadvantages of Migration

1. *Migrating birds can be exposed to a variety of natural hazards (high winds, fog, and extreme cold) along their routes and at their destinations.*

2. *Human activities such as extensive logging, use of chemicals for agriculture, shooting, and structures such as high voltage power lines, high rise buildings, communication towers, aircraft, and communication towers can either stop migration, injure, or kill a bird.*

3. *Migrating birds can be exposed to a variety of altered habitats and conditions. While birds may be able to adapt to some of these conditions, some changes to their habitats may take place so quickly their survival could be in question.*

File 4: Links in the Food Web

File Summary

In *Links in the Food Web*, you will have the opportunity to identify some prey species taken by raptors and discover the role of raptors in the food chain.

File Contents

- Background Information
- Instructions
- Presentation Activity
- Suggested References
- *Links in the Food Web Worksheet*
- *Links in the Food Web Answer Sheet* (see your teacher)

Materials

Raptor Edu-Kit

- a large ball of twine
- 1 set of food web cards and binder clips attached to each one. The cards include:
  - SUN
  - RED-TAILED HAWK
  - GREAT HORNED OWL
  - GOLDEN EAGLE
  - COYOTE
  - SNOWSHOE HARE
  - RICHARDSON GROUND SQUIRREL
  - RED SQUIRREL
  - VOLE
  - DEER MOUSE
  - GARTER SNAKE
  - WOOD FROG
  - ROBIN
  - WREN
  - CHICKADEE
  - GRASSHOPPER
  - MOTH
  - FLY
  - GRASS (3)
  - SEEDS (2)
  - BERRIES (3)
  - TREE BARK AND BUDS (3)

Background Information

In the natural environment, all living things are linked to each other. All energy comes from the sun. Energy from the sun is collected by plants. Energy from plants is passed onto herbivores (animals that eat plants). The energy from plant-eating animals such as deer, hares, and mice is passed onto carnivores (predators such as wolves, eagles, and hawks). This process of energy being passed from the sun to plants to animals is called a food chain. As an example of a food chain, the sun's energy is collected by grass, a mouse eats the grass seeds, and a hawk kills and eats the mouse.

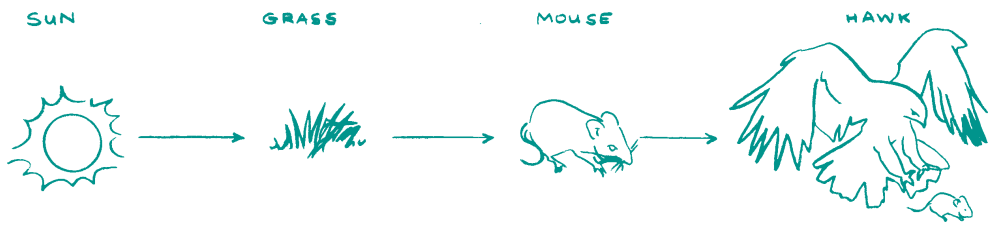
Eventually, when the hawk, mouse, and grass die, their remains become energy for decomposers such as bacteria, worms, and beetles. Energy is used by all living organisms to fuel their life processes. Only a small part of the energy taken in by an animal over its life span is stored; the majority is used by the animal to keep warm and perform bodily functions such as breathing, eating, and moving. For this reason, the energy available to organisms at each successive step of a food chain is always less than the energy taken in by the preceding organism.

Energy, unlike most components in an ecosystem, does not recycle - it simply diminishes with each step in the food chain. Fortunately, with the sun as the ultimate source of energy, there is a considerable amount of energy remaining to fuel the food chains of today and tomorrow.

Like wolves, bears, and cougars, raptors are found at the top of their food chain. They are carnivores which obtain their energy from eating other animals. Different raptors hunt and feed on different kinds of animals. Some raptors will even eat carrion, or meat from animals that are already dead.

Raptors and other predators help to keep the natural world in a dynamic balance. They eat prey species such as insects, mice, voles, ground squirrels, and rabbits which tend to reproduce rapidly. Some of these prey species eat agricultural crops such as grain and by controlling the numbers of these prey, raptors also perform a valuable service to humans. For example, the turkey vulture eats dead animals, and this helps to control blowfly epidemics. The American Kestrel and Burrowing Owl eat grasshoppers and other insects that farmers consider pests. House sparrows, blackbirds, ground squirrels and other birds, mammals and insects that are also considered agricultural pests are also the prey of other raptors.

Nature's balance includes all parts of the ecosystem, and with the disappearance of even one species, the intricate food web could break apart. Conserving habitats and adopting a tolerant attitude towards all living things can help to ensure the health of a ecosystem.

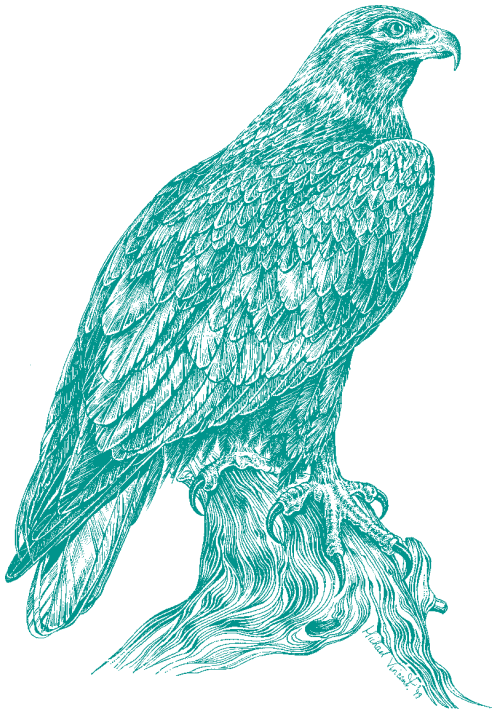


Instructions

1. Read the *Background Information* provided. Using the books listed under *Suggested References* to help you, complete the *Links in the Food Web Worksheet* provided. This will give you an idea of the variety of prey hunted by raptors around the world. A third column has been provided for you to make up some possible food chains using the raptor and prey species listed in your chart. An example is provided for you.

2. You have discovered that raptors from around the world hunt for a variety of prey species. You have used this information to make up some possible food chains which have included those raptors and their prey. From the information you have gathered so far, what do you think would happen to a food chain or a food web if a raptor was eliminated from an ecosystem? Write your thoughts at the bottom of the *Links in the Food Web Worksheet* page.

3. Follow the suggested *Presentation Activity* format to ensure that you are prepared to present your findings to the rest of the class.



Presentation Activity

1. Upon completion of the independent study files, each group of students will be given up to twenty minutes to present their findings to the rest of the class. Your group is responsible for the information contained in this file. Prepare a short and informative presentation for the rest of the class.

2. The following is a suggestion for your presentation on *Links in the Food Web*. This presentation will take the form of an activity which will demonstrate the concept of a food chain how they work together to form a food web.

   The concept of a food chain is a progression of food consumption: a grass seed is eaten by a mouse, the mouse is eaten by a snake, the snake is eaten by a hawk. But snakes are not the only animals interested in mice. A food web shows all of the food connections or relationships in a community or ecosystem. Such a web can be shown by using a string to connect students representing different species in an ecosystem.

   a) Have the class form a circle.

   b) Distribute one food web card to each student in your class and have the students attach their card to the front of their shirt with the binder clip. (Note: There are more producer cards such as grass and seeds because they are in greater abundance)

   c) Give the SUN student the ball of string.

d) Have the student hold onto one end of the string and toss the ball to something in the circle that "feeds on" or needs the sun.
(NOTE: Alternatively, students can sit on the ground and roll the ball of twine between them).

e) Tell the students that they can pass the ball either to an organism that it eats or that it is eaten by (i.e. the hare can toss the ball either to plants or to a coyote). Ask the student who pass the ball to describe their relationship. When a student catches the ball of string have them unravel a few metres of string and grasp the loose string firmly before passing the ball to the next student.

f) Make sure that no organism is left out; eventually all of the students should be holding part of the string. To reinforce the concept of a web, have students continue to pass the ball until it is completely gone.

g) Ask students to note how a web-like pattern results, and how the interdependency joins everyone to the same rope - predators and prey alike.

h) Explain that a food web looks something like a spider's web, and that it is a complex system in which animals can be part of more than one food chain. For example, a hare can be eaten by a red-tailed hawk or a coyote.

i) To illustrate interdependence, have all of the organisms pull gently on their part of the web to take up the slack, and then have the hares drop their part of the rope. Next, have all of the animals who felt a slackening of the rope when this happened to raise their hands. Have these students in turn drop their part of the rope. In a very short time, the rope will be lying on the ground. This exercise illustrates the strong degree of interdependence that exists within a food web.

Discussion

Discuss how humans can influence a food web; for example, if all the chickadees and frogs were poisoned by an insecticide found in the insects they ate what would happen to the rest of the members of the food web? Point out that human activities can cause major changes in the habitat on which wildlife depend, leading to changes in food web relationships.

Suggested References

(these can be found in the kit)

Fisher, Chris and John Acorn. **Birds of Alberta**. Edmonton: Lone Pine Publishing, 1998.

Grambo, Rebecca L. (Ed.) **Eagles, Masters of the Sky**. Vancouver: Raincoast Books, 1997.

Hendrickson, John. **Raptors, Birds of Prey**. Vancouver: Raincoast Books, 1992.

Holroyd, Geoffrey, et al. **A Landowner's Guide to Prairie Raptors**. Canadian Wildlife Service, 1995.

National Geographic. **Field Guide to the Birds of North America**. Washington: National Geographic Society, 1999.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. Toronto: Stoddart Publishing Co. Limited, 1997. (Eyewitness Books).

Links in the Food Web Worksheet

Below is a list of different species of raptor found around the world. Using the Suggested References to help you, write a list of the types of food eaten by these raptors. In the third column, write an example of a food chain which would include a producer, a consumer (one of the prey species listed), and the raptor. An example is provided for you.

Raptor	Prey Species	Food Chain
Swainson's Hawk	*voles, mice, ground squirrels, snakes, small birds, large insects such as grasshoppers*	*grain -> vole -> hawk*
Burrowing Owl		
Martial Eagle		
Osprey		
Gyrfalcon (pronounced Jeer-falcon)		
Secretary Bird		
Turkey Vulture		
Barn Owl		
American Kestrel		
Snail Kite		
Harpy Eagle		
Golden Eagle		

My thoughts: _____

_____

_____

Links in the Food Web Answer Sheet

Below is a list of different species of raptor found around the world. Using the Suggested References to help you, write a list of the types of food eaten by these raptors. In the third column, write an example of a food chain which would include a producer, a consumer (one of the prey species listed), and the raptor.

Raptor	Prey Species	Food Chain
Swainson's Hawk	*voles, mice, groundsquirrels, snakes, small birds, large insects such as grasshoppers*	*grain -> vole -> hawk*
Burrowing Owl	*grasshoppers, beetles, crickets, small rodents, birds, amphibians, reptiles*	*grass -> grasshopper -> owl*
Martial Eagle	*large mammals such as antelopes, jackals, warthogs*	*grass -> antelope -> eagle*
Osprey	*fish*	*plankton -> insect larva -> fish -> osprey*
Gyrfalcon (pronounced jeer-falcon)	*birds, especially waterfowl and ptarmigan*	*pondweed -> duck -> falcon*
Secretary Bird	*snakes, reptiles, rodents, and large insects*	*seeds -> mouse -> snake -> Secretary Bird*
Turkey Vulture	*carrion*	*grass -> deer -> vulture*
Barn Owl	*rats, mice, and other small mammals and birds*	*grain -> mice -> owl*
American Kestrel	*insects, small vertebrates*	*grass -> grasshopper -> kestrel*
Snail Kite	*water snails*	*algae -> snail -> kite*
Harpy Eagle	*monkeys, birds, sloths*	*grass -> monkey -> eagle*
Golden Eagle	*ground squirrels, hares, marmots, grouse, carrion, small goats, sheep, deer*	*roots -> marmot -> eagle*

My thoughts: _____

_____

_____

File 5: Bioaccumulation: It Adds Up

File Summary

In this file, you will learn about some of the risks associated with being at the top of the food chain. The following activity demonstrates how toxins present in the prey are passed on to the predator where they can accumulate.

