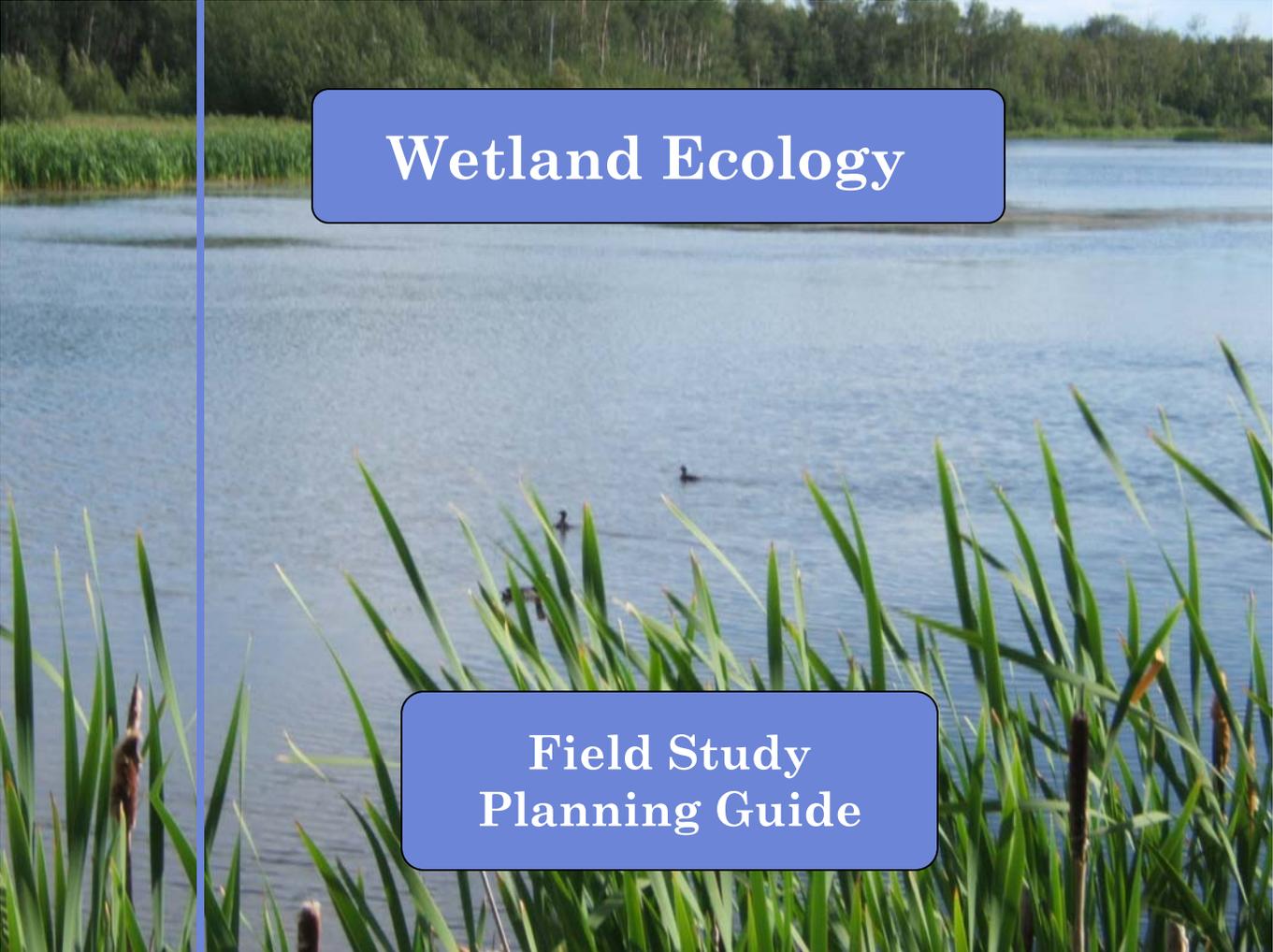


# *Alberta Parks*



## Wetland Ecology

## Field Study Planning Guide

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## 1.0 INTRODUCTION

Welcome to the teacher's planning and activity package for **Wetland Ecology**. This half-day program was developed to offer students a natural environment experience that supports both the Grade 5 Alberta Elementary Science Curriculum Topic: Wetland Ecosystems and the goals of Alberta's Parks:

- **Preservation** – *to preserve in perpetuity a network of parks and protected areas that represent the diversity of the province's natural heritage as well as related cultural heritage.*
- **Heritage appreciation** – *to provide opportunities to explore, understand and appreciate the natural heritage of Alberta, and enhance public awareness and our relationship to and dependence on it.*
- **Outdoor recreation** – *to provide a variety of natural landscape dependent outdoor recreation opportunities and related facilities and services.*
- **Heritage tourism** – *to encourage residents and visitors to the province to discover and enjoy the natural heritage of Alberta through a variety of outdoor recreation and nature based tourism opportunities, facilities and accommodation services.*

### 1.1 Program Outline

Wetland Ecology is a guided program that consists of three components:

- Multidisciplinary preparatory activities to be completed at the school.
- A half-day field study conducted in a park or protected area that takes students through experiential activities focused on wetlands ecosystems.
- Post-visit activities, to be done at the school, that are intended to reflect on and apply what the students have learned.

Note: Checklists, which will help you organize your field study, are provided in this package.

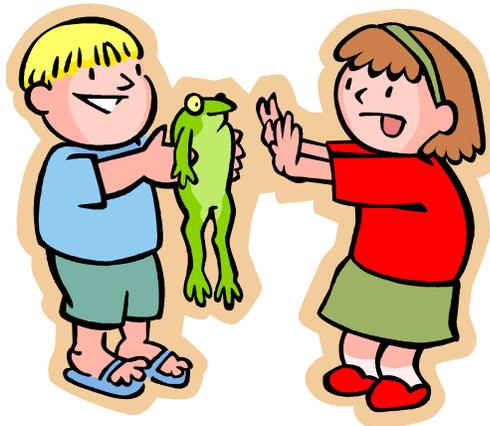
### 1.2 Program Objectives and Curriculum Fit

This field study program and the preparatory and post field study activities that complement it have been designed to address specific learner expectations from Topic E: Wetland Ecosystems (Grade 5) in the Elementary Science Program of Studies.

- Recognize and describe one or more examples of wetland ecosystems found in the local area; e.g. pond, slough, marsh, bog, or fen.
- Identify some plants and animals found at a wetland site, both in and around the water; and describe the life cycles of these plants and animals.
- Identify and describe adaptations that make certain plants and animals suited for life in a wetland.

- Understand and appreciate that all animals and plants, not just large ones, have an important role in a wetland community.
- Identify the role of different organisms in the food web of a pond: producers, consumers, decomposers.
- Recognize that some aquatic animals use oxygen from air and others from water, and identify examples and adaptations of each.
- Identify human actions that can threaten the abundance or survival of living things in a wetland ecosystem; e.g. adding pollutants, changing the flow of water, trapping or hunting pond wildlife.
- Identify individual and group actions that can be taken to preserve and enhance wetland habitats.

There are additional curriculum connections within the Language Arts, Social Studies and Mathematics program of studies.



## 2.0 PLANNING YOUR VISIT

Alberta's provincial parks and protected areas are ideal "outdoor classrooms". Our education staff provide direct programming and support materials to schools and youth groups in various sites. These services are aimed at increasing environmental awareness, understanding and stewardship of the natural world.

To provide your groups with the best experience possible, please review the following section thoroughly.

### 2.1 Safety in the Park

#### Your role...

School groups need to be prepared for the possibility of accidents. We strongly recommend that teachers and/or chaperones have a recognized and current first aid certification.

#### Our role...

In the event of an emergency, there are existing emergency response programs in place at our sites. Onsite personnel have basic first aid and CPR certification. As well, they can access emergency services such as local Emergency Medical Services, STARS Air Ambulance and R.C.M.P, by cellular and satellite telephone and radio. Depending on location, time of response is approximately 20 minutes.

Teachers can also access these resources by dialing 911. If you are guiding your own field study, please check with park personnel to verify your access to local communication sources.

### 2.2 Park Facilities

Many parks and protected areas offer groups the following facilities and services:

- A professional interpreter to guide you on your discovery (and to answer any questions about the visit package).
- All equipment needed for the field study (unless specified in this package).
- Staging/day use areas equipped with a shelter, water pump, pit toilets, and firepits.



