Adopt a Rancher

Student’s Guide

Saskatchewan
Prairie Conservation
Action Plan

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Saskatchewan
Prairie Conservation Action Plan

The **Saskatchewan Prairie Conservation Action Plan (SK PCAP)** Partnership brings together 30 agencies and organizations representing producers, industry, provincial & federal governments, environmental non-government organizations, research and educational institutions working towards a common vision of prairie and species at risk conservation in Saskatchewan.

Saskatchewan
Prairie Conservation
Action Plan

Adopt-a-Rancher

Why Are You Adopting a Rancher?

Ranchers manage some of the largest remaining tracts of native prairie in Saskatchewan. Management decisions based on ecological principles helps maintain sustainable rangelands. Not only do these ranchers make a living for themselves, they also provide many benefits to society by protecting ecosystem health.

By adopting a rancher, you will have an opportunity to learn about one particular ranch ecosystem. Each ranch has its own specific location which displays unique ecosystem characteristics. Each rancher has developed management practises that work for them in that location.

Society faces many environmental issues concerning sustainability. By studying systems which support ecosystem health, one can see what works and apply it to other systems.

This manual contains information and instructions to develop a ranch ecosystem case study.

The arrow points to instructions.

Apply systems thinking about how the parts of the ranch ecosystem work together in relationships.

Consider the inputs and outputs of the system, including cultural, societal and economical components as well as biological ones. How does positive or negative feedback change how the system works?

The case study will be used in a class discussion on sustainable grazing management and its value to society.

How to Develop Your Case Study

Case studies are useful aids, providing examples which help us understand problems and how to solve them. A problem we face in Saskatchewan is how to take care of shrinking native prairie ecosystems while maintaining a sustainable ranching industry.

How can ranching benefit native prairie grasslands? Write a case study for a unique ranch ecosystem in your geographic location.

A case study is a collection of detailed information about how parts of a system interact in a particular real-life situation. It is used as a tool to understand relationships and solve problems. It is different from a report which is an account of something seen, heard or done.

Include the following:

- **Title**
- **Introduction**
  Why is it important to study sustainable ranch ecosystems?

- **The Ranch Ecosystem**
  This portrayal includes:
  - **a description of the land and land history**
  - **biotic and abiotic characteristics**
  - **value of the ranch for species at risk**
  - **threats from invasive alien plants**
  - **sustainable management practices**
  - **ecological goods and services**

- **Ecological Indicators of Range Health**
  (Groups design projects and collect data on Field Day)
  This analysis includes:
  - **importance of chosen indicator(s)**
  - **methodology used to collect data**
  - **results and conclusions**

Convey some of the information visually by using data tables, maps (provide legends), art and photos for illustration.

Check with your teacher to ensure that you are complying with copyright guidelines for schools. Reference the sources of your data.

As you develop your case study, make a list of questions that you would like to ask the rancher about the ranch ecosystem and its management.

A Short History of Native Prairie

A seemingly endless sea of native grasses rippling in the wind surrounded the first settlers to the prairies. No trees to fell or rocks to move; easy to plow and bursting with fertility: this land was a dream-come-true if you could handle the weather.

Now most of the grasslands are covered with annual crops or tame forage and the remnants of native prairie become smaller and more tattered with time. Native prairie is the most endangered ecosystem in North America.

Native prairie is well adapted to our climate. In the past, disturbances like wildfires and herds of thousands of bison thundering by just made it stronger and healthier. Grasses evolved with grazing animals in a relationship which kept them both healthy. Grazing removes biomass, both living and dead, that would smother native grasses over time.

Over the past hundred years, grazing pressure on the rangelands has increased and decreased depending on cycles of drought and the economics of producing beef. Much has been learned since early settlement when the federal government mandated an initial stocking rate of one head of livestock per acre—a rate that far exceeded the carrying capacity of the land!

While there are still examples of overgrazed rangeland, more ranchers manage their range according to ecological principles, producing a sustainable ecosystem. Among the benefits to society that this provides is the protection of native biodiversity and water resources.

Draw a Mind Map

In the center of a page, write Ranch Ecosystem.

Use the above information in *A Short History of Native Prairie* to identify components, characteristics or processes of the ecosystem or positive or negative human actions that affect it. Historical information is important as well as it helps explain the current conditions.

Arrange the elements on the page as words, art or pictures. Use colour to convey information.

Add any other elements that you think are important. With a line, link components that have a relationship and write what the relationship is on the line.

You will be adding elements to the mind map as you get to know the ranch. You may wish to change or delete elements over time.

Find Your Ranch!

In the late 1800s as European settlers flocked to the West, the Dominion Land Survey created a grid system so that the location of a specific parcel of land could be identified. This system is still in place today; ranchers and farmers describe their legal land locations in terms of this grid.

Record the legal land location of the ranch. Use the following information to understand what this data means.

How to Interpret a Legal Land Location

The grid system was laid out using the British imperial system of measurement. How can you change the landscape grid from miles to kilometres now that we have gone metric? Not possible! Referencing miles will always be part of our Saskatchewan culture.