File Contents

- Background Information
- Instructions
- Presenting Activity
- Suggested References

Materials

Raptor Edu-Kit

- thirty small (30 ml) yogurt containers, each with a hole in the bottom
- three large (900 ml) yogurt containers each with a hole in the bottom
- Resource Materials

Other

- one small bag of sunflower seeds
- three large buckets of water
- markers to indicate the boundaries of the activity

Background

Defining Bioaccumulation

An important process through which chemicals can affect living organisms is *bioaccumulation*. Bioaccumulation means an increase in the concentration of a chemical in a living thing over time, compared to the chemical's concentration in the environment. Compounds accumulate in living forms any time they are absorbed and stored faster than they are broken down or excreted.

Understanding the process of bioaccumulation is very important in protecting human beings and other organisms from the adverse effects of chemicals.

The Bioaccumulation Process – It's only natural

Bioaccumulation is a normal and essential process for the growth and nurturing of organisms. All animals, including humans, are constantly accumulating many vital nutrients, such as vitamins, minerals, fats, and proteins. What concerns scientists is the bioaccumulation of harmful substances to levels in the body that can cause harm. Bioaccumulation is the overall result of consuming, storing and excreting a substance. Determining whether a substance can harm an organism depends on understanding how much is consumed, how much is stored in the body, and how quickly it leaves.

The application of chemicals such as herbicides, insecticides, and fertilizers on crops and forest areas is of particular concern to scientists. Researchers studying the effects of these chemicals pay close attention to their movement through air, water and land. Some chemicals (such as the pesticide DDT) can have serious effects on living things, causing injury and even death to carnivores such as raptors.

If a pesticide or fertilizer is not broken down by the natural systems - they can have an effect on species that were never intended to affect. The process by which chemicals can accumulate follows a step by step movement through natural food chains. As an example, insects, small mammals, birds, and other small animal species that live in and around agricultural land feed on plants which have been sprayed by chemicals. Once eaten, these chemicals may be stored in the body of the animal. If that animal is eaten by a raptor, the chemicals are then stored in the raptor's body. Raptors must consume a large number of prey to survive. Unlike the energy and nutrients they obtain from eating their prey, the chemicals are not used up, and may become concentrated in the raptor's body. This can lead to sickness, sterility, or death.

Some of these chemicals are very persistent in the environment and their effects can be felt long after they have been applied to the crops. Their effects can also be felt in areas far from where they were initially applied. Pesticides enter streams, rivers, ground water, and may get blown by the wind to other areas far from where they were applied.

Some raptors eat fish taken from environments which are contaminated with a variety of household, agricultural, and industrial chemicals. Many of these chemicals are passed along the food chain and may concentrate in the bodies of raptors. They may also cause sterility, sickness, or even death.

Presentation Activity

Time Required
Twenty minutes

Group Size
One class

Setting
Outside

Instructions
- one player is a vulture (scavenger) and needs a large yogurt container with a hole in the bottom
- one player is a hawk and needs a large yogurt container with a hole in the bottom
- one player is a falcon and needs a large yogurt container with a hole in the bottom
- all other players are prey and they each need a small yogurt container with a hole in the bottom

Gather together the materials needed for the activity (bucket of water, sunflower seeds, small and large plastic containers, and markers to indicate the boundaries of the activity).

Invite the students to go outside to demonstrate how toxins can be passed along when a predator eats. Move outside and play the activity with the class.

1. The activity is played in a circular playing area approximately thirty metres in diameter.

2. Clearly mark off the boundaries of the playing area with markers.

3. Place the three large buckets of water in the centre of the play area. Add a handful of sunflower seeds to each bucket. Explain to the players that the water in the bucket represents energy and the sunflower seeds floating in the water represent toxins in the environment. Energy is passed from prey to predator. Both prey and predator use energy for bodily functions. This energy use is represented by the water dripping out of the containers. Toxins, however, stay in the body where they accumulate as represented by the sunflower seeds.

4. Assign three students to be the raptors.
   - vulture (scavenger)
   - hawk
   - falcon

   Give them each one of the larger yogurt containers. Everyone else is prey. Give each of them one of the smaller yogurt containers.

5. Explain the rules of the activity:

   The Prey

   The challenge of each of the prey is to go to one of the buckets and scoop up some water in their yogurt container without getting tagged by one of the raptors.

   Before all the water has trickled out of the holes in the bottom of their container, the prey must return to the bucket for a refill of water.

   If they run out of water before getting back to the bucket, then they stop where they are (die) and they must sit down and wait to be "eaten" by the scavenger.

   When approached by the scavenger, they tip their sunflower seeds into the scavenger's container and then go and stand outside the boundary of the activity area.

   Each time they scoop up some water, they will probably (but not necessarily) scoop up some sunflower seeds. Each time they get more water, they will collect more sunflower seeds in their container.

   If they are tagged by a raptor, they tip their water (energy) and sunflower seeds (toxins) into the raptor's container and then go and stand outside the boundary of the activity area.

   The prey continue filling up their containers until they are caught, die, or until the activity is over.

The Hawk and Falcon

The players representing the hawk and falcon try to catch the prey species. When they do, they tip the prey's water (energy) and sunflower seeds (toxins) into their container and keep playing. If a hawk or falcon runs out of water, they 'die' and must sit down and wait to be eaten by the scavenger. When approached by the scavenger, the raptor tips his sunflower seeds into the scavenger's container and then goes and stands outside the boundary of the activity area. The hawk and falcon continue trying to catch prey until they die or the prey are all caught.

The Vulture

The player representing the vulture moves through the activity area looking for 'dead' prey or other raptors who can be found sitting on the ground. The dead prey tip their sunflower seeds into the vulture's container and keeps looking for more food. If the vulture runs out of water, then it also must go and stand outside the boundary of the activity.

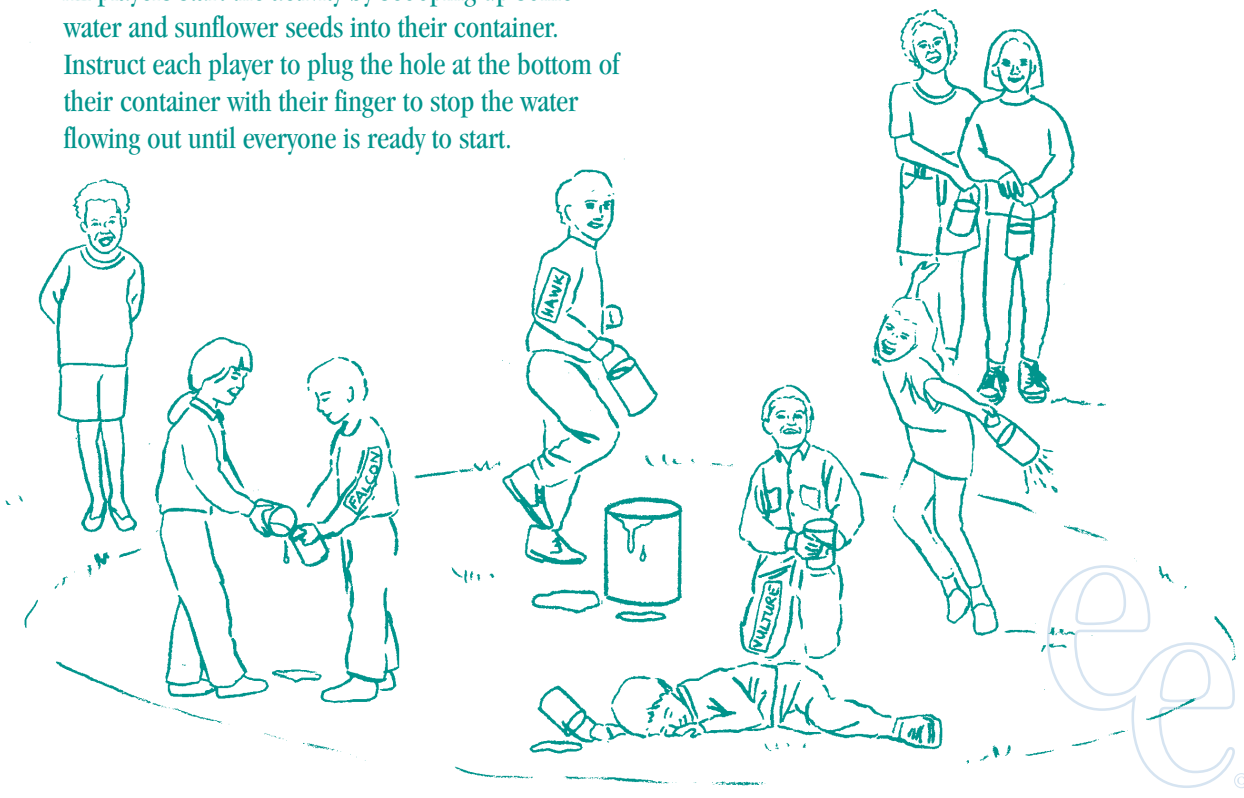
Start the Activity

All players start the activity by scooping up some water and sunflower seeds into their container. Instruct each player to plug the hole at the bottom of their container with their finger to stop the water flowing out until everyone is ready to start.

Tell all the players that the activity will begin when everyone has filled their container. When you say GO! , each player will unplug the hole at the bottom of their container and place their hand over the top of their container to prevent the water and sunflower seeds from spilling out as they run. The prey then try to avoid the raptors while still keeping their containers full. The raptors try to catch the prey. The vulture searches for 'dead' animals.

Stop the Activity

After five minutes of play, gather all the players together. Invite them to look into the raptors' containers. How many sunflower seeds are in each container? Explain that in real life, raptors eat a variety of prey species, some of which may have some toxins accumulated in their bodies. Over time, these toxins concentrate in the bodies of the raptors. Certain levels of toxins result in sickness, sterility (they can't reproduce), or death of the raptor.



Play the Game A Second Time

Now that all the players know what to do, play the game again. You may wish to give three other players the chance to be raptors. After five minutes of play, see how many sunflower seeds have been collected by the raptors.

6. Return to the classroom and ask the students the following questions:
   a) What did the game tell you about how toxins move through the food chain?

   b) Were you surprised by the number of sunflower seeds that accumulated in the raptors' containers?

   c) Sometimes they scooped up sunflower seeds with the water and sometimes they didn't. Was this activity a good representation of what happens in real life?

   d) Explain to the class how prey species might be exposed to toxins in their environment and how these toxins can be passed along to raptors when they eat the prey species.

   e) Ask the students what they think might happen to a food chain or a food web if the raptor was eliminated?

Suggested References

(these can be found in the kit)

Fisher, Chris and John Acorn. **Birds of Alberta**. Edmonton: Lone Pine Publishing, 1998.

Grambo, Rebecca L. (Ed.) **Eagles, Masters of the Sky**. Vancouver: Raincoast Books, 1997.

Hendrickson, John. **Raptors, Birds of Prey**. Vancouver: Raincoast Books, 1992.

Holroyd, Geoffrey, et al. **A Landowner's Guide to Prairie Raptors**. Canadian Wildlife Service, 1995.

National Geographic. **Field Guide to the Birds of North America**. Washington: National Geographic Society, 1999.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. Toronto: Stoddart Publishing Co. Limited, 1997. (Eyewitness Books).

File 6: Habitats At Risk

File Summary

In this activity, you will identify the habitats used by raptors and some of the challenges these birds face in sharing their homes with humans.

File Contents

- Background Information
- Instructions
- Presentation Activity
- Suggested References
- *Raptor Range Worksheet*
- *Raptor Range Worksheet* (Sample of Completed Worksheet)
- *Map of North and South America*

Materials

Raptor Edu-Kit

- Transparency Map of Vegetation Zones in North and South America
- Transparency Map of Human Population Distribution in North and South America
- Transparency Map of Landforms in North and South America
- Transparency Map of Types of Trees in North and South America
- Transparency Map of Farming in North and South America

Other

- Overhead Projector

Background Information

In Alberta, birds of prey are protected by the Alberta Wildlife Act and this legislation protects raptors from being killed or harassed by humans. However, the protection of individuals does not necessarily ensure the survival of a species. Like all wildlife, raptors require suitable habitat in which to nest and feed. When this habitat is removed or substantially altered, raptors must try to find other suitable habitat - that may already be occupied. Since a habitat can only support a certain number of raptors, some will not survive. Reduction in suitable habitat largely occurs because of human activities such as urban, industrial, agricultural, and forestry developments. These activities have been identified as important causes of declines in raptor populations not only in Alberta, but in the rest of the world as well.