## 2.3 Planning Checklist for Your Field Study



### Did you remember to...

- arrange for transportation to and from the park?
- confirm the meeting location with your interpretive guide?
- prepare student material (if required) and complete pre-visit activities at school with students?
- divide your students into small groups and select a volunteer leader for each group?  
We recommend 1 adult for every 5 students
- arrange for and prepare adult volunteers? We appreciate their help and they will be expected to participate in the program. It would be beneficial to:
  - clarify what their roles and responsibilities will be during the field-study
  - provide volunteers with any information they may need for the day
  - orient them to any specific health or student concerns
- ensure that students have lunches (if you are not preparing a BBQ) and that they are appropriately dressed for the weather? Students should wear long pants and bring rubber boots and an extra pair of socks.
- encourage students to reduce garbage in the park by bringing garbage-free lunches such as: reusable lunch bags and containers, drinks in cans or bottles?
- review and discuss the park rules and behavioural expectations found in the [Class Preparation Checklist For Your Field Study](#) on pages 7-8?



## 2.4 Class Preparation Checklist for Your Field Study



Here is a checklist of things to review at school prior to your field study.

- Discuss the roles and importance of provincial parks and protected areas.
  - Alberta contains many different natural landscapes and is home to numerous plant and animal species. Our parks and protected areas network helps to ensure that this environmental diversity is preserved for future generations. For more information on the parks and protected areas network, visit our web site at [www.albertaparks.ca](http://www.albertaparks.ca).
- Discuss how behaviour can affect the natural environment in a protected area. Have the class make a list of things they can do that show respect for living things and a commitment to their care. This list can include:
  - Leave ant hills, nests and rotting logs alone. These are homes for small animals.
  - Walk carefully around bushes and trees, rather than through them.
  - Stay on trails; do not pick or remove anything in a protected area, unless it is garbage.
- Discuss outdoor safety by creating an outdoor classroom safety plan. This plan could include:
  - Have a buddy that you spend the day with.
  - Always be in view of your teacher or adult leader.
  - Don't approach wild animals.
  - Wearing appropriate clothing for the season and for the activities of the day.
- Discuss behavioural expectations while in the park. Teachers are responsible for the behaviour and discipline of the student during our programs.
  - Explain that they are ambassadors for their school.
  - Review appropriate behaviour, both indoors and out.
  - Discuss the facility or the part of the park they will be visiting. Explain that the field study is a school, just a different location. All the school rules apply. Other schools will be using the park to work as well.



☐ Discuss the Park rules:

- Wildlife live in parks and protected areas because they are able to meet their needs for food, water, shelter and space. Feeding them is not necessary. In fact, it can create significant hardships for them because they become dependent on this food and the learned behaviors associated with this can also be dangerous for them. **Do not feed or harass wildlife.** Observe them quietly from a distance.
- Thousands of people visit parks and protected areas each year. If each person took only one cone or picked one plant, it would still have a very significant impact on the natural environment. **Cutting, defacing, picking or removal of any plant, fossil, rock or other Park material is prohibited.** Take only picture and leave only footprints.
- If those same thousands of people threw their garbage on the ground, it would be difficult to clean up and dangerous for wildlife that could mistake the litter for food. **Litter should be placed in garbage cans or in your pocket** if no garbage cans are available.
- Parks and protected areas should remain a natural place. Wildlife are not accustomed to pets chasing them or threatening them with noise. For these reasons, **pets must be on a leash** in the Park. This not only protects wildlife, it also protects people and their pets as well.
- Open fires are a threat to park habitat and human safety. For these reasons, **campfires are permitted only in designated firepits** located in picnic area. When using a firepit, please provide your own roasting sticks and kindling. **DO NOT USE BRANCHES OR DEADFALL FROM THE PARK** for the fire, and remove all garbage from the firepit area. Ensure your fire is out completely before leaving.



## 3.0 PRE-VISIT ACTIVITIES

The following pages contain a variety of pre-visit and post-visit activities that complement your field study and provide students opportunities to practice the skills that they will be using during and after their trip. If possible, invite the adult volunteers into the classroom to also experience these activities.

Feel free to use your own activities or the ones described in this package. Choose activities that reflect each specific learner expectation from the curriculum that will be addressed on the field study day (see **Section 1.2 Program Objectives and Curriculum Fit**).



