Chapter 5

Curriculum Review

for Visitor Services in Alberta Parks Properties
in the David Thompson Corridor

Prepared by
EcoLeaders Interpretation and Environmental Education
Box D82, Bowen Island, BC V0N 1G0
email: info@ecoleaders.ca 0 phone: (604) 947-0483
www.ecoleaders.ca

SAMPLE PAGES

Contents

Introduction ... 5.1

Alberta Education Science Curriculum ... 5.3
- Focus on Inquiry Learning ... 5.4
- Focus on Science Literacy ... 5.4
- Focus on Experiential Education? ... 5.4
- Focus on Environmental Literacy ... 5.4

Philosophy ... 5.5
- Aims of Alberta Education's Three Levels of Science Programs ... 5.5
  - Focus on Constructivist Learning Theory ... 5.6

Primary Science ... 5.7
- Philosophy of the Primary Science Program ... 5.7
- Program Emphasis ... 5.7
- General Expectations ... 5.8
- Skills to Be Developed by Learners—Focus ... 5.8
- Focus ... 5.8

Compatible Science Curriculum Topics for Grades 1-6) ... 5.11

Grade 1 ... 5.12
- Topic A: Creating Colour ... 5.12
- Topic B: Seasonal Change ... 5.13
- Topic D: Senses ... 5.13
  - Using Questions With Students ... 5.14
  - Field Studies are *Not* the Only Option ... 5.14
- Topic E: Needs of Animals and Plants ... 5.15

Grade 2 ... 5.16
- Topic E: Small Crawling and Flying Animals ... 5.16

Grade 3 ... 5.17
- Topic A: Rocks and Minerals ... 5.17
- Topic E: Animal Life Cycles ... 5.19

Grade 4 ... 5.21
- Topic A: Waste and Our World ... 5.21
- Topic E: Plant Growth and Changes ... 5.22
  - Overview ... 5.22

Grade 5 ... 5.23
- Topic D: Weather Watch ... 5.23
- Topic E: Wetland Ecosystems ... 5.24

Grade 6 ... 5.25
- Topic C: Sky Science ... 5.25
- Topic D: Evidence and Investigation ... 5.27
- Topic E: Trees and Forests ... 5.28

SAMPLE PAGES

Compatible Science Curriculum Topics for Grades 7–9 ... 5.29
How To Use This Section ... 5.29
General Comments ... 5.29
Rational and Philosophy ... 5.31
Foundation 1 Science, Technology and Society ... 5.31
Foundation 3 Skills ... 5.31
Foundation 4 Attitudes ... 5.32

Areas of Emphasis ... 5.33
Developing a Nature of Science Emphasis (Grades 7–9) ... 5.33
Developing a Social and Environmental Emphasis (Grades 7–9) ... 5.34
A Summary of Grade 7 Unit A: Interactions and Ecosystems ... 5.35
Grade 8 Unit E: Freshwater and Saltwater Systems ... 5.36

Compatible Science Curriculum Topics for Grades 10–12 ... 5.38
General Principles ... 5.38
Science 10 ... 5.39
Unit D: Energy Flow in Global Systems ... 5.39
Science 20 ... 5.41
Unit 2: Changes in Living Systems ... 5.39
Biology 20 ... 5.45
Table 5.2 Relevant Details of Key Units of Biology 20 ... 5.45
Biology 30 ... 5.47
Table 5.3 Relevant Details of Key Units of Biology 30 ... 5.47
Learning About Environmental Stewardship ... 5.48

Alberta Education Social Studies Curriculum ... 5.49
Decision Making and Problem Solving ... 5.49
Metacognition ... 5.50
Grade Specific Curriculum Connections ... 5.51
Scope and Sequence ... 5.51
Summary of Social Studies Units and Topics that Fit With
Alberta Park's Visitor Services Mandate ... 5.51
Citizenship: Belonging and Connecting ... 5.51
Communities in Canada ... 5.51
Alberta: The Land, Histories and Stories ... 5.51
Canada: Origins, Histories and Movement of People ... 5.51