The alteration of suitable and secure habitat is the greatest threat facing many species. Because many raptors live in different parts of the world at different times of the year, their requirements for habitat in order to survive are truly reflective of the way habitats need to be managed - globally.

As an example, you learned in the video *Twixt Heaven and Earth* raptors such as the Swainson's Hawk live part of the year in the Canadian Grasslands and then travel thousands of kilometres to live in the Grasslands of South America. Altering the landscape for farming, the use of pesticides, and reductions of their food sources in both North and South America are contributing on a global scale a reduction in the numbers of this species. In order for the Swainson's Hawk to survive, the habitat in throughout its entire range must be secure and suitable. Thus, consistent and careful management of these landscapes by the public, landowners, scientists, pesticide manufacturers, and governments in both North and South America is an important part of ensuring the long-term survival of raptors such as the Swainson's Hawk.

In addition to having suitable and secure habitat upon arrival at their final destinations, raptors also require similar areas along their migration to rest and recover during their flight. Having healthy and safe places that lie along a flight-path can help to ensure safe travel between winter and summer ranges. The long-term survival of far ranging species such as raptors depends on strategies that provide protection of habitat over a large and connected network of suitable areas.

Currently in Alberta, there are many initiatives that work to provide habitat for species including the *Buck for Wildlife Program* of the Alberta Environment Fish and Wildlife Management Division. This program provides habitat for game species, raptors, and other non-game wildlife. Programs for hawks and eagles have increased the number of nesting sites through the buidling of nest platforms and development of nesting habitat. For more information on other agencies involved with habitat conservation for raptors, refer to the list at the back of the *Raptor Edu-Kit Activity Guide*.

Classifying our Wildlife: Who's at risk?

Part of the effort to manage all wildlife in Alberta including raptors involves using a classification system that determines their status. To find the status of Alberta's raptors, go the following Website: (www.gov.ab.ca/env/fw/status/index.html).

To find the status of wildlife (including raptors) in Canada go to the following Website: (www.cosewic.gc.ca).

Instructions

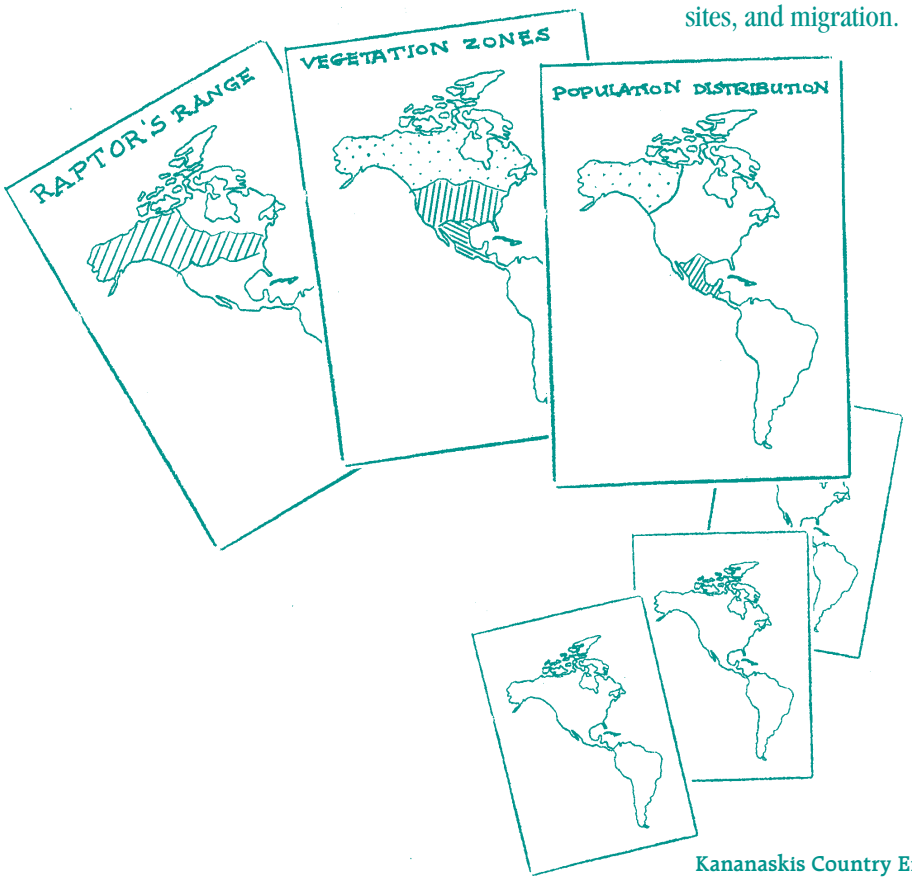
1. Read the *Background Information* provided. Choose one Alberta raptor from the *Student Field Guide for Raptors* that your class made in Part I. Or, visit the Alberta Environment Fish and Wildlife *Status of Alberta's Wildlife Report* at www.gov.ab.ca/env/fw/status/status.html and select an Alberta raptor from there.

   Look up your raptor in one of the bird identification books listed under *Suggested References*. Research the bird's range and habitat (where it nests, what it eats, where it spends the winter, etc.). Fill in the top section of the *Raptor Range Worksheet* provided. An example of a completed *Raptor Range Worksheet* is provided.

2. Using the range description in one of the bird identification books as a guide, sketch the range of your raptor by colouring the *Map of North and South America* provided. Title your map 'The Range of The _____' (raptor name). Note: a map showing what the range map symbols indicate can be found at the beginning of the bird book resurces found in the Edu-Kit.

3. Place the transparency map showing vegetation zones over your range map. Write a list of the vegetation zones covered by your bird's range in the spaces provided on the *Raptor Range Worksheet*.

4. Place each of the other transparencies showing human population distribution, landforms, tree types and tree harvesting, and farming in North and South America <u>one at a time</u> over your range map. As you do so, make notes on what natural features and human activities might affect the survival of your raptor and influence its food supply, habitat, nesting sites, and migration.



5. Follow the suggested *Presentation Activity* format to ensure that you are prepared to present your findings to the rest of the class.

Presentation Activity

1. Upon completion of the independent study files, each group of students will be given up to twenty minutes to present their findings to the rest of the class. Your group is responsible for the information contained in this file. Prepare a short, informative presentation for the rest of the class.

2. The following is a suggestion for your presentation on *Habitats at Risk*:

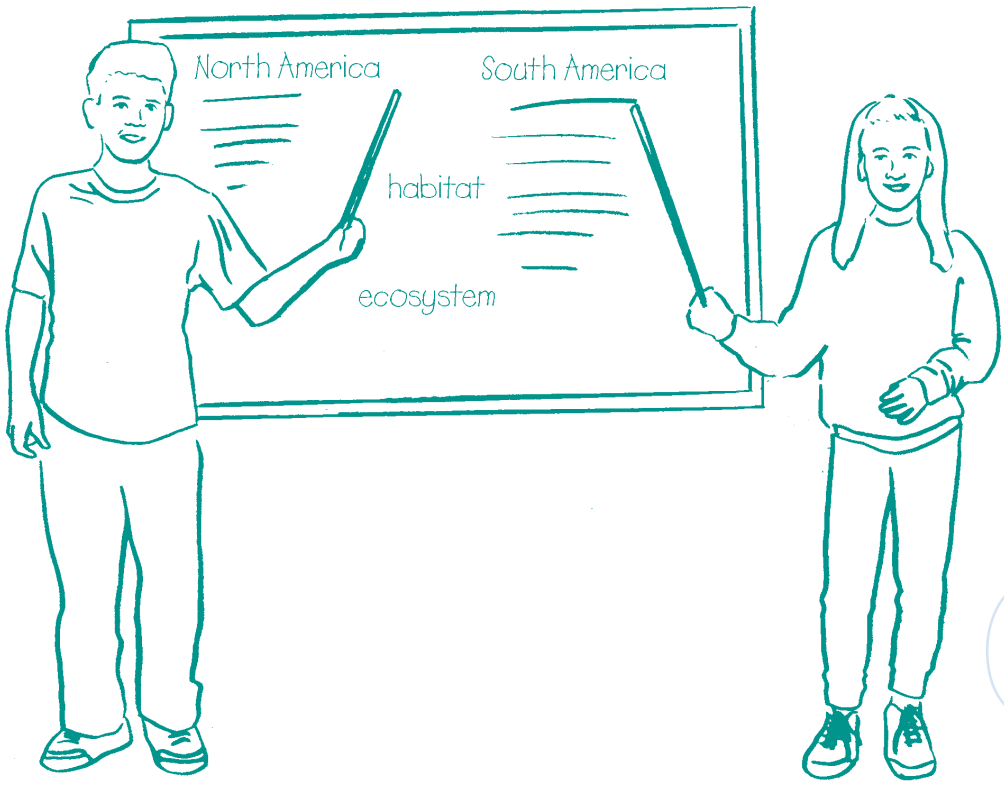
    a) Define the words *ecosystem* and *habitat* giving examples of each.

    b) Describe your raptor and it's status from the Alberta Fish and Wildlife's *Status of Alberta's Wildlife Report*. Explain what the status designation means.

    c) Show the class the map of vegetation zones from North to South America on an overhead projector and how the range of your chosen raptor overlaps them.

    d) List the threats you identified as having an effect on your chosen raptor as it journeys from one end of its range to another by indicating areas of human activity such farming, major cities, etc.

    e) Summarize your findings. Discuss why you think you couldn't find some of the information needed to complete your worksheet. What does this tell us about our knowledge of raptors?



Suggested References

(these can be found in the kit)

Alberta Forestry, Lands, and Wildlife. **Alberta's Threatened Wildlife, Burrowing Owl.** 1990.

Alberta Forestry, Lands, and Wildlife. **Alberta's Threatened Wildlife, Ferruginous Hawk**. 1990.

Alberta Forestry, Lands, and Wildlife. **Alberta's Threatened Wildlife, Peregrine Falcon**. 1990. Alberta Wildlife Management Division.

The Status of Alberta Wildlife. Alberta Environmental Protection, Natural Resources Service. Edmonton: 1996.

Alberta Wildlife Management Division. **Status of the Burrowing Owl (Speotyto cunicularia hypugaea in Alberta**. Alberta Environmental Protection, Natural Resources Service. Edmonton: 1996.

Axia Multimedia Corporation. **Know Your Owls**. Birds of Prey Volume One. Calgary: Axia Multimedia Corporation, 1994. Interactive Multimedia CD-ROM.

Axia Multimedia Corporation. **Birds of Prey, Vultures to Falcons**. Birds of Prey Volume Two. Calgary: Axia Multimedia Corporation, 1994. Interactive Multimedia CD-ROM.

Fisher, Chris and John Acorn. **Birds of Alberta**. Edmonton: Lone Pine Publishing, 1998.

Hendrickson, John. **Raptors, Birds of Prey**. Vancouver: Raincoast Books, 1992.

Holroyd, Geoffrey, et al. **A Landowner's Guide to Prairie Raptors**. Canadian Wildlife Service, 1995.

National Geographic. **Field Guide to the Birds of North America**. Washington: National Geographic Society, 1999.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. Toronto: Stoddart Publishing Co. Limited, 1997. (Eyewitness Books)

Sattler, Helen R. **The Book of North American Owls**. New York: Clarion Books, 1995.

Raptor Range Worksheet

Name of Bird: _____

Range: _____

Habitat: _____

Wintering Location: _____

Location of Nests: _____

Food: _____

Name of Ecosystem or Vegetation Zone For:	Natural hazards or human activities that might affect the raptor's food supply, habitat, nesting sites, and migration.
Summer or Breeding Area	
Migration Route	
Wintering Area	

Raptor Range Worksheet (Sample of Completed Worksheet)

Name of Bird: *Flammulated Owl (This is not an Alberta Species but is provided as an example only.)*

Range: *Breeds from Southern British Columbia south through the mountains west of the Great Plains to the highlands of Mexico and Guatemala.*

Habitat: *Live at lower elevations in mature, old growth Ponderosa Pine and Douglas Fir forests.*

Winter Location: *Northern populations migrate south all the way to Mexico and Guatemala while more southerly populations don't migrate, but rather overwinter in their breeding range.*

Location of Nests: *Nests in a woodpecker hole or a similar tree cavity.*

Food: *They are mostly insectivorous, eating moths, beetles, grasshoppers, and other small invertebrates.*

Name of Ecosystem or Vegetation Zone For:	Natural hazards or human activities that might affect the raptor's food supply, habitat, nesting sites, and migration.
Summer or Breeding Area *Mixed Coniferous Forests*	*In British Columbia, the habitat is affected by logging in the forests used by the owls. Clearing and building of human dwellings is removing habitat. Chemical insecticides used on the spruce budworms is affecting the food and health of these insectivorous owls.*
Migration Route *Mountains* *The Flammulated Owl's migration route to the south follows along the Rocky Mountains.*	*Forest fires, use of pesticides, logging, agriculture, elimination of forests.*
Wintering Area *Tropical* *Spends the winter in central and southern Mexico, and as far south as Guatemala, Honduras, and El Salvador.*	*Elimination of habitat due to logging, agriculture, building. Use of pesticides.*

Map of North and South America

File 7: Raptors in Our Culture

File Summary

In this activity, you will have the opportunity to discover some of the ways people have viewed raptors in stories, legends, music, art, and religion. You will also learn how your classmates feel about raptors after they have learned more about them.

