

ECOSYSTEMS AND IMPACTS

An Educational Field Study for Biology 20 and Science 20 Students

(Revised September 2018)



Fish Creek Provincial Park

Telephone: (403) 297-7927

www.fish-creek.org



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Section I – Before You Go

1. Specific Learner Outcomes / Curriculum Connections

Curriculum Connections

The Ecosystems and Population Change field study will provide students with guided practice, in an authentic setting to support the Biology 20, Unit B: Ecosystems and Population Change as set forth by the Alberta Education.

Program Concepts

1. Ecosystems have distinctive biotic and abiotic factors.
2. Limiting factors can influence organism distribution and range.
3. Human activity can have both intended and unintended consequences for humans and the environment.
4. Alberta Parks helps to protect Alberta's biodiversity.

General Outcome 1

Students will explain that the biosphere is composed of ecosystems, each with distinctive biotic and abiotic characteristics.

Outcomes for Knowledge

Students will:

- B1.1k Define and explain the interrelationship among species, population, community and ecosystem.
- B1.2k Explain how a terrestrial and an aquatic ecosystem supports a diversity of organisms through a variety of habitats and niches.
- B1.3k Identify biotic and abiotic characteristics and explain their influence in an aquatic and a terrestrial ecosystem in a local region.
- B1.4k Explain how limiting factors influence organism distribution and range.
- B1.5k Explain the fundamental principles of taxonomy.

Outcomes for Science, Technology and Society

Students will:

- B1.1sts Explain that science and technology have both intended and unintended consequences for humans and the environment.

Skill Outcomes

Students will:

- Bl.1s Ask questions about observed relationships and plan investigations of questions, ideas, problems and issues, and define and delimit problems to facilitate investigation by
- Hypothesizing the ecological role of biotic and abiotic factors.
- Bl.2s Conduct investigations into relationships between and among observable variables and use a broad range of tools and techniques to gather and record data and information by
- Performing a field study to measure, quantitatively, appropriate abiotic characteristics of an ecosystem or ecosystems and to gather evidence for analysis, both quantitatively and qualitatively, of the diversity of life of the ecosystem(s) studied.

Analyzing and Interpreting

Students will:

- Bl.3s Analyze data and apply mathematical and conceptual models to develop and assess possible solutions by
- applying classification and binomial nomenclature systems in a field study.
 - analyzing the interrelationship of biotic and abiotic characteristics that make up the ecosystem(s) studied in the field.

Communication and Teamwork

Students will:

- Bl.4s Work as members of a team in addressing problems and apply the skills and conventions of science in communicating information and ideas and in assessing results by
- working cooperatively to gather and share data on field trip
 - working cooperatively to make clear and logical arguments to defend a decision on a given issue

2. Vocabulary and Definitions

Vocabulary

The following vocabulary will be used throughout the field study. It's expected that students will have a working knowledge of these terms. The following resources were used to develop these definitions:

The Oxford Concise Dictionary of Ecology by Michael Allaby, Oxford University Press (1996)

The Oxford Concise Dictionary of Zoology by Michael Allaby, Oxford University Press (1996)

Dictionary of Biology by M. Thain and M. Hickman, Penguin Books (1994)

Gage Canadian Dictionary, Gage Educational Publishing Company, (1997)

Teacher Instructions

There is a significant amount of vocabulary involved with this field study. This list, with definitions, is designed to help students sort the vocabulary into meaningful groups so that it can be used successfully for pre-visit activities, the field study day, and post-visit activities.

General Ecosystem Terms

abiotic: The non-living components of the environment (physical and chemical), such as air and water.

adaptation: A structure or behaviour that increases an organism's chance of surviving or reproducing in a particular environment.

biodiversity: The variety of life on Earth; most commonly, the genetic variability within individual species, variety of living species; and the variety of different ecosystems.

biotic: The living components of the environment; in other words, all other organisms in the environment.

community: A group of interacting populations of two or more different species that live together in a particular environment.

ecology: The scientific study of the inter-relationships among organisms and between them.

ecosystem: A network or system of interdependent living (biotic) and non-living (abiotic) things.

environment: The complete range of external conditions, physical and biological, in which an organism lives.

humus: The decomposed (or decomposing) organic material (usually by bacteria and fungi) found in soil.

micro-environment: A small area of an environment that has different conditions (such as temperature and/or humidity) compared with the larger environment of which it is a part.

organism: A life form.

population: A group of organisms, all of the same species, which occupies a particular area.

Measurement Terms

aspect: The directional orientation of a slope which creates differing situations of heat, light and amount of sunshine.

quadrat: A basic ecological sampling unit, ranging in size from one square metre in grasslands, to 10 square metres in forested areas. These smaller units of measure are used for making accurate estimates of the biotic and abiotic features within an ecosystem.

slope: The angle of an area of land.

transect: (1) A line used in ecological study to provide a means of measuring and representing, geographically, the distribution of organisms. Recordings are made at regular intervals. Transects are particularly useful for exploring transitions and the distribution of living and non-living things across an ecosystem. (2) A technique for estimating populations that involves running a straight line of string through the area being studied. At regular intervals along the string, every organism that touches the string, or grows directly above or below it is identified and counted.

Food Web Terms

decomposer: An organism that feeds (to gain energy and nutrients) on material that had once been alive.

deciduous: Plants whose leaves fall off annually, usually in the autumn.

coniferous: Seed-bearing plants that produce cones and bear leaves all year round.

consumer: An organism that obtains its food (to gain energy and nutrients) by eating other organisms.

fauna: All the animal species of a given area.

flora: All the plant species that make up the vegetation of a given area.

producer: An organism that is able to manufacture food from simple inorganic substances.

Land Use Terms

aesthetic features: Sensory aspects of a landscape associated with its natural beauty and wonder.

conservation: The process of managing human use of the environment to ensure that heritage values are considered and such uses are sustainable.

indicator species: A species whose ecological requirements are well understood and where changing population numbers will indicate a particular environmental condition or set of conditions. Indicator species can also give a good indication of how other organisms may be surviving.

land-use: Any behaviour or activity that occurs on a parcel of land.

protected area: Protected areas are natural landscapes that are explicitly legislated to preserve natural heritage values. Management guidelines and monitoring programs must ensure the long term preservation of biodiversity. Environmental diversity (biodiversity) is understood to include all species of plants, animals and other organism, and the habitat, and ecological processes upon which they depend. Protected areas are internationally recognized as one of the cornerstones of biodiversity preservation.

stewardship: Management of the heritage of our natural spaces, species and culture in such a way that it can be passed on, intact, to future generations.

sustainable: Management that ensures that the present uses (human and otherwise) of an area and its resources, do not compromise the future health, availability and prospects for future generations.