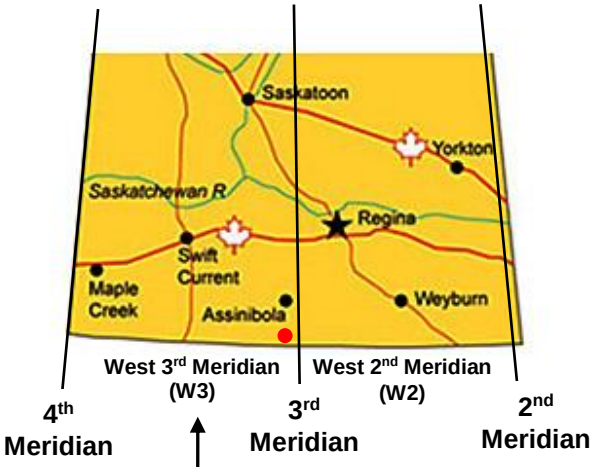
Meridians are lines of longitude running North-South.

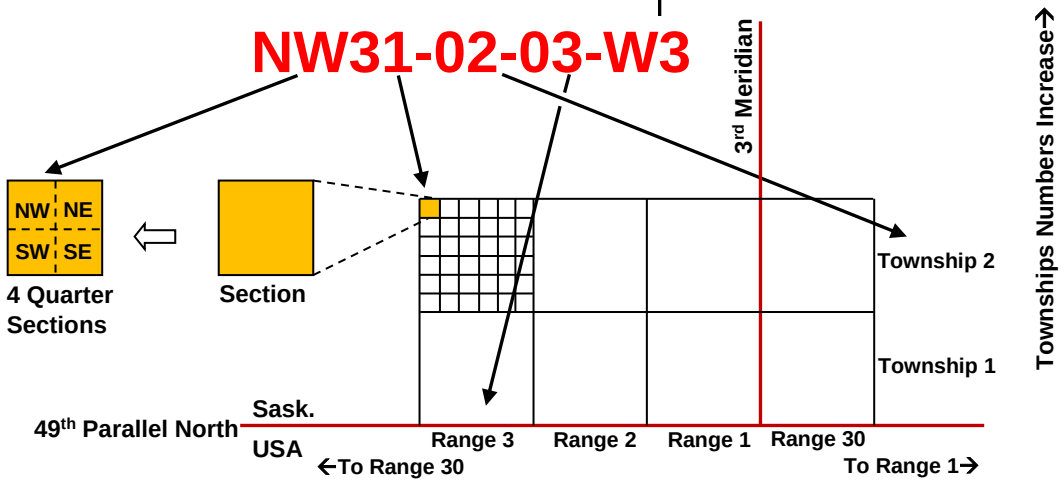
There are 30 **ranges** between meridians.

A **township** contains 36 numbered **sections** starting with Section 1 in the lower right corner.

A section is 1 mile x 1 mile in area and contains 640 acres.

A section contains 4 **quarter sections**.





The Dominion Land Survey grid system provided a method for the orderly development of roads and fields – an easy process on much of the Prairies. Viewed from the air, the Prairies are a patchwork of squares and rectangles.

Roads are essential to our wellbeing but they also have environmental consequences for the ecosystem. For example, when the native vegetation is removed in a road cut, invasive alien plant species can become established.

The Sprague's Pipit, a native ground-dwelling bird species at risk, requires large tracts of land where they can scurry through the grasses and stay hidden from predators. If a road intersects their habitat, they don't cross to the other side—there's too much open ground. They become trapped in habitats that are too small to support them.

Add elements to your mind map about the environmental consequences and social benefits of roads.

Convert the legal land description(s) from the Ranch Profile to geographic coordinates.

Go to http://prairielocator.com/ (7 day trial) or other app that makes this conversion. Omit the quarter section information when entering the location.

31-02-03-W3	→	**49.1677, -106.3962**
Legal Land Description		**Geographic Coordinates**

In order to copy satellite images, you need to go to Google Earth and enter the geographic coordinates. The centre of the section is shown by a yellow tack so use the Google Earth ruler to measure a 1 mile square box around it. These are the borders of the section. With this information you should be able to provide the legal land locations of the quarter sections as well as the surrounding sections.

Make copies of the landscape from different altitudes to show details as well as the relationship the ranch has with external landscape. They can be used in your case study report. Ensure that the Google Earth logo remains in the copied pictures so as not to break copyright law.

Describe the Ranch Ecosystem

Sustainable grazing management is tailored for specific ecosystem characteristics of a location. What landforms and soil types are present? What is the typical composition of a healthy native plant community for this location? What is the composition of the current plant community? What is the history of land use? The answers to these kinds of questions help determine stocking rates and the grazing systems needed to maintain or improve range health, as well as to identify suitable habitat for native species of plants and animals.

1. Use Satellite Imagery to Describe the Ranch Ecosystem

Use Google Earth satellite imagery to find information about the range ecosystem. Different scales of images provide different kinds of information.