File Contents

- Background Information
- Instructions
- Presentation Activity
- Suggested References
- *Raptors in Our Culture Worksheet*
- *Raptors in Our Culture Answer Sheet* (see your teacher)

Materials

Raptor Edu-kit

- none

Other

- class set of small, coloured recipe cards or small pieces of paper 5" x 3" (12.5 cm x 7.5 cm) (to be supplied by the teacher)
- books about wildlife artists, native art, and mythology from the school library
- the cards collected by the teacher from step 3 *Part I - What is a Raptor?*
- large pieces of flip chart paper

Background Information

People all over the world have been fascinated by birds of prey. Images of these birds have been portrayed by artists from ancient times to today. Birds of prey are also featured in stories, myths, songs, literature, and legends around the world. People dress up as birds of prey or use their feathers or images for decorative purposes. People have invented a variety of flying machines, some simple and some as sophisticated as warplanes, all designed to imitate the flight of raptors.

Raptors, particularly falcons, were originally caught and trained to catch food for people. Today, they are kept by falconers around the world for sport. Eagles have long been associated with strength and power. Owls are thought to be wise but are also associated with death or misfortune. Long ago, vultures were revered by people living in places such as Egypt, Central America, and the North American west coast. While some people look upon birds of prey with respect and work to protect them, others do not hold this point of view.

Instructions

1. Read the *Background Information* provided.

2. Collect the cards your class made in *Part 1 - What is a Raptor?* from the teacher.

3. Hand out a coloured piece of paper to each student in the class and ask them to write down five thoughts and emotions that come to mind when they think of raptors now that they have learned more about them. Remind them not to put their names on their pieces of paper.

4. Draw a line down the middle of a piece of flip chart paper. In one column under the heading *Before* write a list of the words the students used to express their thoughts and emotions about raptors at the beginning of the unit. In the other column under the heading *After* write a list of the words the students used to express their thoughts and emotions about raptors after their studies on raptors. Use the two lists to answer the following questions:

   Write your questions with the answers on another flip chart page.
   a) How are the lists the same or different?
   b) What was the general feeling in the class before and after their studies on raptors? Are there any strong differences in opinion?
   c) What conclusions would you draw from your findings? Did students' opinions differ after they learned more about raptors?

5. Using the references listed under *Suggested References,* as well as additional books suggested under *Supplementary Materials* to help you, complete the *Raptors in Our Culture Worksheet* provided. In this worksheet, you are asked to look at how raptors have been viewed by different cultures over time.

6. Follow the suggested *Presentation Activity* format to ensure that you are prepared to present your findings to the rest of the class.

"I have brought the ways of eternity
to the twilight of the morning.
I am unique in my flight."

(Words of an Egyptian Falcon God from an ancient text)

Presentation Activity

1. Upon completion of the independent study files, each group of students will be given up to twenty minutes to present their findings to the rest of the class. Your group is responsible for the information contained in this file. Prepare a short, informative presentation for the rest of the class.

2. The following is a suggestion for your presentation on *Raptors in Our Culture*.
   a) Discuss your findings and conclusions about the students' perceptions of raptors before and after they learned more about them.

   b) Share your findings recorded on the *Raptors in Our Culture Worksheet*.

   c) Share examples of stories, poems, and artworks of a raptor that you particularly liked.

Suggested References

(these can be found in Kit)

Fisher, Chris and John Acorn. **Birds of Alberta**. Edmonton: Lone Pine Publishing, 1998.

Grady, Wayne. **Vulture, Nature's Ghastly Gourmet**. Vancouver: Greystone Books, 1997.

Grambo, Rebecca L.(ed). **Eagles, Masters of the Sky**. Vancouver: Raincoast Books, 1997.

Lawrence, R.D. **Owls, The Silent Flyers**. Buffalo, New York: Firefly Books, Inc., 1997.

National Geographic. **Field Guide to the Birds of North America**. Washington: National Geographic Society, 1999.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. Toronto: Stoddart Publishing Co. Limited, 1997. (Eyewitness Books)

Raptors in Our Culture Worksheet

Using the resource materials listed under *Suggested References* and *Supplementary Materials*, answer the following questions. As you will be sharing this information with the rest of your class, transfer your final answers to large sheets of flip chart paper.

1. What stories, legends, myths, and songs have been told about raptors in ancient and modern times. Choose one story and retell it in your own words.

2. How have people used raptors in ceremony or religion around the world?

3. How have people represented raptors in art? Find pictures showing examples of raptors in art. Chose one or two examples that you particularly like and redraw them here.

4. What other uses do people have for raptors around the world?

Raptors in Our Culture Answer Sheet

Using the resource materials listed under *Suggested References* and *Supplementary Materials*, answer the following questions. As you will be sharing this information with the rest of your class, transfer your final answers to large sheets of flip chart paper.

1. What stories, legends, myths, and songs have been told about raptors in ancient and modern times. Choose a story and retell it in your own words.
   - *The goddess of ancient Upper Egypt was called Nekhbet. Her sacred animal was the vulture and she was sometimes portrayed with the bald head of a vulture.*
   - *In Hindu mythology, vultures are known as the gatekeepers of hell. Tales of the Arabian Nights tells of a great bird called the Roc.*
   - *A great bird appears in many native cultures around the world from Brazil to the Cook Islands to Africa. In some North American native cultures, this great bird is called the Thunderbird, in Central America it is known as the Voc. Some West Coast Native groups tell stories of how the eagle created the land and the humans living on it. Many native legends tell of how the owl came to fly at night and have such large eyes.*
   - *In Africa, there is a Zulu tale called the King of Birds in which Nkwazi, the fish eagle, Khova, the Eagle Owl, and Ngquithi, the Kori Buzzard have a competition to decide which is the king of birds.*
   - *In Europe, vultures symbolized the outcome of war.*
   - *Ancient Greeks told how the eagle was the messenger of the god Zeus. In a Greek legend, Prometheus brought fire from the Gods to man. He was punished for this deed by being tied to a rock and visited by an eagle who ate his liver which grew back each day. Norse legends tell of the giant Hraesvelgr who in the form of an eagle, flapped his wings and caused the winds to blow.*
   - *In Haiti, there is a story about the Owl who thinks he is ugly and only goes out at night when no one can see him.*
   - *When an aboriginal person in Australia was to become a medicine-man, his spirit was taken from his body many times and changed into the form of an eagle-hawk. This eagle-hawk was taken into the sky where it was taught the ways of a medicine-man.*

2. How have people used raptors in ceremony or religion around the world?
   - *The goddess of ancient Upper Egypt was Nekhbet whose sacred animal was the vulture. Temples devoted to the worship of Nekhbet were often decorated with images of the Egyptian Vulture with their wings spread to protect the way into the temple's inner sanctuary. Also in Egypt, falcons were often mummified and buried in tombs with kings as the falcon represented strength, victory, and authority.*
   - *Eagles were often associated with the military and their image has been used by people around the world as imperial symbols. Today, the national bird of the United States is the Bald Eagle.*

2.../ Continued

- *The owl was the symbol of Athena, the Greek goddess of wisdom. Some owls have the genus name Athene.*
- *In Asiatic fables, they tell of Garuda, the god of the sky who bore the sun on his wings. His image can be found in different forms all across Asia.*
- *The eagle was a sacred symbol to the Greek god, Zeus. Zeus would change himself into the form of an eagle to control the lightning and thunder.*
- *In many North American native cultures, eagles and their feathers were important in many ceremonies. Head dresses and fans made with eagle feathers were and still are used to honour the eagle in traditional native dances.*
- *The Hopi Indians of the American Southwest made Kachina dolls to symbolize the Spirit of the Owl.*

3. How have people represented raptors in art? Find pictures showing examples of raptors in art. Chose one or two examples you particularly like.
   - *The goddess of ancient Upper Egypt was Nekhbet whose sacred animal was the vulture. The hieroglyph for Nekhbet was a vulture. In art, she is shown wearing a head-dress fringed with vulture feathers. In Egypt, there was also a falcon-headed god called Horus which meant 'lofty one'. Falcons were mummified and buried in tombs with kings.*
   - *The owl was the symbol of Athena, the Greek goddess of wisdom. Some owls have the genus name Athene.*
   - *In all parts of the world, owls and other raptors are depicted in paintings, pottery, sculpture, relief, and in jewellery.*
   - *In North American native cultures, raptors, especially eagles, were and still are depicted in sculpture (Inuit), carvings (west coast native art), jewellery, prints, and paintings.*
   - *In more recent times, artists such as John James Audubon, J. Fenwick Lansdowne, and Robert Bateman have painted pictures of raptors.*

4. What other uses do people have for raptors around the world?
   - *In Ancient Egypt, falcons were mummified and buried in tombs with kings.*
   - *In many parts of the world, falcons were caught and trained to hunt for food for people. Now they are trained for the sport of falconry.*
   - *In North America, native people collected eagle feathers for ceremonial purposes.*
   - *Settlers in North America shot migrating raptors for sport.*
   - *In parts of the world, including Europe and Asia, some people believe that owl eyes hold magical properties that can cure many diseases when dried and ground up into a powder. Owl feathers and beaks are thought to ward off evil, and owl feet are sold as curios.*
   - *The names of raptors have been used to name things such as cars (the Eagle, Thunderbird, Falcon, Firebird), rock groups (the Eagles), and sports teams (the Winter Hawks).*
   - *The Provincial bird of Alberta is the Great Horned Owl.*
     The Provincial bird of Manitoba is the Great Grey Owl.
     The Provincial bird of Nova Scotia is the Osprey.
     The Provincial bird of Quebec is the Snowy Owl.
     The Territorial bird of the Northwest Territories is the Gyrfalcon.
     (Other provinces and territories have provincial birds that are not raptors)

File 8: Living With Raptors

File Summary

In this activity, you will have the opportunity to identify the economic, ecological, scientific, ethical, and spiritual importance of raptors.

File Contents

- Background Information
- Instructions
- Presentation Activity
- Suggested References
- *Living with Raptors Worksheet*
- *Living with Raptors Answer Sheet* (see your teacher)
- *Interest Group Cards*

Materials

Raptor Edu-Kit

- resource library
- *Twixt Heaven and Earth* video

Background Information

The following is based on an article entitled *Benefits of Biodiversity* found at the website *Living Landscapes, Thompson-Okanagan, Past, Present, and Future.* The site address is:
www.royal.okanagan.bc.ca/mpidwirn/plantsandanimals/plantsandanimals.html

Biodiversity

Biodiversity describes the diversity or variety of life on Earth. Individuals and groups have determined that there are three reasons for preserving biodiversity: for its economic importance, for its ecological and scientific importance, and for its ethical and spiritual importance.

Some important economic reasons for protecting plants and animals include their use as food, medicine, industrial products, or for tourism and recreation. Many, however, agree that if humans decide to preserve a species based on its economic value only, then it is likely that species will continue to disappear.

In the case of raptors, they have a different relationships with humans in different parts of the world. In Canada, for example, the main economic value of raptors is their value in the tourist industry. Thousands of tourists are attracted to areas on the west coast where eagles congregate during the salmon runs in the fall. Birdwatchers gather along flyways to watch thousands of raptors migrate in the spring and fall. The Eagle Festival in Canmore, Alberta is an example of such an event.

In addition to being a popular attraction for tourism, in some parts of the world raptors are also used for medicinal and religious purposes. Their talons, feathers, and heads are considered powerful forms of treatment for illnesses and important ceremonial pieces.