SAMPLE PAGES

Summary of Science Units and Topics that Fit With Alberta Parks' Visitor Services Mandate				
Grade or Course	Unit/ Topic*	Key Focus	Fit	
			Fit with Alberta Parks' Mandates	Compatible with Visitor Services Mandate
1	A	Creating Colour	✔	✔
	B	Seasonal Change	✔	✔
	D	Senses	✔	✔
	E	Needs of Animals and Plants	✔	✔
2	E	Small Crawling and Flying Animals	✔	✔
3	A	Rocks and Minerals	✔	✔
	E	Animal Life Cycles	✔	✔
4	A	Waste and Our World	✔	✔
	E	Plant Growth and Changes	✔	✔
5	D	Weather Watch	✔	✔
	E	Wetland Ecosystems	✔	✔
6	C	Sky Science	✔	✔
	D	Evidence and Investigation	✔	✔
	E	Trees and Forests	✔	✔
7	A	Interactions and Ecosystems	✔	✔
	E	Planet Earth	✔	✔
8	E	Fresh Water and Saltwater Systems	✔	Partly
9	A	Biological Diversity	✔	✔
Science 10	D	Energy Flow in Global Systems	✔	✔
Science 20	Unit 1	The Changing Earth	✔	Only Partly
	Unit 2	Changes in Living Systems	✔	✔
Science 30			No: features physical science and cell biology	
Biology 20	Unit A	Energy and Matter Exchange in the Biosphere	✔	✔
	Unit B	Ecosystems and Population Change	✔	✔
Biology 30	Unit D	Population and Community Dynamics	✔	✔

SAMPLE PAGES

Sources of Curriculum Information

EcoLeaders reviewed the Alberta Curriculum Guides for Social Studies and Science:

Science

- http://education.alberta.ca/teachers/program/science/programs.aspx

Social Studies

Social Studies Curriculum Guide

- education.alberta.ca/media/456082/sockto3.pdf

Overall Goal of School-Focused Visitor Services

The overall goals of Alberta Parks' education services are:

1. **To help educators bring their classrooms into the natural environment**
2. **To increase Albertan's understanding and awareness of the natural world (environmental literacy)**
3. **To instill a sense of stewardship and support for Alberta Parks in students, teachers, parents and the education community at large**

Alberta Education Science Curriculum

Focus for Alberta Parks

Alberta Education's science curriculum is broad, covering physics, chemistry and the natural sciences (astronomy, meteorology, geology, biology, genetics, ecology). Visitor Services programs focused on school science must have connections with Alberta Parks' education and stewardship mandates. This would focus on natural sciences, especially ecology and biology, with some opportunities in geology, astronomy and meteorology.

Another criteria for focusing on science is the set of natural features of the David Thompson Corridor or specific aspects of parks and protected areas therein, e.g., wetlands in Crimson Lake Provincial Park.

Using these criteria, specific teaching units from each grade level or course from the Alberta Education's science curriculum have been identified in this plan > They were chosen because they best fit Alberta Parks' mandates and the resources available in the David Thompson Corridor. The following pages contain a review of the Alberta Education curriculum units. The information gathered will be used by Visitor Services staff when developing science-based education programming for schools.

SAMPLE PAGES

Focus on Inquiry Learning

Inquiry is the process of finding answers to questions. The skills of science inquiry include asking questions, proposing ideas, observing, experimenting and interpreting the evidence that is gathered. Observation and evidence are key elements.

An inquiry may be initiated in a variety of ways. It may be based on a question forward by a teacher or student; or it may arise out of an activity, an interesting observation, an unexplained event or a pattern that appears worth pursuing. Engagement in inquiry is not a linear process; it can have a variety of starting points, and the steps followed may vary from one inquiry activity to another. When an unexpected observation is made or a procedure does not work, there is opportunity for new ideas to emerge and a new set of procedures to be followed.
Focus on Inquiry: A Teacher's Guide to Implementing Inquiry-based Learning 2004

Scientific inquiry refers to the diverse ways that scientists study the natural world and propose explanations based on the evidence derived from their work. Inquiry also refers to the activities of students that they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world.