### 3.1 Vocabulary

Review the following vocabulary with the class. This can be done in a number of ways:

- The words could be incorporated into the spelling program by using them in a weekly quiz.
- Students could be given a copy of the vocabulary list and asked to create poems or a crossword puzzle using the words on the list.
- A “Who Am I?” guessing game could be used that presents clues about each word individually. After each clue, students would deposit written guesses about what they thought the word was into a guessing box,. For example:

#### Who Am I?

Clue 1:

I am a powerful predator in a pond.

Clue 2:

My hind legs are long and hair to help me swim.

Clue 3:

In the larval state, I am known as a water tiger.



This terminology is used throughout the field study program. The more familiar students are with this vocabulary the more successful their field study experience will be.

- **Algae** – marine or freshwater plants that are single-celled, colonial, or multi-celled, with chlorophyll but no true roots, stems, leaves, flowers, or seeds
- **Amphipods** – small shrimp-like crustaceans
- **Bog (Muskeg)** – a type of wetland dominated by moss, characterized by low nutrient and oxygen availability, high acidity and peat accumulation
- **Ecosystem** – a community of interrelated organisms and their environment
- **Emergent** – plants which live partly in and partly out of the water
- **Fen** – a type of wetland characterized by a high water table with slow internal drainage by seepage down low gradients, dominated by sedges
- **Filter feeder** – a way that some animals sort out and eat very small plants and animals from the water
- **Food Chain** – a sequence of organisms in which each is food for the next
- **Food Web** – all the feeding relationships of a community taken together; includes producers, consumers, decomposers, and the flow of energy
- **Habitat** – the place where an organism lives
- **Invertebrate** – an organism without a backbone
- **Kettle** – a specific type of wetland in the rolling hills on the prairies created by glaciers
- **Larva** – a worm-like stage of development in an incomplete life cycle, after the egg and before the pupa and adult
- **Marsh (or slough)** – a depression filled with plants and open water; rich in nutrients and characterized by an emergent vegetation of reeds, rushes, cattails and sedges; they are the most productive wetlands habitat
- **Moraine** – a landform created when material was pushed up by a glacier into distinct landforms

- **Nymph** – The immature stage of an organism that hatch from eggs and gradually acquire adult form through a series of molts without passing through a pupal stage, part of the incomplete metamorphosis
- **Peat** – the dead remains of partly rotted plants that have piled up in deep layers over many years
- **Pond** – an open water wetland; can be seasonal or permanent
- **Sedge** – grass-like plants with long narrow leaves and three-sided stems, “sedges have edges”
- **Submergent** – plants which grow entirely underwater
- **Swamp** – a wetland dominated by shrubs or trees, may be flooded seasonally or for long periods of time
- **Slough (or marsh)** – a type of marsh lying in a depression, surrounded by dry land (prairie); they vary in size from a few metres across up to a few kilometers.

### 3.2 Types of Wetlands

Wetland is a term that refers to the partial flooding of an area of land for short or long periods of time. There are many different types of wetlands in Alberta. Each type of wetland is home to certain kinds of plants and animals. The most common wetlands types in Alberta are; marshes, bogs, fens, and ponds.

Students may research, define and produce a poster for each of the following types of wetlands; marsh, bog, fen, slough, pond.



### 3.3 Create a Kettle Pond

Just east of Edmonton lies an area known as the **Beaver Hills – Cooking Lake Moraine**. The rolling landscape of this area was shaped as glaciers from the last ice age receded some 12 000 years ago. As the continental ice sheets began to retreat, chunks of ice were left behind. These ice chunks were covered with till and other sediments. As the chunks of ice slowly melted, depressions and hills were formed on the surface of the earth. These hills are called **knobs** and the small depressions are called **kettles**. The kettles range in size from several metres to over the size of a football field. Melt water or precipitation collected in these newly created depressions forms the temporary or permanent ponds or wetlands now seen in all over Alberta.

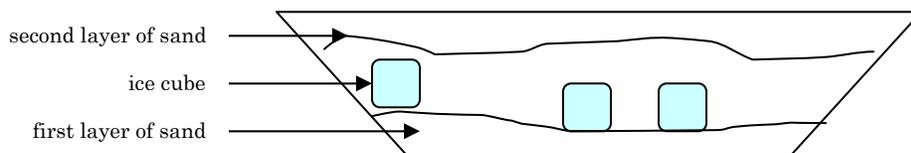
Try recreating your own knob and kettles with the following experiment.