Convert the Google Earth image to Google Maps to see natural or human-made features that may not be apparent from the satellite image.

Can you delineate the borders of the ranch based on the legal land descriptions? Can you see buildings or infrastructure such as roads?

Ecosites are features such as plains, hills or wetlands which have unique abiotic and biotic characteristics. Can you delineate some ecosites?

Are there water features such as streams, wetlands or coulees (dry stream beds), signs of salinity or other elements?

What type of vegetation is present? Is there native prairie, tame forages, annual crop or other kinds? Are there riparian areas or bush in some areas? Knowing the scale of the maps, can you estimate the area for each cover type?

What appears to be the land use on the surrounding land?

2. Use Online Resources to Describe the Ranch's Ecoregion

Larger ecosystems can be divided into smaller ones. The Prairie ecozone contains four ecoregions. Find the ecoregion in which the ranch is located at http://www.biodiversity.sk.ca/ .

Use links at this site for more information about the ecoregion characteristics. Record ecoregion data that includes the following:

Annual precipitation	Landforms
Annual mean temperatures	Soil description
Climate type	Land use
Typical plant and animal species	Concerns

Other resources:

www.soilsofcanada.ca

http://publications.gov.sk.ca/documents/20/86768-soil_zones_map.pdf

Ecoregions and Ecosites classroom copies or at http://www.pcap-sk.org (Resources)

2a. Identify Species at Risk in the Ranch's Ecoregion

Biodiversity promotes ecosystem health. When species decline or disappear, a chain reaction can occur. Altered food chains, increased pest problems, decreased pollination and degraded habitat may be some of the outcomes.

Greater Short-Horned Lizard

Go to http://www.biodiversity.sk.ca/ (Reports and Publications, Species List) Federal Species at Risk to view species at risk in Saskatchewan. This site also has fact sheets on some of the species.

Select two grassland species at risk, one plant and one animal, which could occur in the ranch's ecosystem. Describe their distribution, habitat needs, special adaptations to their environment and why they are at risk. Include beneficial management practices that are used to protect them. Some species are profiled (with distribution maps) at http://www.pcap-sk.org (Resources).

Conduct an on-line search for more information about your species.

2b. Identify Invasive Alien Plants in the Ranch's Ecoregion

If we could put on high tech glasses that showed native plants as green and introduced species as red, most of the prairies would be a sea of red.

Go to http://www.biodiversity.sk.ca/ (Reports and Publications, Species List), Invasive Species Lists to view invasive plant species in Saskatchewan. Select two invasive alien plant species that might occur in the ranch ecosystem. Ensure they are species that can invade native grassland ecosystems.

See also the Saskatchewan Invasive Plant Species Guide at http://www.pcap-sk.org (Resources) for more information on your chosen species. Describe the plant, habitat needs and the characteristics that make the invasive species a threat. Include beneficial management practices that are used for its control.

Conduct an on-line search for more information about your species.

Canada Thistle

3. Use the Ranch Profile to Describe the Ranch Ecosystem

The Ranch Profile contains information about the ranch history, management practices, habitat, wildlife and plants. Add this information to customize the various components of your case study for the ranch location.

4. Use the Rancher's Portfolio to Describe the Ranch Ecosystem

The Rancher's Portfolio contains a set of photographs taken at the ranch. Use these ground view photos as an information source and as illustrations for your case study.

Are there land forms (plains, hills, valleys, dunes, wetlands etc.) that were not apparent from the satellite images?

Are different plant communities visible on different land forms?

Which habitats might be suitable for the species at risk that you researched?

Are there areas where invasive alien species are located or may find habitat?

What infrastructure is seen? What effects might the infrastructure have on the ecosystem?

What other information is conveyed by the photos?

Add elements to your mind map to illustrate new information or processes that you have discovered as you described the ranch ecosystem.

Sustainable Grazing Management

Disturbance in the form of grazing is the key ecological process used in range management.

Reference or climax plant communities are specific to a particular ecosite and can be used as a benchmark for measuring ecosystem health. Ecosites are parts of ecoregions that display distinctive landforms, soils and environmental conditions thereby giving rise to distinctive plant communities.

For example, in the Mixed Grass ecoregion a plant community growing on a sandy hill is different from one on a loamy plain. If too much disturbance occurs, then the climax or near-climax plant community reverts to earlier successional stages and perhaps non-native species will have an opportunity colonize the grassland.

Grazing systems can improve some damaged rangeland although it takes time as it involves changing the plant community. Grazing systems are customized for ecosites. Many of these systems involve moving cattle from one pasture to another.

Cattle may be kept in one pasture for the season as long as the carrying capacity is not exceeded and the grassland remains healthy. The challenge then is to change cattle behaviour and prevent them from grazing the preferred grass species at the same time year after year. Such behaviour acts as selective pressure against these grasses, causing a shift in the species composition of the plant community.