Beyond the ways humans use living things, biodiversity is also of ecological and scientific importance as each species of plant and animal gives scientists information about how life evolved - and how it continues to evolve on Earth. A diversity of life also helps scientists understand how life functions and understand the role of each species in sustaining ecosystems.

In the case of raptors, they help control populations of animals such as grasshoppers and mice which people consider agricultural pests. These functions are important to the ecosystem and therefore to our survival. It has been found that the more diverse an ecosystem is, the better it can withstand environmental stress. When a species is lost, it is difficult to predict how the whole system will be affected.

Biodiversity is also important for ethical and spiritual reasons. Ethical or moral considerations depend upon how humans view themselves in relation to the rest of the living world. However, because we know all things are connected, we can assume the consequences of changing an area's biodiversity could be quite significant. The biodiversity of an area is a part of many cultures' spiritual heritage. For example, many people feel a sense of peace or exhilaration when they see a raptor soaring overhead.

"...when we are considering whether or not to preserve an endangered species ... we must not ask how useful or beneficial that species is to us, or to other species that are beneficial to us, or even how that particular species fits into the complex ecological web of interspecies relationships, which includes us. All we really need to know about a species is that it exists."

- From Vulture, Nature's Ghastly Gourmet

Instructions

1. Read the *Background Information* provided which describes the reasons why raptors are important. In this activity, you will be examining some of the roles played by raptors in their ecosystem and developing your own conclusions about the importance and value of raptors.

2. Watch the video entitled *Twixt Heaven and Earth* if you have not already done so. On the *Living with Raptors Worksheet* provided, record examples showing the value of the Swainson's Hawk in the different ecosystems it visits. Using the books listed under *Suggested References* find five other examples of the role of raptors in their environment. Record your answers on the worksheet. Remember to examine the role of different types of raptors including osprey, vultures, falcons, eagles, hawks, and owls.

3. Not everyone wants to protect raptors. Some think raptors are pests and want them eliminated. Using the same references listed under *Suggested References*, find examples of reasons why people might take this stand. Record your findings on the *Living with Raptors Worksheet*.

4. After watching the video, reading the background information and finding out about some of the different roles raptors play in their ecosystems write a paragraph on the value you place on raptors. Why do you think we need or don't need raptors?

5. Follow the suggested *Presentation Activity* format to ensure that you are prepared to present your findings to the rest of the class.

Presentation Activity

1. Upon completion of the independent study files, each group of students will be given up to twenty minutes to present their findings to the rest of the class. Your group is responsible for the information contained in this file. Prepare a short and informative presentation for the rest of the class.

2. The following is a suggestion for your presentation on *Living with Raptors?* You will be facilitating an activity in which the students will represent different interest groups which will discuss the issue: *Should we take measures to ensure the long-term health and sustainability of raptors?*

   a) Your group will take the role of government (Interest Group #6) and will act as the facilitator.

   b) Divide the rest of the class into groups of four or five.

   c) Tell the class they will be discussing the question: *Should we take measures to ensure the long-term health and sustainability of raptors?* Each interest group has a goal in mind that they want to meet and these are written on the interest group cards.

   d) Photocopy and cut out each of the six interest group cards. Give each group a different interest group card. Each card includes statements which can be used by the groups to start them in their discussions.

   e) Give the groups ten minutes to discuss among themselves how their interest group will deal with the question while insuring that their individual goals are met. Each group must generate ideas and information. Each group member is to keep a record of these ideas.

   f) After ten minutes, ask the groups to summarize their ideas. Tell them they will each be presenting their summary. Ensure that each member of each group understands the ideas.

   g) After five more minutes, bring the group discussions to an end.

   h) Now have each member of each group number count off. For example, if there are five people in the group, have them number off 1, 2, 3, 4, and 5.

   i) Ask all the number one's to go to a specific spot in the classroom. Number two's go to another spot, etc.

   j) Once all the new groups are assembled, explain to them that each person in the group is to present the ideas that were generated in their first group. Give each person two minutes to present their ideas to their new group.

   k) Once each member of the new group has presented their ideas, have the group work together to come up with an answer or answers to the question: *Should we take measures to ensure the long-term health and sustainability of raptors?* While coming up with the answer(s), groups can address these questions on the next page:

l) Can we have raptors and still provide for our needs of food and forest products?

m) What three steps do you think should be taken to ensure the long-term sustainability of raptor populations?

n) Name one change or compromise each agency is willing to make to ensure the sustainability of raptor populations.

o) What information do we need to collect to help us meet our goal? The solution(s)to the question should be reached by consensus, in which all members of the group agree.

p) After five to ten more minutes, have each group present their final solution(s) to the issue.

q) After the group presentations, invite the class to discuss the process and the solutions the different groups came up with. You will act as the facilitator of this discussion.

q) As a final wrap-up to the discussions, describe some of your findings about *living with raptors.*

Suggested References

(these can be found in the Kit)

Canadian Wildlife Service. **The Benefits of Wildlife**. Ottawa: Canadian Wildlife Service, 1995.

Canadian Wildlife Service. **Biodiversity**. Ottawa: Canadian Wildlife Service, 1995

Grady, Wayne. **Vulture, Nature's Ghastly Gourmet**. Vancouver: Greystone Books, 1997.

Holroyd, Geoffrey, et al. **A Landowner's Guide to Prairie Raptors**. Canadian Wildlife Service, 1995.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. Toronto: Stoddart Publishing Co. Limited, 1997. (Eyewitness Books)

Living With Raptors Worksheet

In the space below, record at least five examples of raptors and the role they play in their environment. Remember to examine the role of different types of raptors including ospreys, vultures, falcons, eagles, hawks, and owls.

In the space below, record at least three examples where raptors have been viewed as pests to be eliminated.

Write a paragraph that outlines the value you place on raptors.

Living With Raptors Answer Sheet

In the space below, record at least five examples of raptors and the role they play in their environment. Remember to examine the role of different types of raptors including ospreys, vultures, falcons, eagles, hawks, and owls.

- *One pair of Ferruginous Hawks will kill an estimated 480 ground squirrels in one summer while raising its young. Ground squirrels eat farmer's grain and their burrow holes can hurt livestock if the livestock stumbles into the hole. Raptors control ground squirrel populations.*
- *Burrowing Owls live in holes made by badgers and ground squirrels. As land is cleared for agriculture, these holes are plowed up. Burrowing Owls eat mice, insects (primarily grasshoppers), small birds, amphibians, and snakes. Mice, insects, and small birds feed on crops and thus Burrowing Owls provide a valuable service in helping to control populations of these animals.*
- *The American Kestrel feeds on grasshoppers, dragonflies, and mice; animals which compete with farmers for grass, grain, and other agricultural crops.*
- *Short-eared owls fly over fields looking for small mammals (such as voles), small birds, insects, and amphibians.*
- *Bald Eagles are scavengers that feed on dead fish and animals they find. They also catch live prey such as fish and ducks.*

In the space below, record at least three examples where raptors have been viewed as pests to be eliminated.

- *Populations of Peregrine Falcons that were on the brink of extinction are starting to increase their numbers in many parts of the world. Not all people are happy about this. For example, in California, several peregrine falcons have been shot and in one instance a pigeon keeper was convicted and fined. Peregrine falcons eat birds and the pigeon keeper was protecting his birds.*
- *During World War II, the British shot Peregrine Falcons to protect their carrier pigeons which were used for sending military messages.*
- *Sharp-shinned hawks were once hunted because they preyed upon song birds.*
- *Farmers and ranchers all over the world may kill a large raptor they find feeding on dead livestock. The landowner assumes the raptor has killed the livestock when often the raptor is scavenging on an animal that was already dead.*

Write a paragraph that outlines the value you place on raptors.

- *Answers will vary.*

Interest Group Cards

(Photocopy, cut out, and hand one card to each group)

Interest Group #1 - Scientists

Goal: *We want to provide accurate information on the status and health of raptor populations.*

- The main factor that affects the survival of raptors is the loss of habitat.
- Some pesticides result in low fertility, weak egg shells, or death in raptors.
- We will make an inventory of where raptors spend their time so we can protect those habitats immediately.
- We will work to develop alternatives to the use of pesticides and herbicides.

Interest Group #2 - Land Owners

Goal: *We want to use our land to provide for our family's and society's needs.*

- We need to know what raptors need for survival.
- We need to know what areas of our land are critical for raptor survival.
- We are will consider changing the types of crops we plant and chemicals we use in those critical areas to ensure they will not affect the survival of raptors.
- What choice do we have but to use chemicals to help our crops grow?
- We won't shoot or poison as many ground and burrowing mammals if it means helping raptors.

Interest Group #3 - The Public

Goal: *We want to meet our needs as well as share the planet with other species.*

- We are concerned about the disappearance of natural habitats and the plants and animals that live there.
- If the loss of land and the use of pesticides are killing raptors, what is it doing to us?
- We're concerned about the chemicals that are being put on crops.
- We would like scientists to direct their research towards finding other methods of pest control that don't rely so heavily on chemicals.
- We want the government and industry to fund more research on raptors.

Interest Group Cards

(Photocopy, cut out, and hand one card to each group)

Interest Group #4 - Business and Industry

Goal: *We want to remain productive and competitive in the marketplace.*

- We will step up our research efforts to find alternatives to pesticides and herbicides.
- We're willing to keep our interest rates down on loans to farmers.
- We recognize that our chemical products have been responsible for the inadvertent killing of raptors. We are working to find compounds that are only toxic to the pest species and break down quickly in the environment.
- We will ensure that environmental assessments are done before we start any new development. These assessments will take raptors into account.

Interest Group #5 - Conservation Groups

Goal: *We want to ensure the long-term health and sustainability of raptors.*

- We will lobby governments to support research initiatives which will identify more environmentally-friendly pest control techniques.
- We would like to have green labelled products that are confirmed to have a minimum impact on the environment.
- We would like to see subsidies or incentive programs for farmers who use methods other than pesticides to reduce their use of chemicals.
- Our work in lobbying industry and government has resulted in many success stories such as the comeback of the Peregrine Falcon and the recovery of the Burrowing Owl.
- We will raise funds to purchase land which will provide protected habitat for raptors. Our goal is to set aside parcels of land which are linked, allowing raptors the size and variety of habitat they need for survival.

Interest Group # 6 - Government

Goal: *We strive to balance the needs of all interest groups.*

- We will support raptor habitat studies and research initiatives for alternative methods of pest control.
- We will work with industry and with other governments to have chemicals such as DDT banned world-wide.
- We will work cooperatively with businesses and landowners to ensure that raptors and their habitat are protected.
- We will work with land owners to ensure that they are effectively managing their land in a way that not only meets their needs but also those of raptors.
- We will develop legislation to conserve raptor populations and their habitat.

File 9: What is Being Done to Protect Raptors?

File Summary

In this activity, you will find out what steps are being taken to protect raptors through research, recovery and reintroduction, captive breeding programs, education, and legislation.

File Contents

- Background Information
- Instructions
- Presentation Activity
- Suggested References
- *What is Being Done to Protect Raptors? Worksheet*
- *What is Being Done to Protect Raptors? Answer Sheet* (see your teacher)

Materials

Raptor Edu-Kit

- video: *Twixt Heaven and Earth*
- binder containing information on agencies involved with raptors and habitat conservation (ask your teacher for these materials)

Other

- large pieces of flipchart paper
- set of different coloured felt pens

Background Information

The population of people on Earth and their demand for food, water, land, and raw materials has resulted in significant changes to the Earth's ecosystems. Human activities have altered many habitats, along with the plants and animals that live in them. Raptors inhabit and visit a variety of habitats during migration and they feel the cumulative effects of all the habitats they visit. As a result, their health can be used as a monitor of the overall health of the habitats they occupy. Unfortunately, the health of some raptors isn't good and some species around the world are at risk as a result of habitat loss or contamination of their food supply. Fortunately we now understand this and there are many people and agencies around the world who are working hard to reverse this trend through research, education, and action, especially habitat protection.

The following is a description of what is being done for raptors. Any effort made to help with the recovery of raptors will benefit many other living things that share habitats with them.

Research

Raptor research is taking many forms. Some research is done by individual scientists who are studying the biology and ecology of individual species and their habitats. Other forms of research involve large numbers of volunteers around the world combining their efforts to find out more about bird populations. For example, every year in June, volunteers survey the same forty kilometre route along roadways and count all of the birds seen and heard along the way. This survey is called the Breeding Bird Survey and is done all across North America. The data they collect over the years is put together to form invaluable statistics on trends in bird populations. The Christmas Bird count is another North America-wide program where volunteers go out one day before Christmas to count the birds in their area. This count increases our knowledge of the population of birds in winter. Other research programs involve the banding of birds to learn more about their migration routes, numbers, and survival.