3. Park Etiquette – Key Messages to review before your field trip

1. Alberta's Parks and Protected Areas belong to all Albertans and contain many different natural landscapes that are home to numerous plant and animal species. The province's network of parks and protected areas covers roughly 27,500 square kilometres and includes more than 500 sites. This network helps to ensure that Alberta's biodiversity is preserved for future generations.
2. Our vision: "Alberta's Parks inspire people to discover, value, protect, and enjoy the natural world and the benefits it provides for current and future generations".
3. Provincial parks exist to protect provincially significant natural, historical and cultural features. They contain a range of outdoor recreation, interpretive, and environmental education opportunities, facilities and services so that visitors can explore, learn, understand, and appreciate the natural world.
4. The Provincial Parks Act protects Alberta's parks. It is through this legislation that these landscapes have specific and important guidelines to help keep them healthy and vibrant.
5. Feeding of wildlife is not necessary and is potentially dangerous and is against Park rules. The Park's ecosystem provides all the food and habitat wildlife requires for their basic needs. Human food does not meet their nutritional requirements and can cause some species to become dependent on humans. Quietly observe all wildlife from a comfortable distance.
6. Take only pictures. Everything in the Park – living and non-living is protected to help preserve the complex living system that thrives in our provincial parks. Students are welcome to share their discoveries, but must remember to leave everything as they found it. Treat plants, insects, and trees gently to avoid unnecessary injury or damage. Please do not pick plants.
7. There are no off-leash areas in Alberta's Parks and Protected Areas. This protects the parks wildlife as well as domestic pets. Please do not bring pets on a field study. They can be distractions for students and pose a health risk for those allergic to pets. Guide Dogs and Assisted –Living Dogs are the only animals permitted in Park buildings.
8. Litter should be placed in the rubbish bins provided or in a pocket. Human litter is hazardous to Park plants and wildlife.
9. Use only designated fire pits. Open fires are a threat to public safety and Park habitats. The burning of Park vegetation is not permitted. You must bring your own firewood and water to extinguish the fire.

4. Scientific Teams – Preparing Students to Work Together

The field study you are preparing for is a full-day of exploration and data collection in an outdoor, natural environment setting. It is important that your students understand what they are responsible for and what your expectations are. Be sure to review the Park Etiquette and your own expectations with them before coming to the Park.

Review the data forms that students are expected to complete while on the field study. Reflect and think about the personalities of your students. Take all of this information into account and develop the student groups that will work together on the field study. *You can have a maximum 6 groups of students.*

Review with your students the data sheets and try to explain the variety of information they are expected to collect. Students usually do better if they can try a variety of equipment and exercises in each quadrat survey; rarely will they be happy doing the same thing in each survey.

Review their responsibilities regarding:

- Care of equipment
- Respect for the Park
- Respect for their classmates, teachers, volunteers
- Importance of making careful and complete observations and recordings of data and information

5. Class Preparation Discussions for the Field Study

A. Scales of study in Ecosystems.

If time allows you may want to discuss the idea of scale of study.

If scientists are going to conduct a study then they need to know at what level to conduct it at.

Biome Level:

- Cover large geographical regions with a specific range of temperatures and precipitation and organisms that are adapted to those conditions.
- Canadian terrestrial ecosystems can be grouped into four main biomes: tundra, taiga, temperate deciduous forest and grassland .
- Global warming is an example of a mechanism of change at this scale.
- This scale is too large for us to study in this field study.

Landscape Level:

- At this level researchers can study areas the size of the Fish Creek valley (100 km²). At this level it's possible to see forest communities such as Aspen or White spruce within a region.
- Important factors that scientists can study are climate (average temperature, wind, sunlight etc.) and biogeography (why things tend to grow where they do).
- Changes at this scale include both natural and human disturbances such as fire, disease, floods, clear cutting.
- Maps are made using aerial photos taken from airplanes or satellites.
- This scale is too large for us to study in this field study.

Community Level:

- Researchers look for patterns in forest communities that are 1-10 km. They are interested in understanding how different populations (i.e. grasslands, Aspen, Spruce) interact within a community.
- At this level scientists study elevation, aspect, temp., precipitation, light, wind etc.
- Changes at this level include succession, inter and intra specific competition.
- Today we will be studying 2 different ecosystems at this scale.

If time, briefly comment on smaller scales of study:

Population Level:

- A forest population is made up of one dominant species that tends to have a similar age and distribution pattern
- At this level scientists study factors such as density, abundance and distribution.
- Changes that occur at this level include intra specific competition and natural selection.

Organism: i.e. investigate 1 aspen tree.

Cellular & Molecular: mutation, recombination, reproduction.

B. Discuss sampling techniques students will be engaged in as you review the data forms and equipment to be used during the field study. Emphasize the data they collect, and the methods used, will be the same for both sites. Discuss why scientists use transects and quadrat studies (systematic process to collect data that is representative of a larger area.) Discuss how groups will set up their 3m x 3m quadrat. Discuss all the tests and data students will collect. Not all students will collect the same data; however, groups will work cooperatively and share data for each study site.

C. Data to be collected in the field - refer to the data sheets and information below to discuss with students the information they will be collecting on the field study.

Abiotic Components

Temperatures

Moisture,

Soil Profile

Soil pH

Soil Potassium and Phosphorous

Slope

Aspect

Potassium and Phosphorus – a little more information

In a natural setting, plants grow without the benefit of artificial fertilizers. The continuous recycling of nutrients between decomposing matter and growing plants, and the species of plants growing in the soil, ensures the soil remains productive. In this investigation you will determine the relative amounts of dissolved potassium and phosphorus; two key nutrients needed for plant growth.

Potassium:

- Absorbed by plants in larger amounts than many other mineral elements
- Required in the building of proteins and photosynthesis
- Supplied to plants by soil minerals and organic materials

Phosphorus:

A Key element in:

- cell membranes
- molecules that help release chemical energy
- the making of DNA
- the calcium phosphates of bones

- Park Staff will enlist one group to do the soil Potassium and Phosphorus tests
- Test results will be shared with all other working groups

Biotic Components

Birds (using a point count)

A point count is a count undertaken from a fixed location for a fixed time. It can be undertaken at any time of year, and is not restricted to the breeding season. Point counts are used by biologists to provide estimates on the relative abundance of each species or, if coupled with distance estimations, can yield absolute densities, too (Buckland et al. 2001). For the purposes of this ecosystem study, all students will conduct a point count and will document presence/absence (if name of species is known) and relative abundance of different species. Since it will be used only as an index, no distance band will be incorporated. *Often, a distance band of 30 m in forest communities, and 50 m in more open habitat are used in studies which can be incorporated into calculating the densities of species* (Sutherland, 2006).