Inquiry is a multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations. Students … should develop the capacity to conduct complete inquiries.
National Science Education Standards 1996 developed by the US National Academy of Sciences.

Focus on Science Literacy

According to Alberta Education:
The goal of scientific literacy is to develop the science-related knowledge, skills and attitudes that students need to solve problems and make decisions, and at the same time help them become lifelong learners— maintaining their sense of wonder about the world around them.

Diverse learning experiences within the science program provide students with opportunities to explore, analyze and appreciate the interrelationships among science, technology, society and the environment, and develop understandings that will affect their personal lives, their careers and their futures.

Alberta Education Science Curriculum Grades 8–8–9: www.education.alberta.ca/media/654829/sci7to9.pdf

Focus on Experiential Education

Experiential education is a "process" or "method" that can be used to teach. This process can take place in any location and does not require the learner to be outdoors. The Association for Experiential Education (AEE) defines the term as:

"… a process through which a learner constructs knowledge, skill, and value from direct experiences."

This definition is followed by 12 principles, including these three learning principles:

- Experiential learning occurs when carefully chosen experiences are supported by reflection, critical analysis, and synthesis
- The results of the learning are personal and form the basis for future experience and learning
- Opportunities are nurtured for learners and educators to explore and examine their own values

The AEE definition embraces constructivist learning theory as well as the traditional practice of learning by doing. Also experiential education requires the learner to take initiative, make decisions, and be accountable for the results.

Experiential education is learning where students are active participants in their learning–not just passive recipients of information. In experiential education the learner:

- acts
- understands the effects or consequences of the action
- extends his/her understanding of the specific action/reaction relationship to the general principle that applies to a broader range of actions/reactions
- applies his/her understanding to a new situation within the range of the general principle

SAMPLE PAGES

Focus on Environmental Literacy

Environmental literacy is the desired outcome of environmental education programs. Environmentally literate individuals understand both ecological and social-political systems and have the inclination to apply that understanding to any decisions that pose consequences for environmental quality. The National Project for Excellence in Environmental Education developed a framework depicting four strands of environmental literacy. These are:

- personal and civic responsibility
- knowledge of environmental processes and systems
- skills for understanding and addressing environmental issues
- questioning and analysis skills

Goals of Environmental Literacy

An environmentally literate citizen should be able to apply informed decision making processes to maintain a sustainable lifestyle. In order to do so, she/he should:

- understand ecological systems
- understand the cause and effect relationship between human attitudes and behavior and the environment
- be able to evaluate alternative responses to environmental issues before deciding on courses of action
- understand the effects of multiple uses of the environment.

Philosophy

The educational philosophy of Alberta Education's approach to science education is outlined in the preambles to their primary, junior secondary and senior secondary science curriculum guides. Key components are summarized below.

Inquiry Learning

It is clear that the overlying philosophy throughout is inquiry learning (see Focus on Inquiry Learning on the facing page). Development of inquiry learning skills is central to the primary science program and is a key component of the junior and senior secondary program.

Science Literacy

A key aim of the junior and senior secondary program is to develop science literate citizens (see sidebar: Focus on Science Literacy on on the facing page). Included in science literacy, Visitor Services staff can also include environmental literacy (see sidebar: Focus on Environmental Literacy on on the facing page).

➥ Implications for the Education Programming in the David Thompson Corridor

1. All school science programs should have an inquiry learning focus with:
   - student-focused discovery-based activities
   - students may take part in on-site projects developed by Alberta Parks staff, volunteers and partners where they apply scientific methods and possibly contribute to:
     - wetland inventories in Crimson Lake Provincial Park
     - wildlife and plant inventories
     - studies on plant and wildlife ecology
   - there is little place for lecture-style instruction by Alberta Parks staff, volunteers and partners
2. School programs for most grades but especially for junior and senior secondary students can include information about and opportunities to take part in role-play or shadow any science-based projects that are taking place in the park. Information about the reasons for and the results of these studies will enhance the practical science literacy of students. The opportunity to have contact with real scientists (or at least science in action) and perhaps contribute to their work will make these experiences meaningful and relevant.