Short intervals of intensive grazing may decrease the number of less desirable plant species or long periods of rest from grazing pressure may be needed to rejuvenate others. Moisture conditions need to be considered; wet soil can be compacted by cattle, reducing oxygen and water penetration into the ground.

Special care must be used to keep riparian and wetland ecosites healthy as cattle tend to seek these out for water, forage and shelter. Sometimes alternative watering systems such as solar-powered stock water systems are used to reduce impacts.

How much forage (biomass) will the range produce?

How much forage is required over the grazing season by each animal?

The answers determine the carrying capacity of the rangeland. Sustainable grazing systems incorporate time for the range to recover before grazing can occur again.

Ecologically sustainable stocking rates are determined for different ecosites. The rates are calculated from data collected from rangeland productivity studies and from grazing experience.

Cattle are removed from a site when about 50 percent or less biomass has been grazed. The remaining biomass is needed to maintain ecological functions such as conserving biodiversity regulating water flow, protecting soil resources and cycling nutrients.

Experienced ranchers can determine the carrying capacity by looking at the condition of the rangeland.

A mathematical method is also used to plan sustainable grazing systems.

1 Animal Unit Month (AUM) = a 450 kg cow with a monthly requirement of 355 kg dry forage

Stocking Rate = AUM per unit area

E.g. If a quarter section (160 acres) can support 20 cows for 4 months, then 20 cows x 4 months/160 acres = 0.5 AUMs/acre.

How many kilograms of dry forage (biomass) would this herd consume during this time period?

AUMs are calculated for different ecosites. The carrying capacity can change if environmental conditions change. If drought occurs, the biomass production will decline.

Rough Fescue

Needle and Thread

Blue Grama

Ecologically-based grazing is focused on grasses, not cattle!

How grass grows is critical to its use in grazing. Dormant buds which produce new shoots are nestled down in the base of the grass, protected from weather, fire or grazing. Cattle can't crop grass closer than about 2.5 centimetres—their lips get in the way.

After grazing, the grass plant stops root growth. Photosynthesis in the remaining leaves must provide enough energy for buds to develop and root growth to resume. If too much grass is eaten, the plant doesn't have the photosynthetic apparatus to recover quickly.

Overgrazing decreases the number of roots as well as their diameter and depth, making the plant more susceptible to drought.

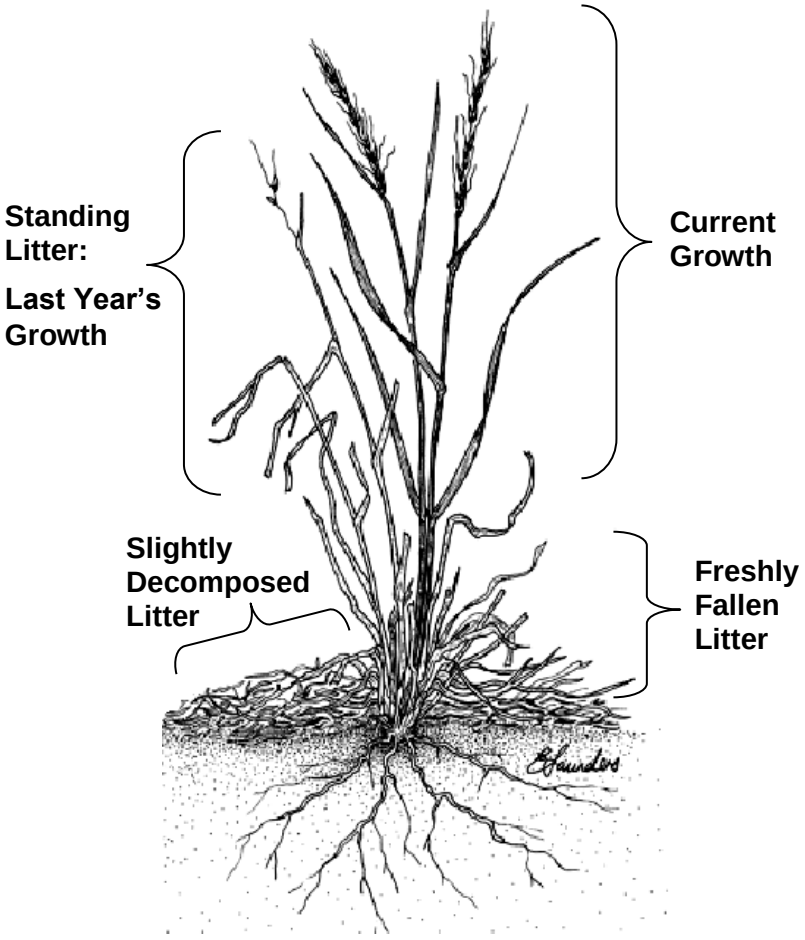
Some grass species are more vulnerable to disturbance at certain times of the year—this knowledge can be used to increase or decrease their populations.

Litter shades the ground, keeping the soil temperature cool. It acts like a sponge to soak up water.

Overgrazing prevents the build up of plant litter, changing the micro-environment in which the grasses grow. The soil becomes hotter and drier, stressing the grasses.