Evidence of Animals (using a line transect)

Line transects involve an observer moving along a pre-determined route through a study area recording the distances at which each individual/track/sign is seen. In protected areas, this study method is used to identify habitat use, as an index of activity, and to determine long-term trends on the movement of wildlife through corridors and the affects of human use. You can also use transects to determine population densities.

- To investigate the presence or absence of wildlife, students will walk the entire length of the line transect, observing all signs 1 metre on either side of the transect.
- Document any wildlife sign, such as tracks, scat, burrows, scratch marks, browsing, food caches etc.

Vegetation

Ground Cover Assessment and Tree and Shrub Identification

- Students will identify and record the dominant trees and shrubs in their 3m x 3m quadrat using the *tree and shrub key provided*.
- Identify and record the common and scientific name (*Genus species*).
- Identify and record major plant types observed using the 50 cm X 50 cm grid square and do basic ground cover calculations

Human Impacts and Observations and Ratings

Students are to observe the Park around their quadrat and record on the Impacts Data Sheet any and all human impacts they observe

Visual Impacts

Auditory Impacts

Other Human Impacts

Students will then discuss with their team whether these impacts are positive, negative or neutral, come up with arguments to justify their ratings and finally choose one impact that their group will present and discuss at the wrap-up

Impacts Discussion and Presentation

Back in the classroom, students work in their groups to develop and present discussions and rationalizations on one Human Impact they observed. Groups need to discuss and present on:

- Identify the impact observed
- State whether the impact has a positive, negative or neutral impact on the Park in regards *ecosystem health, the Park in general, visitor experience in the Park*
- How could the Park better manage this impact?

Students need to present their arguments to the rest of the class and answer questions regarding their views and justifications.

Section II - Your Field Study Day

1. What to Bring – What to leave behind (A few suggestions)

It is most important that you, your students and your volunteers/chaperones know and understand that your field study will be an “OUTDOOR” experience. We will only use a classroom as a home base for the start and end of the day. If the weather is inclement we can have lunch indoors as well. We will have access to washrooms at the start and end of the day, but otherwise will be in the field away from such facilities. With this in mind it is important that everyone attending the field study is prepared. Though we are in the city, everyone needs to be prepared for the day outdoors. The weather can change drastically, we will be moving through out the land base on foot over a variety of trails and off-trail areas, and working with a variety of field equipment.

What to Bring:

- Extra clothing (rain gear, warm layers)
- Sturdy shoes (no sandals or flip-flops)
- Hat, sunscreen, bug repellent
- Food and water for the day (*there are no microwaves, coffee shops, vending machines, etc. on-site or close by*)
- Data sheets, pencils, clipboards
- Camera, binoculars (optional)
- Daypack
- Students in working groups (maximum of 6 groups)

What to Leave Behind:

- Gameboys, MP3s, PSPs, laptops, etc.
- Cell phones (*bring them, but keep them packed away and OFF*)
- Designer clothing – we will be doing field work, getting dirty

2. Your Day in the Field

The field study day can be covered in a 4 – 5 hour timeframe, but can be modified to fit other schedules.

The major portion of your field study will be doing transect/quadrat surveys in 2 habitats (grassland, aspen parkland) collecting information on the biotic and abiotic features of each and observing, recording and discussing human impacts.

Arrival

When doing the field study at Shannon Terrace (see map) have bus drop your group at the Environmental Learning Centre. Staff will meet you and direct your group to the classroom.

Program Outline

- I. Set –Up & Introduction - Classroom
 - Greeting
 - Alberta Parks Behaviour Guidelines (Dos and Don'ts for the day)
 - Overview of the Field Study day
- II. Historic aerial photo analysis
 - Have student groups examine series of air photos and put in order of oldest to most recent
 - Discuss how they decided upon the order
 - Discuss urban development around the Park
 - Discuss development inside Park boundaries
 - Relates to impact observations and scale/scope of studies
- III. Preparation for Field Study
 - Levels of scale to conduct studies
 - Sampling techniques
 - Explanation and review of equipment and use
 - Review Data form
- IV. Human Impacts
 - Making Observations
 - Creating questions
 - Justifications and discussions
- V. Grassland Ecosystem Investigation
- VI. Lunch (Max 30 minutes)
- VII. Aspen Parkland/Riparian Investigation
- VIII. Impacts Discussions and Presentations Activity – classroom
- IX. Wrap-up and Equipment Inventory

Materials Supplied by Park

- Laminated sets of aerial photos of the Fish Creek valley
- Field kits containing:
 - 10 m Measuring tape
 - Transect Line
 - Grid Squares
 - Air thermometer
 - Soil thermometer
 - Soil moisture meter
 - pH test strips, capped plastic vial, bottle of distilled water
 - Soil sampling tube
 - 2 metal spatulas
 - Magnifying glass
 - 4 magnifying boxes
 - soil phosphorus and potassium testing equipment (tests will be done by one working group only for entire class)
 - Compass
 - Key to Common Native Trees and Shrubs of Fish Creek Provincial Park