Aims of Alberta Education's Three Levels of Science Programs

Primary Science Program (Grades K-6)

- *encourage and stimulate children's learning by nurturing their sense of wonderment, by developing skill and confidence in investigating their surroundings and by building a foundation of experience and understanding upon which later learning can be based*
- *engage students in a process of inquiry and problem solving in which they develop both knowledge and skills*
- *develop a framework for students to understand and interpret the world around them*
- *prepare students for life in a rapidly changing world—a world of expanding knowledge and technology in which new challenges and opportunities continually arise*

➥ Implications for the Education Programming in the David Thompson Corridor

1. The first two bullets above should be included in the learning outcomes section of school planning forms for programs aimed at K–6 students. Visitor Services staff should encourage the sense of wonder through discovery and sensory activities with the plants, animals and habitats of specific sites such as wetlands in Crimson Lake Provincial Park.

Junior Secondary Science Program (Grades 7–9)

To assist students to become scientifically literate through the development of:

- *a thorough knowledge of science and its relationship to technologies and society*
- *broad-based skills needed to identify and analyze problems; explore and test solutions; and seek, interpret and evaluate information*
- *meaningful context—providing opportunities for students to explore the process of science, its applications and implications, and to examine related technological problems and issues in ways that are relevant to them and to society*
- *an awareness of the role of science in responding to social and cultural change and in meeting needs for a sustainable environment, economy and society*

➥ Implications for the Education Programming in the David Thompson Corridor

1. Visitor Services programs should be hands-on activities—students practising authentic science—i.e., citizen science projects.
   - look into existing projects such as PlantWatch and FrogWatch (see Chapter 4: Analysis of Potential Partners for details)
   - also use support materials at Citizen Science Central (also see Chapter 6)
2. When possible students should be exposed to scientists who are doing actual studies —e.g., scientists doing research on Crimson Lake wetlands).

SAMPLE PAGES

Compatible Science Curriculum Topics for Grades 1-6)

How To Use This Section
This section on grade-specific science curriculum topics for elementary school (Grades 1–6) that are compatible with the mandates of Alberta Parks and individual parks and protected areas in the David Thompson Corridor. This information can be used by Visitor Services staff, volunteers and partners to:

- select curriculum-related topics for elementary school-focused Visitor Services
- use the general overview, Relevant General Learner Expectations and Relevant Specific Learner Expectations to develop Visitor Services that are grade-specific and relevant to student and teacher needs

General Comments

Traditionally, elementary classes have been the largest school consumers of Visitor Services for most North American park systems. This is often because these grades have single teachers who can easily arrange a half-day to full-day field trip focusing on one unit within a single or multiple subject areas. Also, primary schools often have fewer courses and activities making demands on a limited budget. Therefore, they are often able to find the funds for bussing to field trip sites.

Situations are changing, with many schools facing budget cuts and increased travel costs. Visitor Services staff will need to keep tabs on field trip trends within primary grades and all other grades.

EcoLeaders believes that primary grade classes will continue as the main market for school field trips in the foreseeable future. Therefore, more work has been done in the review of the science units developed by Alberta Education for grades 1–6 than for other grade levels.

We have identified 14 units or science topic areas from the current Alberta Education Primary Science Curriculum Guide (see table on following page) that have direct connection to protected areas in the David Thompson Corridor. These units are rated by importance (Moderate, High, Very High). Criteria include relevance to Alberta Parks' current and anticipated mandate (see the Foundations chapter).