Litter is also the source for much of the organic matter supply for the soil. Decomposers break down the litter, making nutrients available for plants.

Litter is habitat for decomposers and the predatory food chains that feed on them. Removing litter decreases this biodiversity and the ability of the grassland to recover from adverse conditions.



Grass Biomass

Native Grassland and Forest Rangeland Health Assessment Field Workbook, PCAP 2008

The preceding information about grassland ecology and sustainable range management is found in the following publications. Check them out for more details.

References:

Management of Canadian Prairie Rangeland, 2010, Agriculture and Agri-Food Canada
http://publications.gc.ca/collections/collection_2010/agr/A52-178-2010-eng.pdf

Native Grassland and Forest Rangeland Health Assessment Field Workbook, 2008, Prairie Conservation Action Plan
http://www.pcap-sk.org/docs/5_resandlit/Native_Grassland_and_Forest-Red.pdf

Blue Grama

Use the information in this Sustainable Grazing Management section to create a system flow chart. This type of graphic uses words and arrows to show components of a system and their relationships. It is useful to think about cause and effect when working with systems.

Show the relationships between the grassland ecosystem and range management. Use components like litter, water, cattle, communities and biodiversity. Include processes such as photosynthesis, decomposition, grazing and overgrazing. Think about time, as used in AUMs/acre, as a factor.

Combine what you have learned about sustainable grazing management and the management information from the Ranch Profile to develop the sustainable management practises section of your case study.

Ecological Goods and Services

In some parts of the world, poor air quality contributes to the death of thousands; in other parts, large rivers and lakes are drying up due to deforestation, overgrazing, irrigation and other human activities. The problem is our human footprint on Earth is so large that many ecosystems are collapsing and no longer able to absorb our waste products, provide our food or moderate water flow.

In the past, the goods and services provided by healthy ecosystems have not been given value—a problem for our consumer-oriented society! Currently there is a large effort by scientists, governments and non-profit organizations to quantify these goods and services. It is very important that society knows these ecological values before making decisions that will affect future generations. Our ecosystem resources are our natural capital and must be protected.

For your case study, document the ecological goods and services that are provided by the ranch. Include descriptions of the goods and services, their environmental and economic values and consequences of their loss.

http://www.ducks.ca/assets/2012/06/nv1_eg.pdf has a factsheet series, *Natural Values: Linking the Environment to the Economy*, with information on natural capital, ecological goods and services.

See http://www.pcap-sk.org (Resources) for:

Ecological goods and Services: What You Need to Know (Prairie Conservation Action Plan, 2011)

Agriculture & Biodiversity: The Value of Biodiversity to Ranching On the Prairie (Nature Saskatchewan, 2006)

Add elements to your mind map about ecological goods and services

Create a public service advertisement to "sell" a good or service that the ranch provides.

Measure Range Health

All the components of the ranch ecosystem must be present and work together in order for the rangeland to function properly and be sustainable. Functions include maximizing primary productivity, maintaining soil stability, regulating water movement, cycling nutrients and protecting biodiversity. Range health is a measure of the ability of the land to perform such functions.

But how can an ecosystem, with its complex web of interacting components, be practically and quickly assessed? Ranchers and other range managers determine the state of range health by using ecological indicators.

An indicator provides biological, chemical or physical information about an ecological process. The current state of some component is compared to an optimal reference state for that particular ecosystem. It aids management by tracking or predicting changes on the range and by identifying environmental stresses.

Design a project that examines indicators of range health. Collect data for your project on Field Day.

For this part of your case study, you will be working in a group. You are not conducting a scientific experiment (there's not enough time) but rather examining indicators of range health to see what they tell us about the health of the ranch ecosystem.

Pick one or two indicators to assess. Possible projects are listed for each ecological indicator in this section. Your group may choose, however, to create a completely different project.

Use the *Native Grassland and Forest Rangeland Health Assessment Field Workbook* (class copies or online) to learn about ecological indicators and sampling methods. You do not need to follow the procedures exactly as given; you may wish to modify them or develop your own procedures.

Native Grassland and Forest Rangeland Health Assessment Field Workbook,
http://www.pcap-sk.org/docs/5_resandlit/Native_Grassland_and_Forest-Red.pdf

Write a group report with the following information:

- **Importance of the chosen indicator(s)**
- **Objective of project**
- **Methodology**
- **Results (add after Field Day)**
- **Conclusions**

Create data tables to record the field data.

Include the report in your case studies.

Project Information

- It's important that your project doesn't damage the native prairie ecosystem. If soil is left exposed, invasive alien plants can colonize or erosion can occur. If a plant is rare, it shouldn't be collected.

- Decide on a group name that is thematically linked to the project. Be creative. This is the name to use when communicating with the rancher.

- Use the description of the Field Day locations from the Ranch Profile as a factor in deciding what type of project your group can develop.

- On Field Day you will have about one hour to record data for your project.