Section IV – Appendices

Appendix A – Maps, Access Map & Fish Creek Provincial Park

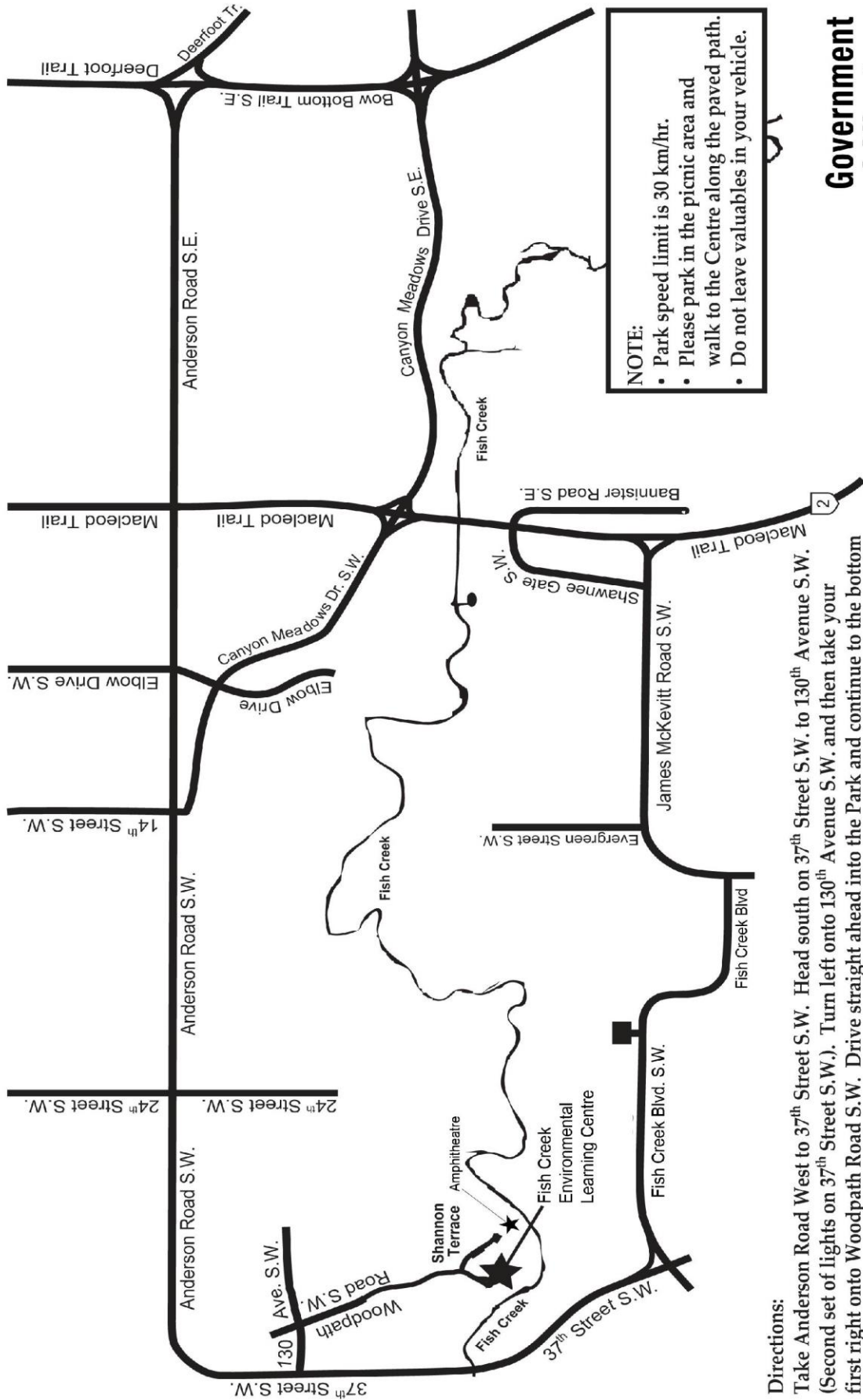
Appendix B – Data Forms

Appendix C – A Simplified Key to Common Native Trees and Shrubs

Appendix A: Maps

ACCESS MAP

Fish Creek Environmental Learning Centre
 13931 Woodpath Road S.W., Calgary, Alberta T2W 5R6
 Phone: (403) 297-7827 Fax: (403) 297-7849

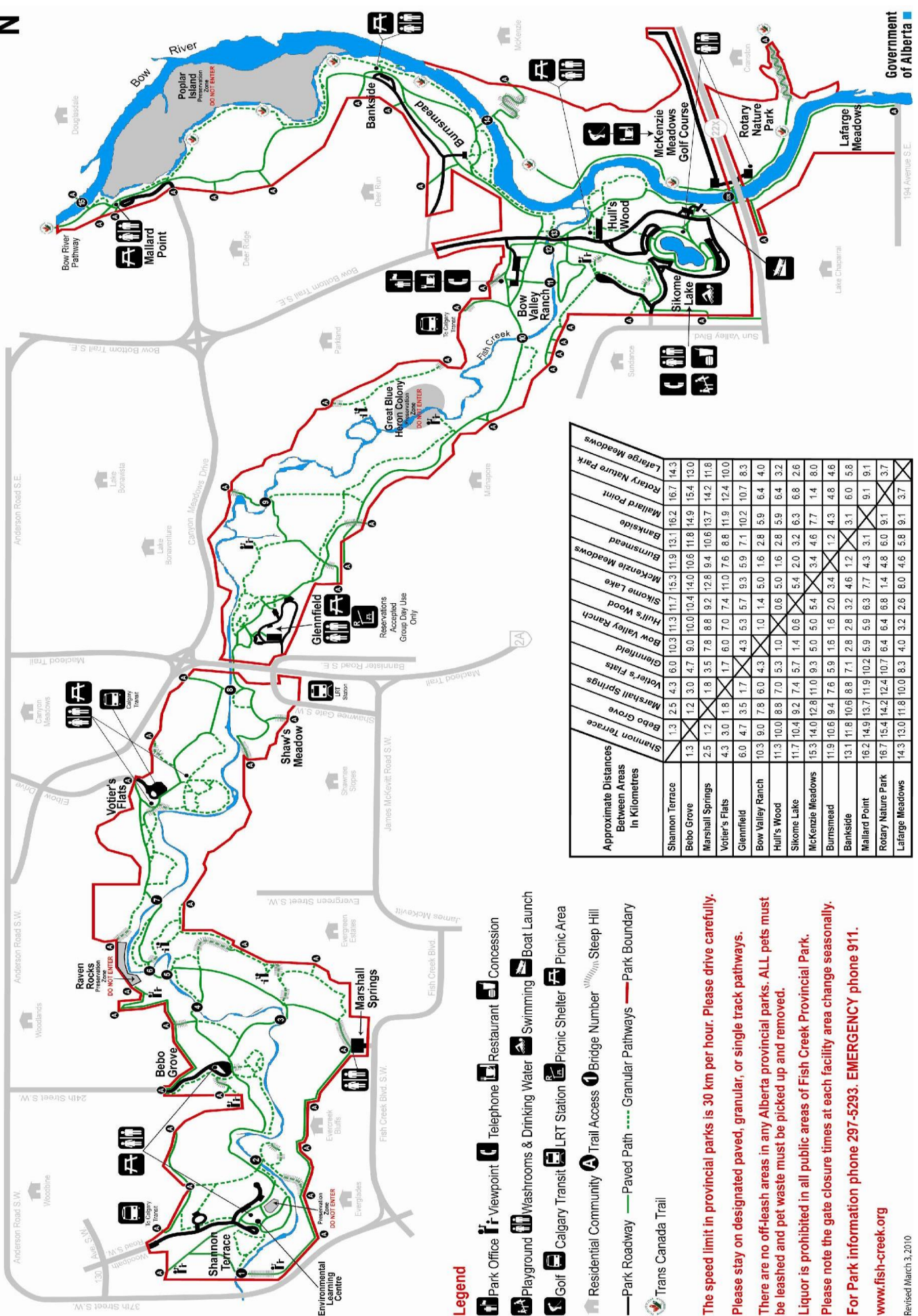


Directions:

Take Anderson Road West to 37th Street S.W. Head south on 37th Street S.W. to 130th Avenue S.W. (Second set of lights on 37th Street S.W.). Turn left onto 130th Avenue S.W. and then take your first right onto Woodpath Road S.W. Drive straight ahead into the Park and continue to the bottom of the hill. The Environmental Learning Centre is on the right hand side (watch for signs).