The units we have selected are covered in some detail in the following pages with the following information:

- general overview of the topic
- Relevant General Learner Expectations
- Relevant Specific Learner Expectations
- implications for delivering school-focus Visitor Services (when appropriate)
- recommended Alberta Parks for field trips

Appropriate Science Units Rated by Importance to Alberta Parks Visitor Services

Grades	Unit	Importance*
1	Topic A: Creating Colour	Moderate
	Topic B: Seasonal Change	Moderate–High
	Topic D: Senses	Moderate–High
	Topic E: Needs of Animals and Plants	Very High
2	Topic E: Small Crawling and Flying Animals	High
3	Topic A: Rocks and Minerals	Moderate
	Topic E: Animal Life Cycles	Very High
4	Topic A: Waste and Our World	High
	Topic E: Plant Growth and Changes	Very High
5	Topic D: Weather Watch	Moderate
	Topic E: Wetland Ecosystems	Very High
6	Topic C: Sky Science	Moderate
	Topic D: Evidence and Investigation	Moderate
	Topic E: Trees and Forests	Very High

Importance Rating Scale
This is a general scale based on EcoLeades' estimation of how closely a teaching unit fits with the mandates of Alberta Parks. Also, accessibility of park features may also be taken into consideration.

SAMPLE PAGES

Grade 2

Topic E: Small Crawling and Flying Animals

Overview

Students will:

- *learn about the structure and life habits of animals by studying small animals that live in their own community*
- *investigate outdoor spaces in and around the school and their homes*
- *discover a wide range of animals that find shelter and food within the local area*
- *by studying these animals, they learn about where animals live, what they eat, what they are eaten by and features of the animals that suit them to their particular environment*

SAMPLE PAGES

Relevant General Learner Expectations

Students will:

- *describe the general structure and life habits of small crawling and flying animals; e.g., insects, spiders, worms, slugs; and apply this knowledge to interpret local species that have been observed*

Relevant Specific Learner Expectations

Students will:

1. *Recognize that there are many different kinds of small crawling and flying animals, and identify a range of examples that are found locally.*
2. *Compare and contrast small animals that are found in the local environment. These animals should include at least three invertebrates—that is, animals such as insects, spiders, centipedes, slugs, worms.*
3. *Recognize that small animals, like humans, have homes where they meet their basic needs of air, food, water, shelter and space; and describe any special characteristics that help the animal survive in its home.*

4. *Identify each animal's role within the food chain. To meet this expectation, students should be able to identify the animals as plant eaters, animal eaters or decomposers and identify other animals that may use them as a food source.*
5. *Describe the relationships of these animals to other living and non-living things in their habitat, and to people.*
6. *Identify and give examples of ways that small animals avoid predators, including camouflage, taking cover in burrows, use of keen senses and flight.*
7. *Describe conditions for the care of a small animal, and demonstrate responsible care in maintaining the animal for a few days or weeks.*
8. *Identify ways in which animals are considered helpful or harmful to humans and to the environment.*

➥ **Implications for the Education Programming in the David Thompson Corridor**

1. This is a broad topic that could feature discovery and observation of many of the terrestrial and aquatic invertebrates found in site in the David Thompson Corridor. The concept of capture, proper care and release back to the appropriate environment can be modeled by:
   - by park staff and volunteers
   - by professional and amateur biologists doing research in parks in the David Thompson Corridor
     - perhaps with the supervised assistance of students

   in hands-on discovery programming.

   The need for direct exposure such at this is championed by thinkers such as Richard Louv, author of *Last Child in the Woods* and leading child behaviour researcher like David Sobel author of *Childhood and Nature: Design Principles for Educators* and *Biophobia*. These authors and many others strongly endorse hands-on contact with small creatures as an important step to a child's making connections to nature and developing commitment to nature stewardship action.

   This type of activity strengthen the stewardship ethic that is part of Alberta Parks' mandate.

Grade 3

Topic A: Rocks and Minerals

© William Husby

SAMPLE PAGES

Overview

Students will:

- *learn about materials found on Earth's surface—rocks, minerals and soil*
- *closely examine sample rocks*
- *discover similarities and differences and explore these, using simple tests and tools*
- *learn that each kind of rock has a set of characteristics and that these characteristics can be used in classifying and identifying them*
- *in studies of soil, discover that the component materials include rock fragments and remains of living things and living things*
- *find that different soils have different compositions*
- *learn that the characteristics of rock and soil are important to their use within the community*

Relevant General Learner Expectations

Students will:

- *demonstrate knowledge of materials that comprise Earth's crust, and demonstrate skill in classifying these materials*

Relevant Specific Learner Expectations

Students will:

1. *Compare samples of various kinds of rock, and identify similarities and differences.*
2. *Given a description of the properties of a particular rock or mineral, identify a sample rock or mineral that matches those properties. Properties that students should be able to describe and interpret include:*
   - *colour*
   - *lustre or "shininess"; e.g., shiny, dull, glassy, metallic, earthy*
   - *texture; e.g., rough, smooth, uneven*
   - *hardness, based on scratch tests with available materials*
   - *presence of carbonates. Note that the presence of carbonates can be tested with vinegar or another mild acid*
   - *crystal shape for minerals, or overall pattern of rocks*
3. *Describe and classify a group of rocks and minerals, based upon the above properties.*

➥ Implications for the Education Programming in the David Thompson Corridor

1. An education program on weather and weather watching could be offered at Crimson Lake Provincial Park and perhaps other locations in the corridor.
    - the park could set up a weather station at Crimson Lake Provincial park with funding from local partners and in partnership with Environment Canada or other agencies
    - locations where weather impacts are visible, such as the shoreline of lakes and ponds and the water flow of creeks where changing weather-related water levels are visible, would be ideal
    - can especially feature the effects that forests and water bodies have on microclimate
    - can also include slope and aspect-related microclimates (this is especially visible on slopes in Kootenay Plains
    - may include a focus on chinooks and plant adaptations to this phenomena
    - there are partnership possibilities with federal and provincial meteorology agencies and universities
    - can also include a focus on monitoring and predicting the effects of climate change

Topic E: Wetland Ecosystems

SAMPLE PAGES

Overview

Students will

- *learn about wetland ecosystems by studying life in a local pond, slough, marsh, fen or bog*
- *through classroom studies, and studies in the field, students learn about organisms that live in, on and around wetlands and about adaptations that suit pond organisms to their environment*
- *through observation and research, students learn about the interactions among wetland organisms and about the role of each organism as part of a food web*
- *the role of human action in affecting wetland habitats and populations is also studied*

Relevant General Learner Expectations

Students will

- *describe the living and nonliving components of a wetland ecosystem and the interactions within and among them*

Relevant Specific Learner Expectations

Students will:

1. *Recognize and describe one or more examples of wetland ecosystems found in the local area; e.g., pond, slough, marsh, bog, fen.*
2. *Understand that a wetland ecosystem involves interactions between living and nonliving things, both in and around the water.*
3. *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.*
4. *Identify and describe adaptations that make certain plants and animals suited for life in a wetland.*
5. *Understand and appreciate that all animals and plants, not just the large ones, have an important role in a wetland community.*
6. *Identify the roles of different organisms in the food web of a pond:*
   - *producers—green plants that make their own food, using sunlight*
   - *consumers—animals that eat living plants and/or animals*
   - *decomposers—organisms, such as molds, fungi, insects and worms, that reuse and recycle materials that were formerly living*
7. *Draw diagrams of food chains and food webs, and interpret such diagrams.*
8. *Recognize that some aquatic animals use oxygen from air and others from water, and identify examples and adaptations of each.*
9. *Identify human actions that can threaten the abundance or survival of living things in wetland ecosystems; e.g., adding pollutants, changing the flow of water, trapping or hunting pond wildlife.*
10. *Identify individual and group actions that can be taken to preserve and enhance wetland habitats.*
11. *Recognize that changes in part of an environment have effects on the whole environment.*

➥ Implications for the Education Programming in the David Thompson Corridor

1. An education program featuring wetland ecosystems offered at Crimson Lake Provincial Park is already popular (nearly 40% of spring environmental education programs delivered over the past two years have focused on wetlands). Wetland education programs could also attract students from much of Central Alberta. This should be developed in conjunction the wetland education program at Fish Creek Provincial Park in Calgary. Because that park is designated by Alberta Parks as a centre of excellence for environmental education they could mentor the development of a wetland learning centre at Crimson Lake. Also, since Fish Creek's Environmental Learning Centre draws student's from Calgary and southern Alberta, the Crimson Lake wetland education centre would most likely focus on a market extending fro Red Deer north to Edmonton.