### Materials:

- Baking pan
- Ice cubes
- Sand or other fine materials

1. Cover bottom of the pan with a layer of sand.
2. Place a few ice cubes on the pan on top of the sand layer.
3. Completely cover the ice cubes with another layer of sand.
4. Leave the pan at room temperature and watch the depressions form and change with time as the ice melts. (It will take up to 30 – 60 minutes for the ice to melt).
5. Have the student draw what the pan looked like every 10-15 minutes
6. Discuss with the class. When humans alter the landscape, how does the landscape adapt? Can it adapt?



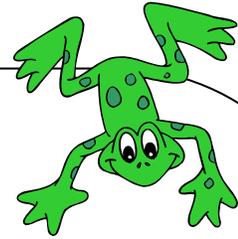
### 3.4 Interdependencies in Ecosystem

Review the follow ecological concepts with your students:

- **Interdependency** – the reliance of an organisms on other organisms to fill some or all of their survival needs of food, water, space and shelter
- **Adaptations** – specific structures and behaviours that help an organism survive within a specific ecosystem
- **Ecosystem** – community of organisms interacting with its environment, including non-living factors such as soil and water

Have the class create a chart or web listing the ways organisms affect or are affected by wetlands. Remind the students, if necessary, that the relationship may not be as obvious as food and shelter. Keep copies of the charts or webs. You will need them during the post-trip activity.

## 4.0 POST-VISIT ACTIVITIES



### 4.1 A Living Web

Imagine that you are looking at a handmade quilt made up of individual patches with different fabrics, colours, shapes, and sizes. They are stitched together into a beautiful and complex quilt. Removing one patch will not ruin the quilt, but it will lose some of its strength and beauty. Remove too many patches and you will destroy the quilt.

One can say that a wetland ecosystem is like a quilt. This “quilt” is stitched together by a series of complex and dynamic interactions and interrelationships. The patches represent the plants, insects, amphibians, algae, etc. in the wetland. This diversity of life is called **biodiversity**. Remove one patch and you will affect the wetland’s biodiversity. Remove too many patches and you risk destroying the wetland ecosystem. Thus, in order to sustain a healthy ecosystem, we must preserve biodiversity.

#### Materials:

- Ball of string
- Index cards (or scrap paper)
- Tape

1. Make a list of all the plants and animals that the students discovered during their field study. Assign items on the list to students and have them research food habits and predators for that plant/animal. Have the students write their findings on an index card, with the name of the plant or animal they researched. Have the students tape the cards on the front of their shirts.
2. Have the class stand in a circle. You are the sun. You begin making the web by wrapping the end of the string once around your hand, and then pass the ball to a student chosen to be a plant. Give that student the ball of string and ask him/her to then pass the ball to something that eats the plant, connecting one that is consumed to the consumer. This student should then wrap the string around his or her hand and pass it on and so on. The student can only receive the ball of string once.
3. Once the web is complete, have the students shift around until the web is taut. Discuss with the students that sometimes the role of a plant or animal in the web will change, or it may be removed altogether. All parts of the ecosystem are interconnected and interdependent; every link is vital to the health of the whole.
4. Scenario: Have the students decide which organism would most likely be affected if we sprayed pesticides over ponds to kill mosquitoes. Have the student wearing the sign give the string a tug. Anyone who feels the tug should raise his or her free hand. Then have these students tug in the string so the effects are passed throughout the web.
5. Debrief with a discussion that includes how we are all connected to wetlands, to animals, to plants, to people, and so on. Discuss alternative solutions to controlling mosquitoes without affecting the wetland’s biodiversity.

One strategy we use to maintain biodiversity involves protecting representative landscapes of Alberta's biodiversity. Alberta Parks and Protected Areas is a provincial effort to protect, inform about and involve the public in Alberta's environmental diversity. In these protected spaces, human activities are carefully managed and certain activities that harm ecological processes are controlled or prohibited. By protecting landscapes from potentially harmful activities, we protect the integrity of ecosystems.



#### 4.2 Plant Purifiers

Just as a human's kidney filters unwanted substances from our blood, wetland plants filter, absorb and break down many of the pollutants that find their way into the water. Excessive nutrients like phosphorus and nitrogen can enter the water system from agriculture and industrial development and can seriously pollute water and harm life that depends on the wetland. In fact, up to 92% of phosphorus and 95% of nitrogen draining from the surrounding watershed can be removed by passing through a wetland. Use the following experiment to show how plants absorb substances from the water.