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Fish Creek Provincial Park



Legend

- Park Office
- Viewpoint
- Telephone
- Restaurant
- Concession
- Playground
- Washrooms & Drinking Water
- Swimming
- Boat Launch
- Golf
- Calgary Transit LRT Station
- Picnic Shelter
- Picnic Area
- Residential Community
- Trail Access
- Bridge Number
- Steep Hill
- Park Roadway
- Paved Path
- Granular Pathways
- Park Boundary
- Trans Canada Trail

The speed limit in provincial parks is 30 km per hour. Please drive carefully.

Please stay on designated paved, granular, or single track pathways.

There are no off-leash areas in any Alberta provincial parks. ALL pets must be leashed and pet waste must be picked up and removed.

Liquor is prohibited in all public areas of Fish Creek Provincial Park.

Please note the gate closure times at each facility area change seasonally.

For Park information phone 297-5293. EMERGENCY phone 911.

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Revised March 3, 2010

Approximate Distances Between Areas In Kilometres	Shannon Terrace	Bebo Grove	Marshall Springs	Votter's Flats	Glennfield	Bow Valley Ranch	Hull's Wood	Sikome Lake	Bow Valley Ranch	Glennfield	Marshall Springs	Shannon Terrace
Lafarge Meadows	1.3	2.5	4.3	1.6	10.3	11.3	11.7	15.3	11.9	13.1	16.2	16.7
Rotary Nature Park	1.3	1.2	3.0	4.7	9.0	10.0	10.4	14.0	10.6	11.8	14.9	15.4
Mallard Point	2.5	1.2	3.5	7.8	8.8	9.2	12.8	9.4	10.6	13.7	14.2	11.8
Bankside	4.3	3.0	1.8	1.7	6.0	7.0	7.4	11.0	7.6	8.8	11.9	12.4
Burnsmead	6.0	4.7	3.5	1.7	4.3	5.3	5.7	9.3	5.9	7.1	10.2	10.7
McKenzie Meadows	10.3	9.0	7.8	6.0	4.3	1.0	1.4	5.0	1.6	2.8	5.9	6.4
Sikome Lake	11.3	10.0	8.8	7.0	5.3	1.0	0.6	5.0	1.6	2.8	5.9	6.4
Hull's Wood	11.7	10.4	9.2	7.4	5.7	1.4	0.6	5.4	2.0	3.2	6.3	6.8
Bow Valley Ranch	15.3	14.0	12.8	11.0	9.3	5.0	5.4	3.4	4.6	7.7	1.4	8.0
Glennfield	11.9	10.6	9.4	7.6	5.9	1.6	1.6	2.0	3.4	1.2	4.3	4.8
Marshall Springs	13.1	11.8	10.6	8.8	7.1	2.8	3.2	4.6	1.2	3.1	6.0	5.8
Shannon Terrace	16.2	14.9	13.7	11.9	10.2	5.9	6.3	7.7	4.3	3.1	9.1	9.1
Bebo Grove	16.7	15.4	14.2	12.4	10.7	6.4	6.8	1.4	4.8	6.0	9.1	3.7
Votter's Flats	14.3	13.0	11.8	10.0	8.3	4.0	3.2	2.6	8.0	4.6	5.8	3.7

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Appendix B: Data Forms

ECOSYSTEMS AND IMPACTS

Biology 20/Science 20 Field Study

STUDENT DATA FORM

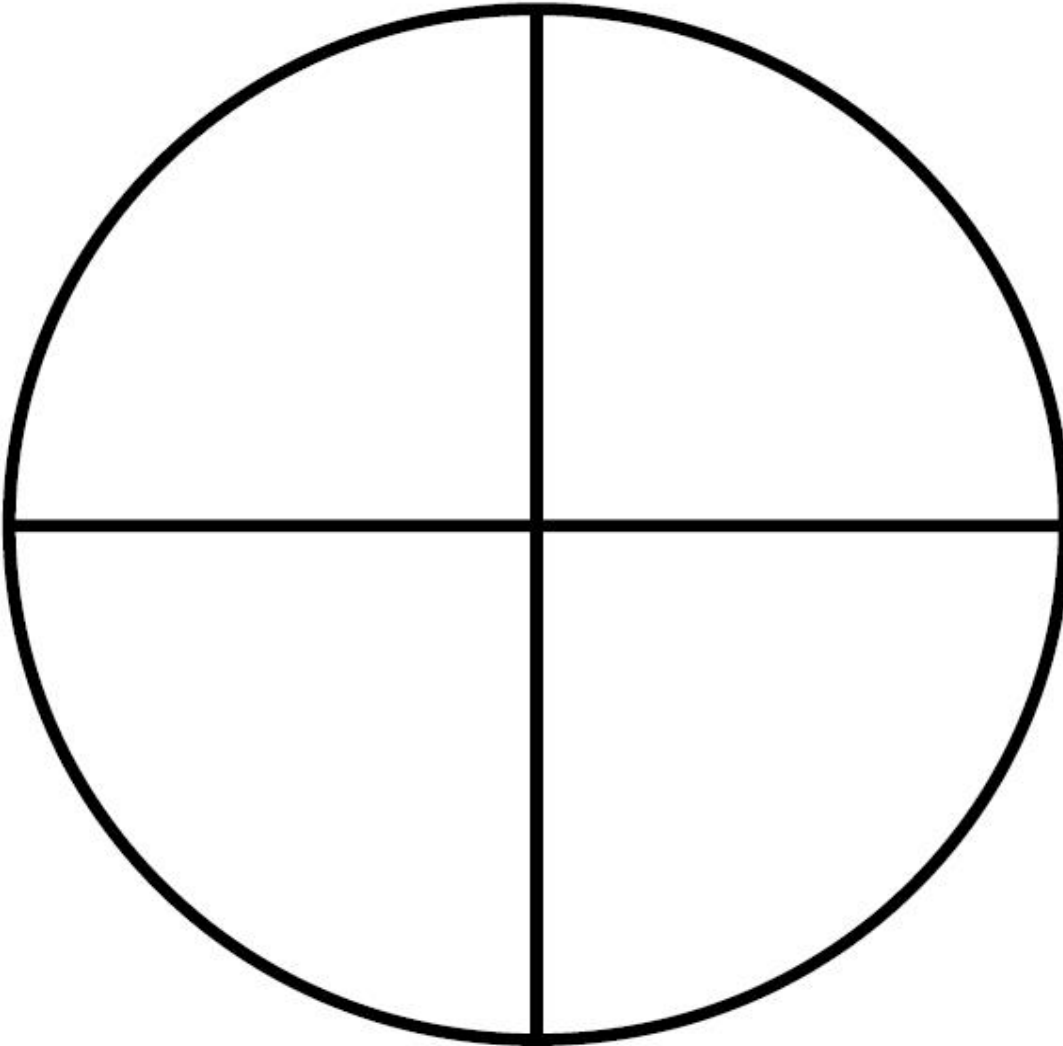
In this field study, you will be exploring two different ecosystems, grasslands and aspen parkland. In your assigned groups, complete this data form with as much detail and accuracy as possible.