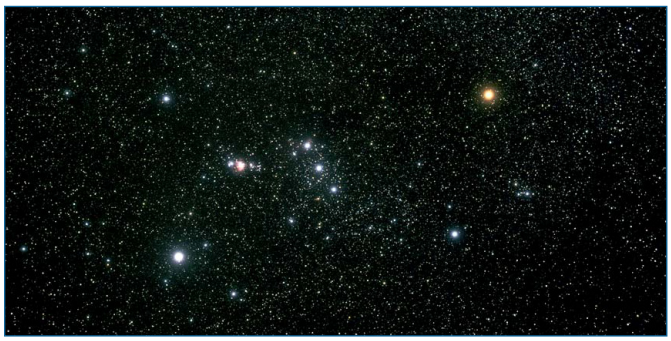
   A wetland education centre makes sense at Crimson Lake because:
   - the park has a wide variety of wetland types that could be accessed by students (note that this would require park staff to identify and map locations of wetland types and develop a series of trails to access a variety of representative types.
     - students can compare and contrast the natural features of these wetland types
   - can include the importance of beaver to the area's wetlands
   - the park could pursue a partnership with Ducks Unlimited Canada to develop and deliver wetland programs to grade 5 students

   A wetland education centre could be simple, dock and equipment shelter located at the Crimson Lake Beaver Pond or it could be something much more substantial. See the education section of the Program Statements and Implementation (Chapter 17) for more details.

SAMPLE PAGES

Grade 6

Topic C: Sky Science



Overview

Students will:

- *learn about objects in the day and night sky*
- *through direct observation and research, students learn about the motions and characteristics of stars, moons and planets*
- *using simple materials, such as balls and beads, students create models and diagrams which they use to explore the relative position and motion of objects in space*
- *move from a simple view of land and sky, to one that recognizes Earth as a sphere in motion within a larger universe*
- *revisit the topics of seasonal cycles, phases of the Moon and the apparent motion of stars.*

Developing a Social and Environmental Emphasis (Grades 7–9)

Key Concepts	Skills
After completing this unit students will have been exposed to the following concepts: • Science and technology are developed to meet human needs and expand human capability. • Science and technology have contributed to human well-being and have influenced, and been influenced by, social development. • Science and technology have both intended and unintended consequences for humans and the environment. • Society provides direction for scientific and technological development. - Canadian society supports scientific research and technological development that helps achieve a sustainable society, economy and environment. - Decisions regarding scientific and technological development involve a variety of considerations, including social, environmental, ethical and economic considerations. - Society supports scientific and technological development by recognizing accomplishments, publishing and disseminating results, and providing financial support. • Scientific and technological activity may arise from, and give rise to, such personal and social values as accuracy, honesty, perseverance, tolerance, open-mindedness, critical-mindedness, creativity and curiosity. • Science and technology provide opportunities for a diversity of careers, for the pursuit of hobbies and interests, and for meeting personal needs.	In these grades student will focus on developing their research and scientific inquiry skills that include: **Initiating and Planning Skills** • identify science-related issues • identify questions to investigate arising from science-related issues • select appropriate methods and tools for collecting relevant data and information. **Performing and Recording Skills** • research information relevant to a given question, problem or issue • identify information and data that are relevant to the issue • select and integrate information from various print and electronic sources, or from several parts of the same source **Analyzing and Interpreting Skills** • apply given criteria for evaluating evidence and sources of information • identify new questions and problems that arise from what was learned • identify and evaluate potential applications of findings **Communication and Teamwork Skills** • work cooperatively with team members to develop and carry out a plan and troubleshoot problems as they arise • defend a given position on an issue, based on findings • evaluate individual and group processes used in investigating an issue and in evaluating alternative decision

SAMPLE PAGES

The following tables contain information gathered from Alberta Education's Curriculum Guide for grade 7–9 science. Three teaching units are featured. These units are compatible with the goals and objectives of Alberta Parks. Each unit contains comments about the implications for Visitor Services for schools in the David Thompson Corridor.