Recovery and Reintroduction

Many facilities around the world take in injured birds. The birds receive veterinary attention and whenever possible, they are returned to the wild. In the event the injuries are fatal, their remains are kept for research and education. Facilities such as the Alberta Birds of Prey Centre in Coaldale, Alberta provide these recovery services.

Captive Breeding Programs

Some raptors are so rare and have such difficulty raising young successfully, that scientists remove eggs from their nests, incubate them in a laboratory, raise the young birds out of sight of people, and when they are ready and able to look after themselves, the birds are released back into their natural habitat. In some areas, raptors have disappeared for a variety of reasons. Whenever possible, raptors are reintroduced into those areas. For example, in Alberta, the use of persistent organochlorine pesticides such as DDT resulted in the decline of Peregrine Falcon populations (DDT is no longer used in Alberta or Canada). Intensive management programs such as captive rearing and the fostering of young birds to wild nests resulted in Peregrine Falcons making a strong recovery. These management programs are being phased out in Alberta, but there is still a need to monitor populations of Peregrines to ensure they are self-sustaining. This is because Peregrines continue to be exposed to toxic chemicals, especially when they fly south for the winter.

Education

Education involves teaching everyone about the fate of birds and other living things. Education takes many forms. School programs such as this one are distributed for students such as you to learn more about raptors so you can make educated decisions about issues that affect their future. Rehabilitation centres provide education through hands-on experiences with raptors. Larger audiences are reached through magazines, nature programs on television, and videos. Brochures are produced and distributed to farmers to inform them of the issues with suggestions on how they can help protect wildlife by setting aside some natural habitat on their property and through the responsible use of pesticides and herbicides. Local natural history groups and larger, national and international organizations also educate members and non-members and lobby governments to implement legislation on wildlife issues.

Legislation

Governments and agencies work to protect raptors and other wildlife by implementing laws. For example, in Alberta, birds of prey are protected by the *Alberta Wildlife Act*. This legislative act protects birds from being killed or harassed by humans. Alberta also has a *Status of Alberta Wildlife Report* that evaluates the well being of wildlife populations found in Alberta. The information in this report is the basis for planning and making decisions related to wildlife conservation, protection, and management. An understanding of the status of wildlife helps identify species which must be designated endangered or threatened under Alberta's Wildlife Act.

The national advisory organization called the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) oversees the status designation of all species of plants and animals in Canada. The agencies concerned combine efforts to protect and conserve the most seriously threatened species. All across Canada, protected lands such as National and Provincial Parks, ecological reserves, wilderness areas, and natural areas provide wildlife habitat with different levels of protection.

Instructions

1. Read the *Background Information* provided. As you can see from this information, much is being done to help raptors. There are many individuals, organizations, scientists, and government agencies who are committed to protecting raptors. On the *What is Being Done to Protect Raptors? Worksheet*, a number of agencies are listed. Using the reference materials listed under *Suggested References*, find out what these agencies are doing to help protect raptors and their habitat. Record your answers on the worksheet.

2. Use your findings to do a thought mapping activity such as the one illustrated below.

The mapping will help you organize your findings. Write the words *What is being done to protect raptors?* in the middle of the flipchart paper. Draw a circle around the words.

Add more circles and lines to the page linking different ideas to the main topic. Your map will illustrate how different organizations are directing their efforts to protecting raptors. You may choose to draw circles with words inside or labelled pictures to illustrate your map. Each general topic can be illustrated using a different coloured pen.

3. Follow the suggested *Presentation Activity* format to ensure that you are prepared to present your findings to the rest of the class.

Presentation Activity

1. Upon completion of the independent study files, each group of students will be given up to twenty minutes to present their findings to the rest of the class. Your group is responsible for the information contained in this file. Prepare a short and informative presentation for the rest of the class.

2. The following is a suggestion for your presentation on *What is Being Done to Protect Raptors*?

   a) Place your flipchart map on the wall. Explain how the map works and what you found out about the work different organizations are doing to protect raptors.

   b) Invite other students in your class to come up and add something to the map from the *Independent Study Files* they did on raptors. Ensure that they link their findings to an appropriate section of the map. You will end up with a class web which will summarize the class's findings on raptors.

Suggested References

Alberta Environmental Protection. **Alberta's Threatened Wildlife, Burrowing Owl**. 1990.

Alberta Environmental Protection. **Alberta's Threatened Wildlife, Ferruginous Hawk**. 1990.

Alberta Environmental Protection. **Alberta's Threatened Wildlife, Peregrine Falcon**. 1998.

Web Sites

Alberta Environment, Fish and Wildlife Division
http://www.gov.ab.ca/env/fishwl.html
http://www.gov.ab.ca/env/fw/threatsp/index.html
http://www.gov.ab.ca/env/fw/watch/index.html

Alberta Conservation Association
http://www.agric.gov.ab.ca/sustain/programs/program38.html

The Commitee on the Status of Endangered Wildlife in Canada (COSEWIC)
http://www.cosewic.gc.ca

The Canadian Nature Federation
http://www.cnf.ca/birds-main.html

The Canadian Wildlife Federation
http://www.cwf-fcf.org

The Nature Conservancy of Canada
http://www.natureconservancy.ca

The Canadian Wildlife Service
www.mb.ec.gc.ca/ENGLISH/LIFE/MIGBIRDS/SANCTUARIES/askimiski/about.html

The World Wildlife Fund
http://www.wwfcanada.org/home.html

Wildlife Habitat Canada
http://www.whc.org

What is Being Done to Protect Raptors? Worksheet

The following is a brief list of some of the agencies who are working to protect raptors. Using the references listed under *Suggested References*, write a description of the work of each of these agencies and organizations.

Alberta Environment, Fisheries and Wildlife Management Division

Alberta Conservation Association

The Canadian Nature Federation

The Canadian Wildlife Federation

The Nature Conservancy of Canada

The Canadian Wildlife Service

The World Wildlife Fund

Wildlife Habitat Canada

Others (use another page)

What is Being Done to Protect Raptors? Answer Sheet

The following is a brief list of some of the agencies who are working to protect raptors. Using the references listed under *Suggested References*, write a description of the work of each of these agencies and organizations.

Alberta Environment, Fisheries and Wildlife Management Division *is responsible for monitoring raptor populations and for conservation management programs on species at risk. Alberta Environment is also involved in public education through the production of* ***Alberta's Threatened Wildlife*** *brochures and posters and the development of programs such as* ***Alberta's Watchable Wildlife****. Also, the* ***Buck for Wildlife*** *program is a province wide initiative that seeks to sustain, retain, or acquire habitat for all of Alberta's wildlife including raptors.*

Alberta Conservation Association *was established in April, 1997 as a private, not-for-profit organization that would administer the Fish and Wildlife Trust Fund. This Fund was formerly managed by Alberta Environmental Protection to protect habitat and improve wildlife and fisheries by collecting a levy from hunting and fishing licenses sold. One of their programs is the* ***Wildlife Habitat Development Program*** *which is designed to retain, enhance, or create wildlife habitat.*

The Canadian Nature Federation *educates members and lobbies governments to pursue environmentally sound polices and direct more resources towards conservation.*

The Canadian Wildlife Federation *educates the public in matters of wildlife and environmental conservation.*

The Nature Conservancy of Canada *acquires title to land important to wildlife and ensures that it is properly managed for conservation.*

The Canadian Wildlife Service (CWS) *acquires and manages land containing prime habitat for wildlife. The CWS also conducts research into the biology and ecology of birds, monitors contaminants in ecosystems, and works with international organizations to protect populations of birds that live outside Canada.*

The World Wildlife Fund (WWF) *lobbies for wildlife and has developed a variety of cooperative programs with industry and governments including the Wildlife Toxicology Fund and the Endangered Species Recovery Fund with Environment Canada, the Wild West program in the prairies, and Operation Burrowing Owl. The World Wildlife Fund Canada also provides an international perspective on conservation by habitat conservation efforts in Costa Rica and Belize.*

Wildlife Habitat Canada *is a Crown Corporation mainly funded by the Habitat Stamp which hunters buy with their permit. This organization has played a leading role in acquiring habitat critical for wildlife throughout the country.*

Others
Answers will vary.

Part III: Presentations

Summary

In this part, students or groups of students will present their findings after completing their independent study files. It is an opportunity for all the students to become familiar with all the topics covered by the nine study files.

Time Required

Each group will require time to present their findings (the total time will vary, according to the activity and the teacher's discretion).

Group Size

Individuals or small groups depending on class size.

Setting

Classroom or gymnasium.

Objective

Students will have the opportunity to:

- share and increase their knowledge and understanding of raptor biology and ecology and the issues that affect their survival.

Materials

- The materials required for each presentation are listed under each independent study file.
- Video: *Birds of Prey, Their Biology and Ecology* (optional)

Teacher Background

At this point, the students will have completed their independent study files. This is an opportunity for each group to present their findings to the rest of the class. The following is a summary of the suggested presentation activity included with each study file.

File 1: Raptor Who's Who

The group will introduce each of the families of raptors by naming each family, showing the class photographs of representative species, and describing one distinguishing characteristic they found interesting about each family. The students will project the overhead of the *Raptor Wingspans* on the wall and invite the members of the class to compare their arm-span with the wingspans of the birds on the overhead. This will give the class an idea of the size of some of these birds. Students will also explain the Alberta Status of Wildlife classification system (for example what does the Red, Blue, Yellow A and Yellow B list mean) and indicate which raptors are considered to be **at risk** in Alberta**.**

File 2: Adaptations for Flight

The students will briefly describe the aerodynamics of flight using paper airplanes as props to help them. They will explain how birds are adapted for flight and how they move their wings and wing feathers, tails and tail feathers as they fly to help them steer. The students will pass around the sample feathers asking students to look for the differences in the feathers. They will explain that birds have feathers of varying shapes depending on their needs for flying, feeding, etc. The students will describe some of the advantages and disadvantages of flight.

File 3: Raptor Migration

The students will show the class the map of North and South America that illustrates the migration route of the Swainson's Hawk. They will read their journals about this migration, highlighting some of the advantages and disadvantages of migration.

File 4: Links in the Food Web

This presentation will take longer to deliver as it demonstrates how food chains work and how energy is passed along from the prey to the predator. Using identication cards and a ball of twine, students will demonstrate the intricate nature of a food web and how the loss of even one species can have an impact on the entire community.

File 5: Bioaccumulation: It Adds Up

Bioaccumulation means an increase in the concentration of a chemical in a living thing over time, compared to the chemical's concentration in the environment. Compounds accumulate in living forms any time they are absorbed and stored faster than they are broken down or excreted. In this file, students will learn about some of the risks associated with being a carnivore at the top of the food chain. The presentation activity will be conducted outside and will demonstrate how toxins present in the prey are passed on to the predator where they can accumulate.

File 6: Habitats at Risk

The students will define the word *ecosystems* and *habitat* giving examples of each. They will explain how Alberta Environment, Fisheries and Wildlife Management Division evaluates the status of Alberta wildlife and how the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species of plants and animals in Canada.

Students will also show the class the map of ecosystems in North America and how the range of their chosen raptor overlaps several ecosystems. They will list the natural hazards and human activities they identified as having an effect on their chosen raptor.

File 7: Raptors in Our Culture

The students will discuss their findings and conclusions about the class's perceptions of raptors before and after they learned more about them. They will share their findings recorded on the *Raptors in Our Culture Worksheet*. They will also share examples of stories, poems, and artworks of a raptor.

File 8: Living with Raptors

Students will facilitate an activity in which groups of students take on the role of different interest groups to discuss the questions: *Should we take measures to ensure the long-term health and sustainability of raptors?* After discussing the question in interest groups, the class is rearranged into new groups with representatives from each of the interest groups. These new groups work cooperatively to discuss the issue and answer the question. Finally, the students will present their own findings how we can live with raptors.

File 9: What is Being Done to Protect Raptors?

Students will share their thought mapping activity with the class. After explaining the way the map works and discussing their findings on what different organizations and agencies are doing to help raptors, they will invite each student to come up and add something to the map from their own investigations.