Name: _____ **Date:** _____

Group Members: _____

Weather Observations: _____

Bird Point Count #1: Grassland



Birds Seen _____ # Birds Heard _____ Total # of Species _____

Total # Birds _____

Can you identify any species? _____

Grassland Abiotic Data

	1	2	3	Avg.
Air Temp. (°C) 1 m above the ground.				
Air Temp. (°C) at ground.				
Wind (Slight, Moderate, Strong)				
Slope (Flat, moderate, steep)				
Aspect (Direction of Slope)				

Notes:

Grassland - Soil Characteristics

Soil Profile	Labelled Sketch of soil layers (Record depth of layers in cm.)
<p style="text-align: center;">O Horizon</p> <p>Litter – Fermentation – Humus contains:</p> <ul style="list-style-type: none"> • Last years fallen material • Decomposing material that you can identify as a leaf, etc. • Black layer of decomposing material that can not be identified as a leaf etc. 	
<p style="text-align: center;">A Horizon</p> <p>Also called topsoil; it is dark brown to black in colour.</p>	
<p style="text-align: center;">B Horizon</p> <p>It is often light brown to orange in colour and known as the mineral layer due to the leaching of materials from upper layers.</p>	
<p style="text-align: center;">C Horizon</p> <p>Contains weathered parent rock material that is unconsolidated into soil.</p>	
<p style="text-align: center;">Soil Temperature (°C)</p>	
<p style="text-align: center;">Soil Moisture (Take the average of 3 readings)</p>	
<p style="text-align: center;">Soil pH (1 – 14)</p>	
<p style="text-align: center;">Potassium (L – M – H)</p>	
<p style="text-align: center;">Phosphorous (L – M – H)</p>	

Grassland – Evidence of Animals and Insects

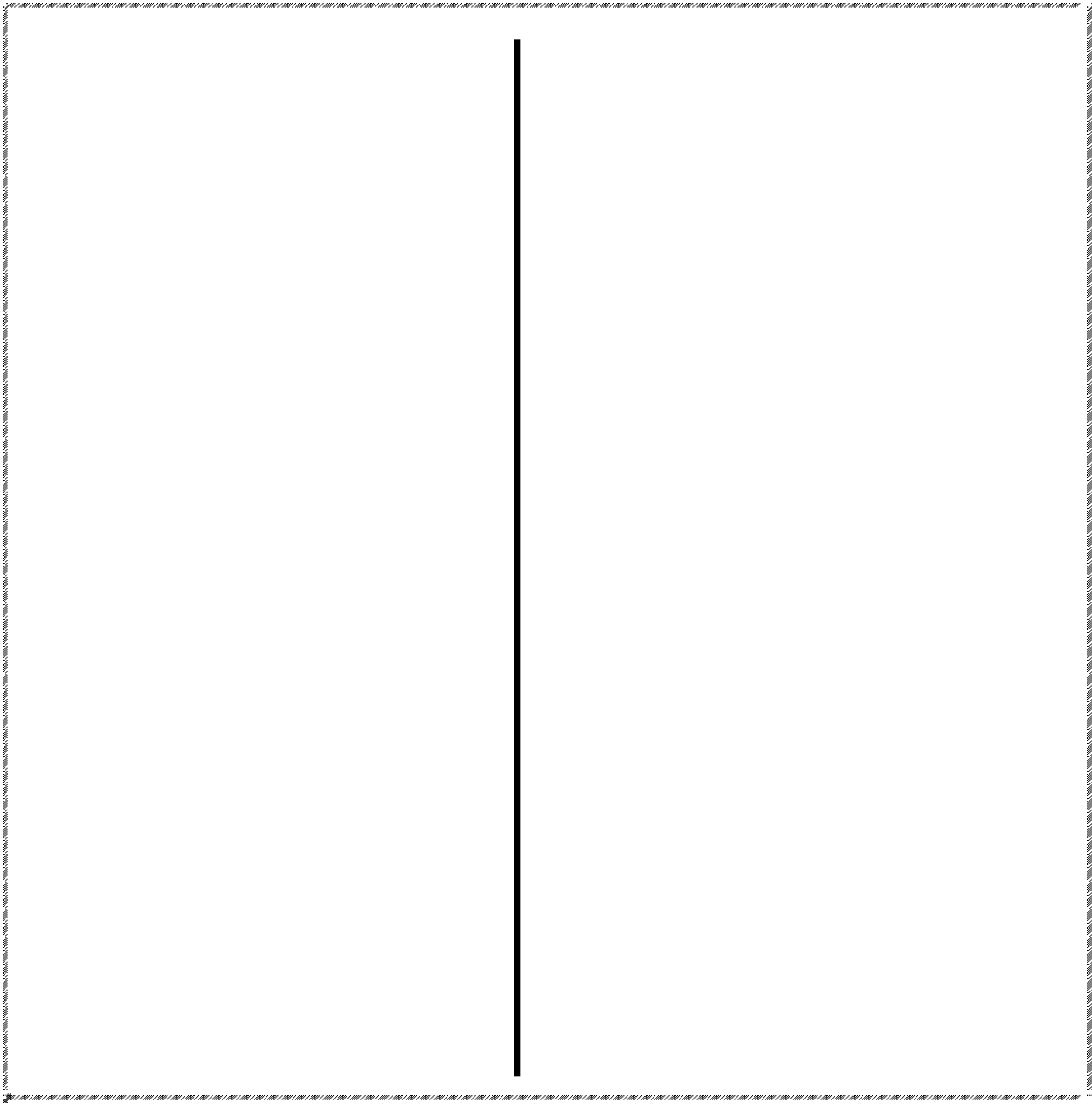
Using the square below, complete a detailed drawing of your entire **3m x 3m quadrat** that highlights all evidence of animal activity (insects, mammals, birds or reptiles). Sketch, draw and label with as much detail as possible all evidence you find.