##### Materials:

- Celery stalk (or a carnation flower)
- Water
- Glass
- Red food colouring

1. Add a few drops of food colouring to some water in a beaker. The food colouring represents pollutants in a wetland.
2. Cut a piece off the end of the celery and place it in the water. Leave it overnight.
3. Have the students respond to the following observations:
  - a. How can a plant purify the water?
  - b. Why is there still red water in the beaker?
  - c. Where does the water go after it is absorbed by the plant?
4. Discuss how some wetland plants, like cattails, can remove impurities from the water.

For more information on how wetlands keep our water clean, visit the following websites:

- <http://www.ducks.ca>
- <http://www3.gov.ab.ca/env/resedu/index.cfm>





### 4.3 Wetland Follow-up

Divide the class back into the small groups they were in during the field session. Distribute the Wetland Student Booklets provided at the field study. On the blackboard, compile a class list of discoveries in the wetland. What is the relationship between each plant, animal or insect? How does this list of relationships compare to the list compiled during the preparatory activity? Did the students discover some relationships they had not considered prior to their field trip? Correctly identifying every relationship is not critical. The students will learn from the process of considering the possibilities.



### 4.4 The Value of Wetlands

A. Using a class discussion, compile a master list of the functions of a wetland ecosystem. The list may include:

- cleans water
- provides valuable wildlife habitat
- reduces flooding
- replenishes ground water
- guards against soil erosion
- watershed maintenance

B. Using a class discussion, compile a master list of how people use wetlands. This list may include:

- bird watching
- wildlife viewing
- agriculture
- peat mining
- treats wastewater
- esthetics
- art



Organize the uses into the different categories of values: ecological, economical, cultural, spiritual, and recreational.

C. Have the students use the ideas in the two master lists to create a collage illustrating the values of wetlands. Students could draw their own pictures or cut them out of magazines, old calendars or newspaper advertisements.

D. Alberta's parks and protected areas are faced with many different values when they plan for the long-term management of wetlands. Four goals reflect a collective commitment to maintaining a network of protected areas for present and future generation. The primary goal of **preservation** is balanced with three other goals: **heritage appreciation**, **outdoor recreation**, and **heritage tourism**. Ask the students to think about the different competing values and how they would work to balance them.

- Whose concerns would they have to consider?
- How would they balance different values and in what circumstance would one value take precedence over another? How would they judge this?

Have the students make a brief written summary of their key points and to present them to the class.



#### 4.5 Threats to Wetlands

Wetlands face many pressures from peat mining, neighbouring land use, fire, drainage and pests. Destroying wetlands can lead to serious consequences such as; increased flooding, extinction of species and decline in water quality.

1. Post the following question for discussion by groups of students.
  - What human actions affect wetland ecosystems and its biodiversity?
2. Have the groups brainstorm and record their ideas on chart paper. After 15 minutes, have the groups share their ideas with the class.
3. Depending on the general responses by students, ask them if all human actions are necessarily bad or are necessarily good. Have the groups review their ideas and sort them into two categories; those that are harmful and those that are beneficial.
4. Have the groups design a conservation poster promoting preservation of wetlands.



#### 4.6 Getting Involved

Despite these many benefits that wetlands provide to people and wildlife, they continue to be lost due to industrial development, agriculture, pollution and climatic changes. Since the beginning of the 20<sup>th</sup> century, 60% of the wetlands have disappeared from Alberta's Parkland region alone.

As wetlands disappear, the many plants and animals that call this environment home are also in danger of disappearing. One third of North America's threatened and endangered species are found in wetlands. Preserving wetlands means balancing the needs of humans and protecting the existence of wetlands. Fortunately, more and more individuals are becoming aware of the functions and values wetlands provide and are shifting the focus to managing human activities so both wetlands and people can benefit. Have the students complete a web search on how they can become involved in preserving our wetlands. For example:

- There are a number of parks and protected areas in need of volunteers. Visit our website at <http://www.cd.gov.ab.ca/involved/parks/volunteer/index.asp> for current opportunities.



## **Wetland Ecology**

A field study program for Grade 5



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