Instructions for the Teacher

1. Invite the groups to present their findings to the rest of the class. Study File 9 should be presented last as it will result in a summary of the class's findings. Allow time for each presentation. Give each group a two minute warning to wrap up their presentation. Allow time for questions from the class and discussion after each presentation.

2. The last study file *What is Being Done to Protect Raptors?* will produce a class summary of findings. This leads to the next activity in Part IV where the class will look at the map they have created and identify an area where they would like to take action.

Part IV: Optional Field Study

Summary

A field study to observe raptors and explore raptor habitat will help students recognize the diversity and beauty of these birds and the landscapes they occupy. Students can also develop a sense of stewardship and an appreciation for the continued existence of raptors.

Staff Required

One teacher with one adult volunteer per 5-7 students

Time Required

- 20 minutes briefing prior to the field study
- One full day for the field study
- 20 minute discussion after the field study

Group Size

One class

Setting

Classroom and field study location as suggested in the *Teacher Background*

Season

Spring or fall

Objectives

Students will have the opportunity to:

- observe raptors and explore raptor habitat
- compare different habitats for their suitability for raptors

Materials

Raptor Edu-Kit

- *Alberta Wildlife Viewing Guide* (this can be found in the kit or on-line at): www.gov.ab.ca/env/fw/view/
- one *Raptor Habitat Worksheet* for each student
- copy of bird identification book *Birds of Alberta* found in the Kit

Other

- each student will need a lunch, snacks, drinks, and extra clothes in a day pack
- class set of consent forms for the field study
- one topographical map of the field study area (to be obtained by the teacher)
- one clipboard for each student
- binoculars (to be provided by teacher and students)

Teacher Background

A field study to a protected area, a rehabilitation centre, or a zoo will give students the opportunity to observe raptors, their habitat and the work that's being done to protect, preserve, and rehabilitate them. The choice of field study location will depend on the interest of your group. For suggestions on field study locations, refer to the *Alberta Wildlife Viewing Guide*, or contact your local field naturalists society.

For a visit to a facility where you can observe raptors try these locations:
Alberta Birds of Prey Centre Coaldale, (403-345-4262)
The Calgary Zoo (403-232-9300)
The Inglewood Bird Sanctuary (403-269-8289)
The Vally Zoo, Edmonton (780-496-6911)

Instructions for the Teacher

1. Choose a location for the field study. Use the *Alberta Wildlife Viewing Guide* included with your kit to help you. Make up a field study schedule allowing time for two stops and a lunch break.

2. Make a booking for a site tour if applicable.

3. Make arrangements for bus transportation. Send consent forms home with the students. Instruct students to bring a pack with a lunch, snacks, extra drinks, pencils, and binoculars if they have them. Tell them to dress for the outdoors with walking shoes or boots and clothes appropriate for the weather. Provide each student with a clipboard. Arrange for parent volunteers at a ratio of one volunteer for every 5 - 7 students. Provide each parent volunteer with a field study schedule and an outline of their responsibilities.

4. Obtain a copy of the topographical map that covers the field study location. Photocopy the area on the map that covers the two field study stops for distribution to each student.

5. Visit the field study location prior to taking the students to familiarize yourself with the route and facility. Choose another site along the way for a second stop. This second stop should be different from the first in that it should have more or less human development. For example, if your field study is to the Calgary Zoo, a second stop will be in a more natural area with less human disturbance. Choose a location for lunch.

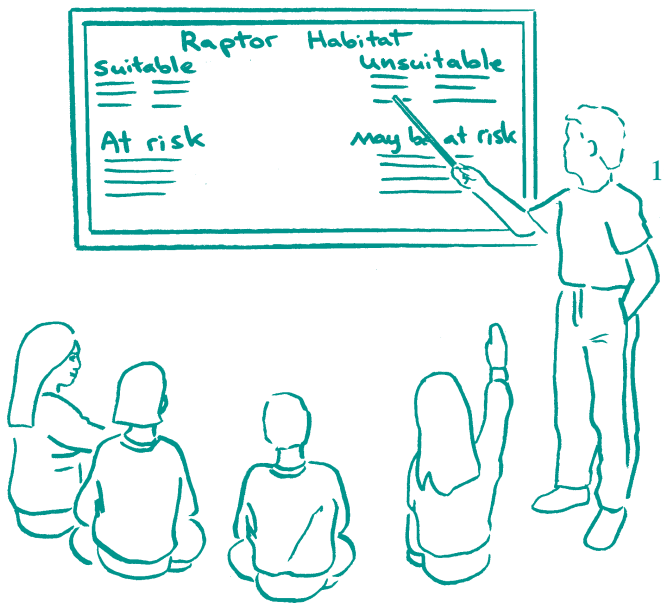
6. Brief the students on the rules of going on a field study. Explain that the purpose of going on the field study is to visit raptor habitat and to hopefully see some raptors.

7. Hand out the copy of the topographic map to each student. Explain that topographic maps give us a *bird's-eye* view of the landscape. Have the students find and circle the locations of the two field study stops on their map.

8. Hand out a copy of the *Raptor Habitat Worksheet* to each student. Explain that on their field study they will be stopping at two locations to examine their suitability for raptors. Each student will fill out their worksheet with their own observations.

9. Take the students on the field study. Allow students time to write their observations and to complete the worksheets. Allow extra time to watch any raptors they may see. Make a stop for lunch.

10. After the field study discuss the observations they made at each of the stops. What features at each site made it suitable raptor habitat? What features made it unsuitable raptor habitat? How did they feel when they saw or didn't see a raptor?



Raptor Habitat Worksheet Name:_____

Complete the following chart based on observations made at the two field study stops. Use your teacher's topographical map to help you.

Feature	Area One	Area Two
Describe natural features of this habitat that make it suitable for raptors (nesting sites, sources of food, etc)		
Describe features of this habitat that make it unsuitable for raptors.		
Describe natural features of this habitat that make it suitable for raptor prey species.		
Describe features of this habitat that make it unsuitable for raptor prey species.		
List human activities seen or heard at the site.		
Look at your topographic map for natural habitat in the surrounding area that might affect the suitability of this site for raptors.		
Look at your topographic map for human activities in the surrounding area that might affect the suitability of this site for raptors.		
What species of raptor did you see?		
How did you feel when you saw the raptor(s)?		

Part V: Action

Summary

The students are now familiar with many aspects of raptor biology and ecology as well as some of the factors that affect their survival. In this activity, students will identify an issue related to raptor survival that concerns them. They will identify and implement actions to help address the issue.

Time Required

- 20 minutes to choose the issue
- 45 minutes to discuss actions and identify one for the class to carry out or individual students to carry out
- Time required to implement action varies

Group Size

One class

Setting

Classroom and other venues depending on the chosen action

Objectives

Students will have the opportunity to:

- identify an issue related to raptors that concerns them
- identify actions to address their concerns
- implement the actions

Materials

- Large map made by the group doing Student Investigation File 9 - *What is Being Done to Protect Raptors?*
- Set of coloured felt pens
- Article: *Environmental Issues: Steps to Action* (found on the following pages)
- Other materials (depending upon actions chosen)

Teacher Background

An action is the act or process of producing an effect or performing a function. It is doing something. It implies a process which takes time and involves more than one step.

In this part, students are encouraged to take what they have learned about raptors and apply it in some way to address their own concerns. The teacher can take the student from the classroom to the real world by exploring political, economic, social, and environmental pathways to address the challenges in raptor conservation.

It is of little use to comment on the environmental challenges of our time if we are not also prepared to act in a positive and constructive way to address the concerns.

Instructions for the Teacher

1. Review the article *Environmental Issues: Steps To Action*.

2. Explain to the students that they now have enough knowledge about raptor biology and ecology as well as the issues that face raptor populations to be able to make a valuable contribution to raptor conservation.

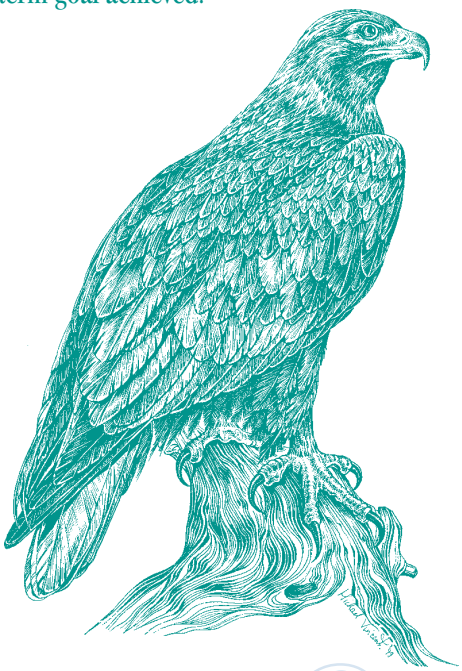
3. Review the large map completed by the students doing Independent Study File 9 - *What is Being Done to Protect Raptors?* Have students identify areas on the map that illustrate how human activities are putting raptors at risk. Circle these areas in red. Have the students focus on these red areas and as a group, choose one area where they would like to get involved by taking action.

   The following are examples of some actions that students could take to conserve raptors in Alberta:
   - fundraise to support an organization that purchases land to protect habitat
   - help with habitat restoration (build nesting platforms)
   - lobby to protect local habitat including nesting trees
   - write letters to governments, businesses, and corporations that make decisions and laws that affect wildlife
   - educate others in the community or present to other classes
   - volunteer on a bird count
   - respect and help take care of existing protected land in your area.
   - adopt a more globally conscious lifestyle and model it to others. By changing our lifestyle we can help improve the quality and quantity of natural habitats in other parts of the world.

4. Review and discuss with the students the steps outlined in the article *Environmental Issues: Steps To Action*. Have the students identify one of the actions listed that they could implement.

5. Once actions have been determined, begin the process of implementing their action. This is an interactive phase, where students will encounter new challenges. Creativity, commitment and persistence are the key ingredients to success in addressing environmental issues. Encourage open dialogue, provide support and remind students of the great value and importance of their actions.

   Encourage students to set a deadline for action so they can see the results of their initial work. Many actions will have long term results, but a letter back from an agency would be one example of a good short term goal achieved.



Environmental Issues: Steps to Action

Environmental issues are as timeless as human activity itself. Some issues can be dealt with in a very quick manner, others may require many lifetimes to resolve. Whether the time frame is short or long, the process to address environmental issues remains basically the same. This process is outlined below. As with all outlines you will need to fill in the details and change it to suit your needs and goals. The key words to remember, *and be*, when addressing issues of concern are the four C's: Caring, Commitment, Cooperation, and Creativity.

Before working on an issue such as the conservation of raptors in Alberta, review the process outlined below and ask yourselves the following question:

Do you and your classmates have the time to address the issue and carry through on the various steps of the action process?

If your answer is yes, then you have a key ingredient to deal with some of the most important issues of our time. Read on!

1. Select an issue, one that is attainable, focused, and initially local in scope.

2. Find out what you know and do not know about the issue. Become an expert. Also examine how you feel about the issue, how you might be connected to the issue and what actions you might already be taking to address the issue.

3. Determine what you wish to accomplish, and state them as your goal(s). As with the selection of the issue, ensure that your goal(s) are attainable, focused, and initially local in scope. The goal should be a statement that everyone agrees with or at least will try. Goals address the question *what do I want to do?*, not the question *how do I want to do it?* Actions address the how.

4. Determine *how* you can address your goal(s). Brainstorm to come up with actions to achieve the goal(s). Group the actions under the following *Categories for Change*:
   - organizational - actions which address how the group will be set up
   - research/information gathering - what information do you need - how will you get it?
   - education/media - how to communicate your concern and educate others
   - direct action - actions you can take as an individual or part of a group
   - political action - how to communicate with elected officials and other decision makers

   Do an analysis on each action, viewing the social, economic, political, and environmental implications of each. If the implications are too negative, the action may not be feasible.

Appendix I: Inventory of Materials Contained in The Raptor Edu-Kit

WRITTEN MATERIAL

Alberta Environmental Protection. **Alberta's Threatened Wildlife, Burrowing Owl**. 1990.

Alberta Environmental Protection. **Alberta's Threatened Wildlife, Ferruginous Hawk**. 1990.

Alberta Environmental Protection. **Alberta's Threatened Wildlife, Peregrine Falcon**. 1998.

Alberta Environmental Protection. **Alberta's Threatened Wildlife. Teacher's Guide for Elementary**. 1995.

Alberta Environmental Protection. **Alberta's Threatened Wildlife. Teacher's Guide for Grades 4 - 9**. 1996.