Grassland - Plants

Randomly place your 50 cm x 50 cm grid square into your quadrat. In the grid below, do a detailed drawing of the plants found in your grid square. You may include labels or codes to identify different types of plants (G = Grass, M = Moss, F = Flower, S = Shrub) and do cover percentage calculations.

Grassland Line Transect



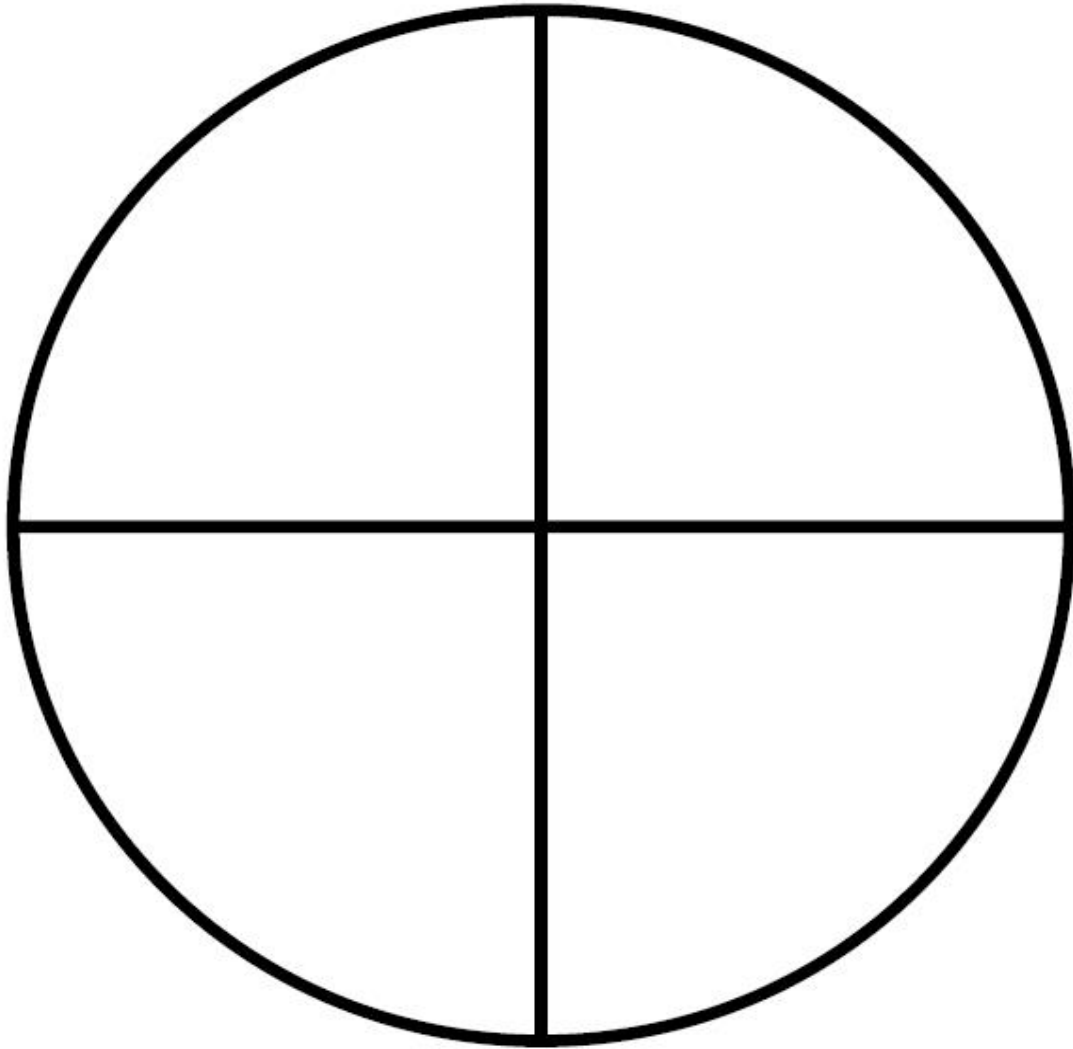
Instructions: Line transects involve an observer moving along a pre-determined route through a study area recording the distances at which each individual/track/sign is seen.

Impacts Exploration: *Grasslands*

Visual Impacts	Houses	Roads	Bridges	Vehicles	Power Poles	Utility Lines	Traffic Signs	Other	Totals
Number of Each									
Positive									
Negative									
Neutral									
Auditory Impacts	Traffic	Construction	Music	People	Dogs	Lawnmower	Equipment/Machines	Other	Totals
Number of Each									
Positive									
Negative									
Neutral									
Human Impacts	Developed Trails	Desire Trails	Litter	Pets	Pet Waste	Graffiti/Vandalism	Fences/signs	Other	Totals
Number of Each									
Positive									
Negative									
Neutral									

For each rating (positive, negative, neutral) discuss and justify the rating you gave....