- Use different types of data collection like quadrat or transect sampling, taking photos and measurements and writing notes.

- After the group has completed project planning, send a group letter to the rancher briefly explaining the project for Field Day. The group may also ask information about project locations, permission to do certain types of sampling or other questions related to the project. Sign the letter with your group name.

- Make an equipment list. Remember items like rulers, data tables (on a clipboard) and pencils.

- Use GPS coordinates, if possible, to record your locations for data collection.

Indicators of Range Health Project Ideas

1. Species Composition

- In an assessment of plant species composition, the reference plant community of an ecosite is compared to the current plant community. Look in the Ecoregions and Ecosites class copies or the Ecosite Guides at http://www.pcap-sk.org/ (Resources) to find the reference plant community. Use species information from the case studies as well.
- Survey the diversity of grasses in native grasslands and compare to the diversity of grasses in a roadside ditch.
- Plant identification is part of assessing species composition. Your group may do a photo survey of plants occurring in different habitats or microhabitats. A data table could be used to code each photo to the species name and specific habitat conditions.

2. Community Structure

- Energy absorption and nutrient uptake is usually more efficient in a plant community when there is a diversity of species providing different levels of structure. Tall plants will absorb sunlight from a different zone than short plants; deep roots will reach different nutrients than shallow roots. Find methods to measure the diversity of community structure in one or two ecosites.

3. Invasive Species

- Range that has been degraded is easily colonized by invasive plants. Document the presence of invasive alien species in two locations: native prairie and a roadside ditch. Compare the habitat characteristics.
- Measure the distribution and density of invasive plants in a location.

4. Site Stability

- Soil covered with vegetation is protected from erosion by water and wind. Measure the density of plant cover versus bare soil in healthy rangeland and/or areas with natural instability or human-caused instability.

5. Hydrologic Function and Soil Protection

- The dead plant material (litter) at a site functions to regulate water flow and prevent soil erosion. Find methods to measure the amount of litter at one or more ecosites.

The Human Factor

"How we look at the world makes a difference. The things that we identify as important get special attention and care while all the rest is apt to be neglected. Our sense of what is important comes partly from our tradition and culture and partly from our own experience and thought. In western culture, neither our tradition nor or experience has made us look at the world as being important or sacred."

J. Stan Rowe 1980
Landscapes: A Guide to the Landforms and Ecology
of Southern Saskatchewan
Saskatchewan Environment

Dr. Rowe, a plant ecologist at the University of Saskatchewan, thought deeply about the relationship that people have with ecosystems. His great love for the landscapes of Saskatchewan made him concerned about declining ecosystem health and so he promoted stewardship. Whether a city or country dweller—he felt everyone should be involved because people are part of ecosystems, not apart from them.

How we think determines the kinds of societies we built.

Many of our problems such as climate change and loss of biodiversity are created by society, so in order to tackle these problems, we need to go back to the beginning and change how we think. Then we can build sustainable societies.

Scientists accept that human activities will likely result in dramatic changes to our climate. We are experiencing some of these changes today. Complete the following three activities that will help you consider climate change. Include the results in a special "climate change" section of your case study.

Were Winters Colder When Grandpa Was A Boy?

Modified from "is Grandpa Right, Were Winters Colder When He Was A Boy?" from mynasadata.larc.nasa.gov/lesson-plans/climate-change-lessons/

Students often hear that winters were colder or had more snow in the past. This activity will help you to determine if this is a true or accurate statement for your location.

Procedure:

Part I: Visit the NOAA Paleoclimatology website http://www.ncdc.noaa.gov/paleo/ctl/100.html
And read about weather events and climate trends over the past 100 years. Also, click the link on that page called Climate History.

1. List seven facts that you discover about the world's climate history.

Part II: Locate your school latitude and longitude by using Google Earth or by another method. Use the Live Access Server http://mynasadata.larc.nasa.gov/live-access-server
to create graphs of the temperature, clouds, and precipitation for your location.

1. Click on the Live Access Server link.
2. If you are not automatically prompted with parameter choices, click on 'Choose Data Set' in the upper left hand corner of the screen then, click on Atmosphere, then Atmospheric Temperature, then the radio button for Monthly Near-Surface Air Temperature (ISCCP).
3. Under the Line Plots options to the left of the screen, Select 'Time Series' and then click on the radio button at the top of the page next to 'Update Plot' to see the changes to your plot as you edit your options.
4. Enter your coordinates in the text boxes under the map
5. Select the full time range available.
6. Save or print your graph.
7. Repeat steps 2-6, except choose Atmosphere, Precipitation, Monthly Precipitation (GCPC).
Note: You should now have a total of two line graphs.

Questions:

1. What trends can you determine from your graphs of temperature, precipitation and cloud cover where you live?

2. Is it an accurate statement that winters were colder in the past?

3. What are some possible reasons for the changes?

4. Were there notable short-term changes that may have been caused by geophysical events such as a large volcanic eruption?