Alberta Environmental Protection. **The Status of Alberta Wildlife**. Wildlife Management Division, 1996.

Alberta Environmental Protection. **Alberta's Watchable Wildlife, Falcons and Woodland Hawks**. (laminated poster)

Alberta Environmental Protection. **Alberta's Watchable Wildlife, Large Hawks and Eagles**. (laminated poster)

Alberta Environmental Protection. **Alberta's Watchable Wildlife, Owls**. (laminated poster)

Alberta Forestry, Lands, and Wildlife. **Alberta Wildlife Viewing Guide**. Edmonton: Lone Pine Publishing, 1990.

Canadian Wildlife Service. **Bald Eagle**. Ottawa: Environment Canada, 1992. (laminated poster)

Canadian Wildlife Service. **Biodiversity**. Ottawa: Environment Canada, 1995.

Canadian Wildlife Service. **Endangered species in Canada**. Ottawa: Environment Canada, 1997.

Canadian Wildlife Service. **Estuaries: Habitat for Wildlife.** Ottawa: Environment Canada, 1993.

Canadian Wildlife Service. **Great Horned Owl**. Ottawa: Environment Canada, 1991. (laminated poster)

Canadian Wildlife Service. **National Wildlife Areas and Migratory Bird Sanctuaries**. Ottawa: Environment Canada, 1994.

Canadian Wildlife Service. **Osprey**. Ottawa: Environment Canada, 1983. (laminated poster)

Canadian Wildlife Service. Peregrine Falcon Captive Breeding Facility. Ottawa: Environment Canada. (laminated poster)

Canadian Wildlife Service. **Pesticides and wild birds**. Ottawa: Environment Canada, 1998.

Canadian Wildlife Service. **Sharp-Shinned Hawk, Cooper's Hawk, and Northern Goshawk**. Ottawa: Environment Canada, 1990. (laminated poster)

Canadian Wildlife Service. **Snowy Owl**. Ottawa: Environment Canada, 1991. (laminated poster)

Canadian Wildlife Service. **The Benefits of Wildlife**. Ottawa: Environment Canada, 1995.

Canadian Wildlife Service. **What you can do for Wildlife**. Ottawa: Environment Canada, 1994.

Environmental Citizenship Learning Program. **The Wonder of Biodiversity**. Ottawa: Environment Canada.

Fisher, Chris and John Acorn. **Birds of Alberta**. Edmonton: Lone Pine Publishing, 1998.

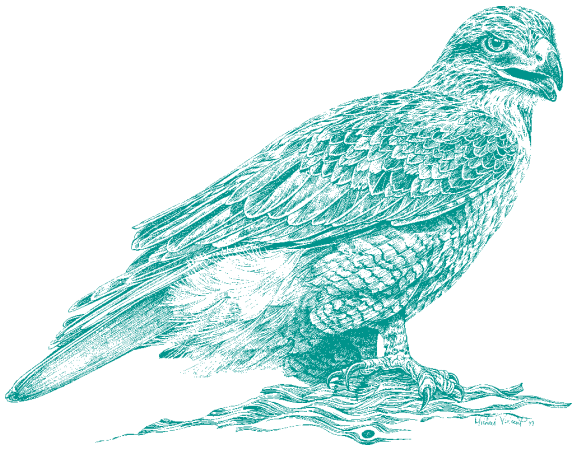
Foard, Marlene. **Raptor Ecology. Teacher's Guide to Classroom Activities (grades 4 - 8)**. Salt Lake City: HawkWatch International Inc., 1994.

Gaussoin, Bret and Janice Lapsansky. **The Barn Owl and the Pellet**. Bellingham: Pellets, Inc., 1994.

Grady, Wayne. **Vulture, Nature's Ghastly Gourmet**. Vancouver: Greystone Books, 1997.

Grambo, Rebecca L. **Eagles, Masters of the Sky**. Vancouver: Raincoast Books, 1997.

Hendrickson, John. **Raptors, Birds of Prey**. San Francisco: Chronical Books, 1992.



Holroyd, Geoffrey, et al. **A Landowner's Guide to Prairie Raptors**. Canadian Wildlife Service, 1995. On-line version: www.mb.ec.gc.ca/nature/migratorybirds/raptors/dc17s00.en.html

Important Bird Areas of Canada. (brochure)

Important Bird Areas of Canada Newsletter. Fall, 1998.

Important Bird Areas of Canada Newsletter. Spring, 1999.

Kalman, B. ed. **How Birds Fly**. New York: Crabtree Publishing Company, 1998.

Latimer, J. P. And K.S. Nolting. **Birds of Prey**. Boston: Houghton Mifflin Company, 1999.

Lawrence, R.D. **Owls, The Silent Fliers**. Buffalo: Firefly Books, 1997.

Morris, Campbell. **Advanced Paper Aircraft Construction**. Harper Collins Canada, Ltd., 1993.

National Geographic. **Field Guide to the Birds of North America**. Washington: National Geographic Society, 1999.

Parry-Jones, Jemima. **Eagle and Birds of Prey**. New York: Alfred A. Knopf, 1997.

Rowell, Petra and David Stepnisky. **Status of the Peregrine Falcon (*Falco peregrinus anatum*) in Alberta**. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report 8. Edmonton, 1997.

Sattler, Helen R. **The Book of North American Owls**. New York: Clarion Books, 1995.

Stepnisky, David P. **Demographic Features of the Recovering Peregrine Falcon Population (*Falco peregrinus anatum*) in Southern Alberta: 1980 - 1997.** Alberta Environmental Protection, Natural Resources Service, Wildlife Management Division, Occasional Report Series, Number 15. Edmonton, 1998.

Wellicome, T. I. **Status of the Burrowing Owl (Speotyto cunicularia hypugaea) in Alberta**. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report 11. Edmonton, 1997.

VIDEOS

Birds of Prey, Their Biology and Ecology. Boise: The Peregrine Fund, 1996. (20 minutes)

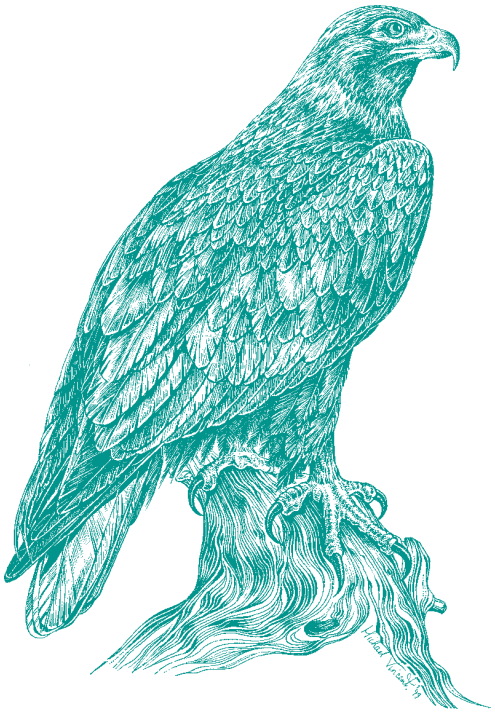
Eagle Man. CBC Television. (10 minutes)

For the Birds. Calgary: Missing Link Productions, 1993. (21 minutes)

Night Moves, Owls in Fact and Fantasy. Calgary: Missing Link Productions, 1995. (50 minutes)

Twixt Heaven and Earth. Montreal: National Film Board of Canada, 1998. (48 minutes)

Twixt Heaven and Earth. Montreal: National Film Board of Canada, 1998. (Abridged version: 18 minutes)



COMPACT DISCS

Know Your Owls. Birds of Prey Volume One. Calgary: AXIA Multimedia Corp., 1994.

Know Your Birds of Prey, Vultures to Falcons. Birds of Prey Volume Two. Calgary: AXIA Multimedia Corp., 1994.

ADDITIONAL PROPS

Audiotape of raptor calls (*R.T. Peterson - A Field Guide to Western Birds*)

Raptor Wingspans overhead transparency

Sample hawk, falcon, and owl feathers

Three magnifiers

Silhouettes of a hawk, falcon, and owl in flight

30 small (30 ml) yogurt containers

3 large (900 ml) yogurt containers

Transparency Map of Vegetation Zones in North and South America

Transparency Map of Population Distribution in North and South America

Transparency Map of Landforms in North and South America

Transparency Map of Types of Trees in North and South America

Transparency Map of Farming in North and South America

Mounted Eagle Skull

Map of North and South American showing the migration route of the Swainson's Hawk

Binder containing information on agencies involved with raptors and habitat conservation

Ball of twine (large)

1 set of food web cards (binder clips attached)

1 Laminated colour picture of bald eagle (Teacher File)

16 Laminated colour pictures of raptors (Teacher File)

LAMINATED POSTERS

Alberta's Watchable Wildlife, Falcons and Woodland Hawks

Alberta's Watchable Wildlife, Large Hawks and Eagles

Alberta's Watchable Wildlife, Owls

Alberta's Threatened Wildlife, the Burrowing Owl

Alberta's Threatened Wildlife, the Peregrine Falcon

Birds of Prey: Hawks, Eagles, Falcons, and Kites

Canada's Birds of Prey

Environment Week Poster of the Great Horned Owl

Kananaskis Country Great Grey Owl

Regal Raptor of the West, the Ferruginous Hawk

Appendix II: Agencies Involved with Raptor Conservation and Related Issues

Alberta Conservation Association
http://www.gov.ab.ca/env/fw/aca.html
6th Floor, 9920 - 108 Street
Edmonton, Alberta
T5K 2M4
780-427-5192

Alberta Environment Information Centre
http:/www.gov.ab.ca/env/info/infocentre/
Main Floor
9920 - 108 Street
Edmonton, Alberta
T5K 2M6
780-944-0313

Fisheries and Wildlife Management Branch
http:/www.gov.ab.ca/env/fishwl.html
Alberta Environment
Natural Resources Service
Main Floor, 9945 - 108 Street
Edmonton, Alberta
T5K 2G6
780-427-6750

Alberta Birds of Prey Centre
http://www.birdsofprey.ab.ca
Burrowing Owl Lane
Box 1150
Coaldale, Alberta
T1M 1M9
403-345-4262

Calgary Wildlife Rehabilitation Society
http://gumbi.com/cwrs/
152, 234 - 5149 Country Hills Blvd. NW
Calgary, Alberta
T3A 5K8
403-239-2488

Ducks Unlimted
http://www.ducks.ca
Oak Hammock Marsh Conservation Centre
PO Box 1160
Stonewall, Manitoba
R0C 2Z0
1-800-665-DUCK(3825)

The Calgary Zoo
www.calgaryzoo.ab.ca
Botanical Garden and Prehistoric Park
P.O. Box 3036, Station B
Calgary, Alberta
T2M 4R8
403-232-9300

The Canadian Nature Federation
http://www.cnf.ca/
Suite 606 - 1 Nicholas Street
Ottawa, Ontario
K1N 7B7
1-800-267-4088

The Canadian Wildlife Federation
http://www.cwf-fcf.org
2740 Queensview Drive
Ottawa, Ontario
K2B 1A2

The Canadian Wildlife Service
http://www.mb.ec.gc.ca
Environment Canada
Western and Northern Region
Rm. 210, 4999 - 98 Avenue
Edmonton, Alberta
T6B 2X3
780-468-8919

BirdLife International
birdlife@ecnet.ec
Vicente Cardenas E5 75, tercer piso, Casilla 17-17-717
Quito, Ecuador
(593-2) 453645

Journey North
Internet-based science program that allows students to participate in a global study of wildlife migration.
http://www.learner.org/jnorth

Medicine River Wildlife Rehabilitation Centre
Box 115
Spruce View, Alberta
T0M 1V0
403-728-3467

The Nature Conservancy of Canada
http://www.natureconservancy.ca
P.O. Box 26011 Station BRM B
Toronto, Ontario
M7Y 4S1
1-800-465-0029

Pesticide Action Network of North America
http://www.panna.org
49 Powell Street, Suite 500
San Francisco, California
94102
U.S.A.
415-981-1771

Wildlife Habitat Canada
http://www.whc.org
7 Hinton Avenue N.
Suite 200
Ottawa, Ontario
K2A 1C7 613-722-2090

World Wildlife Fund Canada
http://www.wwfcanada.org/home.htm
245 Eglington Avenue East, Suite 410
Toronto, Ontario
M4P 3J1
1-800-26 PANDA