Key Science Units Grades 7–9 (from Alberta Education Science Curriculum Guide)

Grades	Unit	Importance
7	Unit A: Interactions and Ecosystems	**High Potential** The features of Crimson Lake Provincial Park and Kootenay Plains Ecological Reserve make them ideal locations for this unit (see summary table). Here students will investigate the key components of the natural environment and relate how the environment supports us and how in turn we affect the environment. As you read through the curriculum, you will see that there are many tie-ins to Alberta Parks foundations and activities.
8	Unit E: Freshwater and Saltwater Systems	**Moderate/High Potential** Since this unit looks at freshwater systems and oceans, Alberta Parks will not afford complete coverage due to the lack of ocean access. However, the corridor's extensive supply of freshwater systems provides a broad spectrum of freshwater habitats for study. As you read through the curriculum, you will see that there are many opportunities for Visitor Services staff to develop activities and projects that will fit this unit.
9	Unit A: Biological Diversity	**High Potential** The David Thompson Corridor and Crimson Lake Provincial Park in particular consist of rich mosaics of habitats supporting a diverse flora and fauna. This make these areas ideal locations for hands-on discovery activities featuring discovery of biological diversity (see the unit summary table).

Grade 9 Unit A: Biological Diversity

	Key Content of the Curriculum Guide	Implications for VS Services
Key Point	This unit has a field biology and a lab-based genetics component. VS services should focus on field studies. • biological diversity is reflected in the range of species found in local and global environments and by subtle variations in characteristics found within individual species.	The parks in the David Thompson Corridor have rich mosaics of natural and human-altered habitats that support a wide variety of plant and animal species that illustrates the concept of biological diversity.
Overview	Student will learn that: • biological diversity is reflected in the range of species found in local and global environments and by subtle variations in characteristics found within individual species • diversity is maintained through: - natural processes of sexual and asexual reproduction - the survival of individual species—and variations within those species—may be influenced by ecological and human-caused factors Students examine trends toward loss of diversity and examine related issues concerning environmental quality and the impact of technologies.	
Focussing Questions	• What is biological diversity? • By what processes do diverse living things pass on their characteristics to future generations? • What impact does human activity have on biological diversity?	The questions set an inquiry-learning tone.
Key Concepts:	• biological diversity • species • diversity within species • habitat diversity • niches • populations	All can be addressed in the parks in the David Thompson Corridor.
Know-ledge Out-comes	1. Investigate and interpret diversity among species and within species, and describe how diversity contributes to species survival 2. Investigate the nature of reproductive processes and their role in transmitting species characteristics 3. Describe, in general terms, the role of genetic materials in the continuity and variation of species characteristics; and investigate and interpret related technologies 4. Identify impacts of human action on species survival and variation within species, and analyze related issues for personal and public decision making	There is a strong stewardship component in this unit. Students will: • *Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment (e.g., consider implications of changing land use on the welfare and survival of living things; identify potential conflicts between attempting to meet the wants and needs of humans and, at the same time, providing life-supporting environments for all living things; minimize environmental impact during studies by avoiding sampling that will affect an animal or plant population)* There are many opportunities to look at Alberta Park's many stewardship initiatives.
Skill Outcomes	Initiating and Planning • Ask questions about the relationships between and among observable variables, and plan investigations to address those questions Performing and Recording • Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data Analyzing and Interpreting • Analyze qualitative and quantitative data, and develop and assess possible explanations Communication and Teamwork • Work corroboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	
Attitude Outcomes	Interest in Science • show interest in science-related questions and issues • pursue personal interests and career possibilities within science-related fields Mutual Respect • appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds Scientific Inquiry • seek and apply evidence when evaluating alternative approaches to investigations, problems and issues Collaboration • work corroboratively in carrying out investigations and in generating and evaluating ideas Stewardship • demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment - assume personal responsibility for one's impact on the environment - predict consequences of proposed personal actions on the environment - consider both immediate and long-term consequences of group actions - identify, objectively, potential conflicts between responding to human wants and needs and protecting the environment Safety • show concern for safety in planning, carrying out and reviewing activities	

SAMPLE PAGES