Historical Temperature and Precipitation Levels

Using data from Environment Canada (http://climate.weather.gc.ca/) from the Maple Creek North weather station create a graph that tracks average temperature and precipitation levels from 1960 to 2005 in 5 year intervals.

1. Select “Advanced Search” near the bottom of the page
2. Select “Search by Station Name”
3. Type “Maple Creek North”
4. In the Data Interval Box, select “Monthly”
5. In the Year Box, select “1960”
6. Click on “Go”
7. Scroll down the page to access the data
8. Record the Mean Max Temp and Total Precip data for the months March, June, September, and December
9. Scroll down the page and select the year 1965. Repeat step 8.
10. Repeat step 8 for the years 1970, 1975, 1980, 1985, 1990, 1995, 2000, and 2005.

Using the data you recorded, complete the graphs on the worksheets “Historical Temperature Line Graph” and “Historical Precipitation Bar Graph”.

Analyze the data you have graphed to address the following:

1. Create a statement that describes both the temperature and precipitation data during the period shown.
2. Identify any data points that seem strange or unusual.
3. Describe any trends indicated in the data.
4. Comment on how any trends or changes may effect rangeland practises.

East Helps West: The Drought of 2001-2002 and ‘Hay West’

Modified from The Canadian Atlas Online “East Helps West: The Drought of 2001-2002 and ‘Hay West’”

Access the section of The Canadian Atlas Online, **Human Impact/Prairies/Climate Change** at http://www.canadiangeographic.ca/atlas/themes.aspx?id=climate&sub=climate_impact_praries&lang=En

Answer the following questions.

1. Explain how the drought of 2001-2002 had an impact on the agriculture industry in western Canada.

2. Climate change on the Prairies could lead to many more negative happenings. List 4 of these:

3. Some people believe that climate change could have positive effects on the Prairies. What might some of these positive effects be?

The Hay West Effort

In 2001-2002 Western Canada experienced the worst drought in 133 years. Hay and grain crops were reduced throughout much of Alberta and Saskatchewan. What little feed survived was eaten by swarms of grasshoppers. Three million cattle as well as horses, buffalo and wildlife faced starvation. People who had farmed or ranched for generations were left with no crops nor feed for their animals. They had the dismal choice of selling their stock at very poor prices or watching them starve.

As a result, during the summer and fall of 2002, some areas in the West began bringing in hay from other provinces. In an effort to help, farmers in eastern Canada donated hay in a campaign that became known as “Hay West”.

Many Western farmers were getting rid of entire herds of livestock because they didn't have enough hay to feed them. Farmers in Ontario and Quebec decided they couldn't just sit back and watch this happen, so they began organizing Hay West. It was a moving story: farmers from Ontario to Prince Edward Island sent shipments of hay to struggling farmers in the West who had no hay to feed their livestock.

Farmers from other Maritime provinces soon joined the cause too. Between July and the end of October, the Hay West campaign shipped more than 110,000 bales of hay to the west. CN and CP Rail donated the use of 187 of their rail cars to ship the hay. The federal government contributed $2.2 million toward the campaign.

Since there wasn't enough hay being shipped for all the farmers, a lottery system was used to choose the lucky farmers who would receive the hay. Each Prairie province organized its own Hay West lottery system.

In August 2002, the premier of Saskatchewan, Lorne Calvert said "It just goes to show that farmers, no matter where they live, know the impact severe weather can have," Calvert said. "A few years ago, on the other side of the country, it was an ice storm. Today, on the prairies, it is drought. In both cases, farmers stepped in to do what they could for their counterparts. The people of Saskatchewan appreciate that generosity."

Following on the lead of Hay West, two concerts called "Say Hay" were organized on Thanksgiving weekend in October 2002 to raise money for Prairie farmers. One took place in Edmonton, and the other took place the next night in Calgary. More than 30 musical acts, including well-known Canadian country singers like Patricia Conroy and Tom Jackson, took part. The concert raised $1.5 million for the cause.

For more information about Hay West, also read
http://ageconsearch.umn.edu/bitstream/27975/1/02010014.pdf

1. Premier Calvert of Saskatchewan talked about the effects of severe weather. Read the sections of CAOL website **Climate Change/Basics**:
   http://www.canadiangeographic.ca/atlas/themes.aspx?id=climate&sub=climate_basics_introduction&lang=En

   How are climate change, severe weather happenings, and human activity related?

2. The drought of 2001-2002, along with grasshoppers eating hay and grain crops, caused a shortage of feed in western Canada. What 3 key questions would you ask about the

drought, the years leading to it, the Hay West movement, and the years that followed the drought?

3. Contact your adopted Rancher to find out if he knew of or participated in the Hay West program. Solicit his opinions about Hay West and his recollections of the drought conditions of 2001-2002. Record his opinions and recollections.

In the early 1900's, European settlers began colonizing the land and building communities. Native prairie was broken, with little regard to how much remained. The worldview was that human enterprise improved wild lands and brought order to the landscape by taming it. Since then the worldview has been changing.

