Rangeland Health Assessment for Grassland, Forest and Tame Pasture

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We wish to express our sincere thanks to all those that have contributed to the development of this health assessment guide. We have had big shoes to fill. The first range condition guide for Alberta was published in 1966 by Sylver Smoliak, Bob Wroe, Alex Johnston, L.M. (Mac) Forbes and Scotty Campbell and has survived the test of time. Now, as they have taught us, it is our turn to build on their work and to try to improve on their practical tool. It is the authors hope that we and others will continue the process of learning and refinement of the tools, now and in the future.

The philosophy of rating ecological function of rangelands has been inspired by riparian health tools developed by Dr. Paul Hansen and William (Bill) Thompson and the Cows and Fish Program. We would like to express our thanks to Paul Hansen and Bill Thompson, Bitterroot Restoration, Corvallis, MT, and to our Cows and Fish colleagues Lorne Fitch, Norine Ambrose, Greg Hale, Kelsey Spicer-Rawe, Kerri O'Shaughnessy and Michael Gerrand.

We have also borrowed heavily from the National Range and Pasture Handbook developed by the National Resource Conservation Services (USDA), and we have also been informed by the ongoing dialogue on range health provided by the International Society for Range Management. We appreciate the useful feedback provided in the early stages of this work by Dr. Jim Romo (University of Saskatchewan, Saskatoon), Dr. Edward Bork (University of Alberta, Edmonton) and Dr. Walter Willms (Agriculture and Agri-Food Canada, Lethbridge).

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ABOUT THIS WORKBOOK

Why Use This Workbook?

Rangelands are complex and diverse, but with practical field training, it is possible to consistently evaluate the condition or health of a range site. Traditional range condition assessment sometimes seems complex and cumbersome. This new methodology provides a visual system that allows users to readily see changes in range health and to provide some early warning when management changes are needed. Like the system of riparian health assessment developed by the Cows and Fish Program in Alberta, range health assessment is intended to help users "tune" their eyes to some key indicators of range health.

Who Is This Workbook For?

This workbook is for livestock producers, resource managers, environmental consultants, agency staff, energy companies, protected area managers and anyone with an interest in the protection and maintenance of rangeland plant communities.

What Will The Workbook Do For Me?

The workbook can be used as an aid to field training and a field reference for on the ground range health assessments. The workbook provides pages where health scores can be recorded for future reference.

Where Does It Apply?

The field workbook is designed for application on a full spectrum of range landscapes, including native grassland, native forest and tame pastures. It is also useful for modified rangelands where range plant communities have become dominated by non-native species.

INTRODUCTION

What are Rangelands?

Rangeland (*syn*. Range) is land supporting indigenous or introduced vegetation that is either grazed or has the potential to be grazed and is managed as a natural ecosystem. Rangeland includes grassland, grazeable forestland, shrubland, pastureland and riparian areas (Public Lands Range Resource Management Program 2002). Rangeland ecosystems have traditionally been valued as an important source of forage for the livestock industry. Today there is a growing awareness of the important functions and values that rangelands provide to society. We must act as careful stewards to maintain rangelands in healthy condition. This field workbook is intended as a tool to measure rangeland health and help producers, resource managers and all users to make sustainable use of these lands.

What is Range Health?

We use the term "range health" to mean the ability of rangeland to perform certain key functions. The term health conveys the meaning that all parts that make up the whole, are present and working together. Range health is analogous to the health of the human body. When we are ill or under stress, important functions like circulation, immunity, cell growth, excretion, mental processes or reproduction may be impaired.

For rangelands, the functions of healthy range (Table 1) include: net primary production, maintenance of soil/site stability, capture and beneficial release of water, nutrient and energy cycling and functional diversity of plant species. Healthy rangelands provide sustainable grazing opportunities for livestock producers and also sustain a long list of other products and values. Declines in range health will alert the range manager to consider management changes.

Table 1. Functions of healthy rangelands and why they are important.

Rangeland Functions	Why Is the Function Important?
Productivity	• Healthy range plant communities are very efficient in utilizing available energy and water resources in the production of maximum biomass • Forage production for livestock and wildlife • Consumable products for all life forms (e.g. insects, decomposers etc.)
Site Stability	• Maintain the potential productivity of rangelands • Protect soils that have taken centuries to develop • Supports stable long-term biomass production
Capture and Beneficial Release of Water	• Storage, retention and slow release of water • More moisture available for plant growth and other organisms • Less runoff and potential for soil erosion • More stable ecosystem during drought
Nutrient Cycling	• Conservation and recycling of nutrients available for plant growth • Rangelands are thrifty systems not requiring the input of fertilizer
Plant Species Diversity	• Maintains a diversity of grasses, forbs, shrubs and trees • Supports high quality forage plants for livestock and wildlife • Maintains biodiversity, the complex web of life

Why Do We Need A New Methodology?