Bird Point Count #2: Aspen Parkland



Birds Seen _____ # Birds Heard _____ Total # of Species _____

Total # Birds _____

Can you identify any species? _____

Aspen Parkland Abiotic Data

	1	2	3	Avg.
Air Temp. (°C) 1 m above the ground.				
Air Temp. (°C) at ground.				
Wind (Slight, Moderate, Strong)				
Slope (Flat, moderate, steep)				
Aspect (Direction of Slope)				

Notes:

Aspen Parkland - Soil Characteristics

Soil Profile	Labelled Sketch of soil layers (Record depth of layers in cm.)
<p style="text-align: center;">O Horizon</p> <p>Litter – Fermentation – Humus contains:</p> <ul style="list-style-type: none"> • Last years fallen material • Decomposing material that you can identify as a leaf, etc. • Black layer of decomposing material that can not be identified as a leaf etc. 	
<p style="text-align: center;">A Horizon</p> <p>Also called topsoil; it is dark brown to black in colour.</p>	
<p style="text-align: center;">B Horizon</p> <p>It is often light brown to orange in colour and known as the mineral layer due to the leaching of materials from upper layers.</p>	
<p style="text-align: center;">C Horizon</p> <p>Contains weathered parent rock material that is unconsolidated into soil.</p>	
Soil Temperature (°C)	
Soil Moisture (Take the average of 3 readings)	
Soil pH (1 – 14)	
Potassium (L – M – H)	
Phosphorous (L – M – H)	

Aspen Parkland – Evidence of Animals and Insects

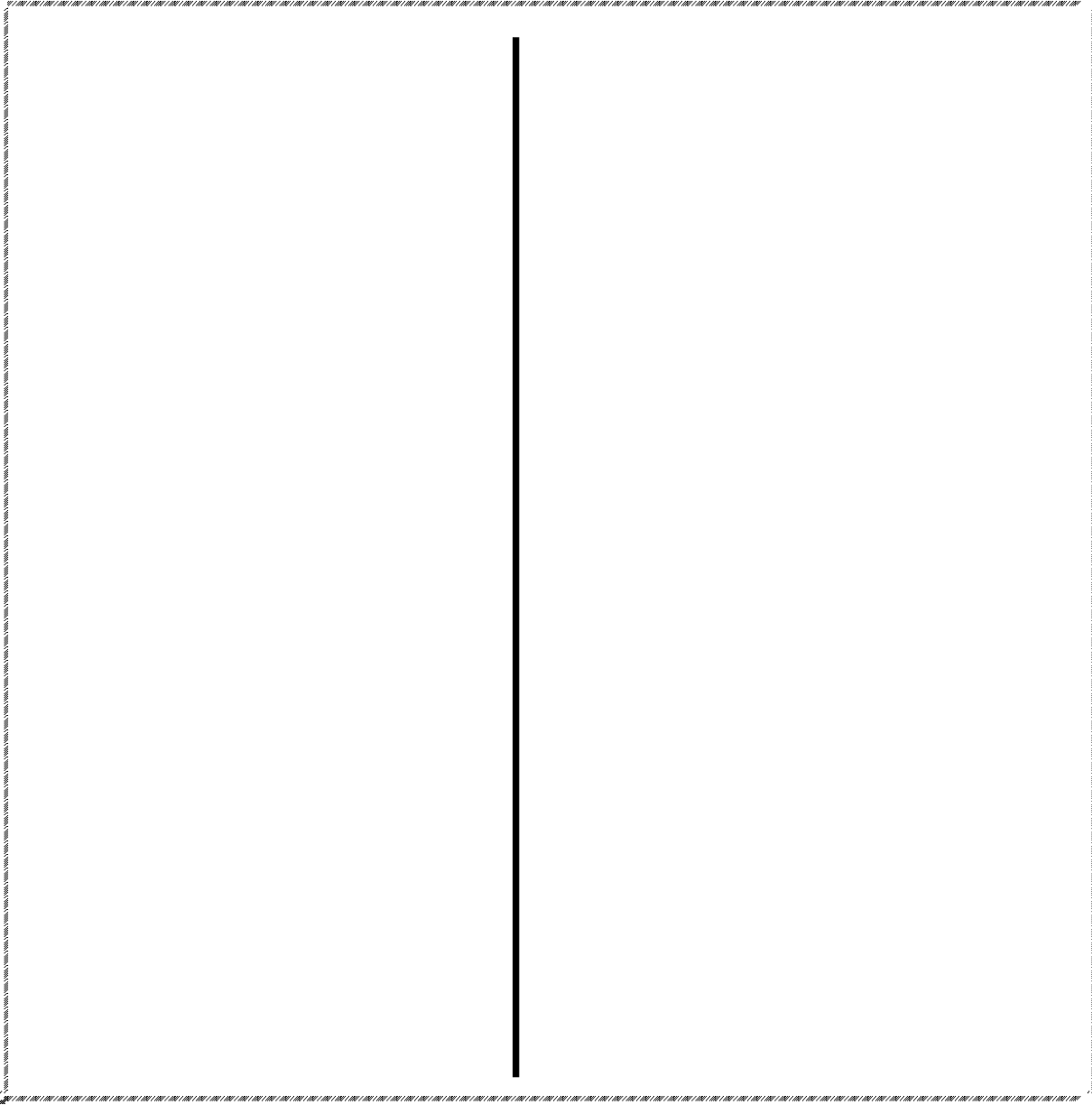
Using the square below, complete a detailed drawing of your entire **3m x 3m quadrat** that highlights all evidence of animal activity (insects, mammals, birds or reptiles). Sketch, draw and label with as much detail as possible all evidence you find.



Aspen Parkland - Plants

Randomly place your 50 cm x 50 cm grid square into your quadrat. In the grid below, do a detailed drawing of the plants found in your grid square. You may include labels or codes to identify different types of plants (G = Grass, M = Moss, F = Flower, S = Shrub) and do percentage cover calculations.

Aspen Parkland Line Transect



Instructions: Line transects involve an observer moving along a pre-determined route through a study area recording the distances at which each individual/track/sign is seen.

Impacts Exploration: *Aspen Parkland*

Visual Impacts	Houses	Roads	Bridges	Vehicles	Power Poles	Utility Lines	Traffic Signs	Other	Totals
Number of Each									
Positive									
Negative									
Neutral									
Auditory Impacts	Traffic	Construction	Music	People	Dogs	Lawnmower	Equipment/Machines	Other	Totals
Number of Each									
Positive									
Negative									
Neutral									
Human Impacts	Developed Trails	Desire Trails	Litter	Pets	Pet Waste	Graffiti/Vandalism	Fences/signs	Other	Totals
Number of Each									
Positive									
Negative									
Neutral									

For each rating (positive, negative neutral) discuss and explain or justify the rating you gave....

Predictions

As a group, discuss and make predictions on the most important factors you feel determine the Grassland, and Aspen Parkland you will explore today.

Focusing Questions

Which ecosystem studied had the greatest diversity of life? Explain your reasoning.

What was the most negative of the Human Impacts you observed and why?

What was the most positive of the Human Impacts you observed and why?

What effects could these impacts have on the ecosystems you studied today?

Getting Critical – Interpreting the Data

After interpreting your group's data, which factor/s do you think are the most significant in determining the ecosystems you investigated?

How could you test your hypothesis?

Can you think of other factors that could be shaping the ecosystems you observed today?