In the 1960's, the new science of ecology gained importance as the signs of failing ecosystems became more obvious. Developing the technical ability to measure and monitor various environmental components and processes has greatly advanced society's understanding of ecosystem functions. Beneficial management practises for grazing, protecting species at risk and reducing the impact of invasive alien species are methods developed from this knowledge.

Dr. Rowe thought of ecosystems as our homes and as such, we should look after them. This new way of thinking sustainably is gaining acceptance in society. Personal beneficial practices like reducing waste or conserving water are promoted along with community and globally based sustainability initiatives to reduce our footprint on ecosystems.

Add information about society and worldviews from this section to the introduction of your case study.

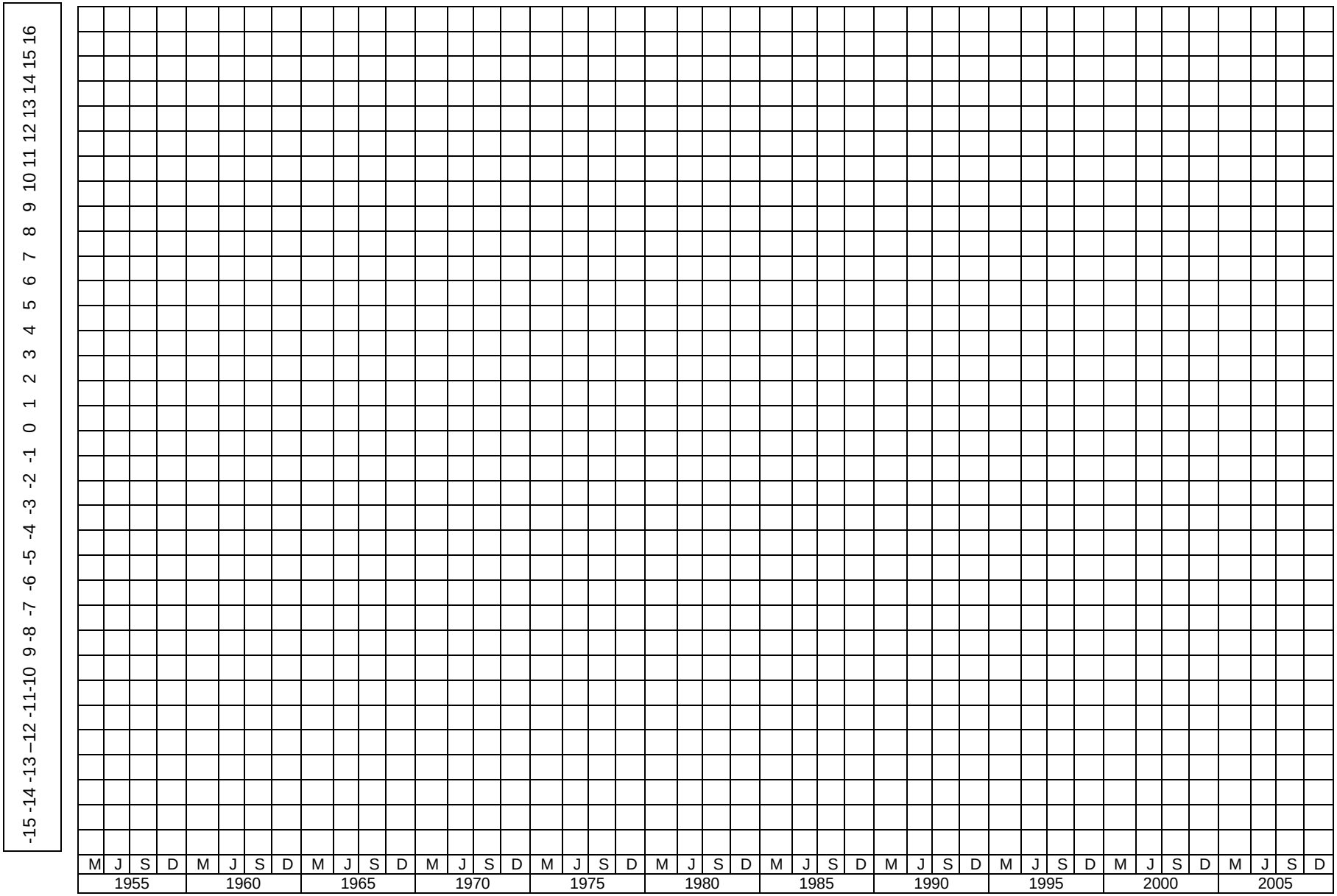
Add yourself to your mind map. Think about three beneficial practises that you can adopt that will contribute to sustainable ecosystems. They could include personal habits, school or community initiatives or stewardship behaviour for natural lands.

Add the three beneficial practices to your mind map.

Stone Crop

Now your case study is complete. Using systems thinking to understand the complex relationships among biological, economical, cultural and societal components of the ranch ecosystem provides you with the information needed to participate in a class discussion about the value of sustainable grazing management in Saskatchewan.

Historical Temperature Line Graph



Historical Precipitation Line Graph