The range condition (RC) concept evolved in response to grazing management problems on western rangelands going back to the early 1900's. Alberta's first stocking guide for prairie grasslands was published in 1966 (Johnston et. al 1966). The range condition approach measures the alteration of plant species composition due to grazing or other disturbances, relative to the climax plant community, the potential vegetation for the site. The RC approach has worked well in semi-arid grasslands and has been well accepted by ranchers and wildlife managers. It relies on descriptions of relatively undisturbed range sites and their plant communities. However, the evolution of scientific thought in North America has highlighted a number of shortcomings of the RC concept. One of the key assumptions is that all declines in range condition are reversible. Experience shows that this may not be the case. Plant succession may establish stable states that are relatively resistant to change, even with decades of rest.

A very significant shortcoming relates to communities that are invaded by non-native species or are seeded to non-native species and show no apparent trend back towards climax with any management treatment. Furthermore, the concept of a single climax or potential natural community under a forest community does not address the dynamic character of the forest under-story as stand succession proceeds.

The traditional range condition approach did not consider management needs of soil. Range managers should be concerned if management practices are leading to accelerated erosion. A more robust range health assessment tool must include soils indicators like site stability. In developing the range health assessment procedure, we have reflected on the discussion of this concept within the International Society for Range Management and among federal and state agencies in the US. Since 1999, an Alberta Range Health Task Group has selected indicators and developed a scoring system to address key ecological processes and the diversity of Alberta rangelands and tame pastures.

How Is Range Health Measured?

Range health builds on the traditional range condition approach that considers plant community type in relation to site potential, but also adds new and important indicators of natural processes and functions. Range health is measured by comparing the functioning of ecological processes on an area of rangeland to a standard known as an ecological site description. An **ecological site** is similar to the concept of **range site**, but a broader list of characteristics are described. *An ecological site, as defined by the Task Group on Unity and Concepts (1995), "is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation".*

With some background knowledge about the local soils and vegetation, range health is rated for a site by scoring a series of questions that reflect key indicators of healthy range. This section will explain the key indicators of range health and their importance. Sections two, three and four provide the actual grassland, forest or tame pasture health questions and scores. In section five, general field sampling instructions are available along with blank field worksheets. Section six provides some insights on what the scores mean and how to interpret them. Additional reference materials are found in the back pages of the workbook.

Why Does Range Health Matter?

Ask anyone what they would prefer, sickness or health. We can all describe what its like to be ill and how much better we can work and play when we are healthy. We can demonstrate the same contrast for rangelands. Healthy rangelands can sustain a broad range of values and benefits (Table 2). When range health declines, so does the flow of values and benefits we might otherwise enjoy.

Table 2. Values and benefits of healthy rangeland.

Rangeland Users	Values and Benefits of Healthy Range
Livestock Producers	• Lower feed costs • Renewable and reliable source of forage production • Stability of forage production during drought • Greater flexibility and efficiency for alternate grazing seasons (e.g. autumn or winter where applicable) • Lower maintenance costs like weed control • Does not require the input of inorganic fertilizers and other soil amendments and additives. • Reduced concern for noxious weeds
Resource Managers	• Quality wildlife habitat • Maintain fisheries habitat • Maintain grazing opportunities • Preventing soil erosion • Timber production • Increased total net benefits
The Public	• Esthetic landscape values • Watershed protection • Water quality • Large soil carbon sinks • Bio-diversity • Opportunities for passive and consumptive recreation like hunting and tourism
Socio-Economics and Governance	• Healthy rangelands provide increased cooperation, increased total benefits to society with fewer conflicts to resolve, less regulation and enforcement. This means lower costs!

What Are the Indicators of Range Health?

Range health questions are indirect measures of the following indicators. An evaluation allows the manager to see whether important ecological functions are being performed.

1. Integrity and Ecological Status

Plant species composition is a fundamental consideration in range health assessment. Plant species composition influences a sites ability to perform functions and provide products and services. Native plant communities evolve within their environment and slowly change over time as environmental factors change. Significant short term changes in plant composition do not normally occur unless caused by significant disturbances like continuous heavy grazing, high levels of recreational traffic, prolonged drought, prolonged periods of high precipitation, exotic species invasion, frequent burning or timber removal.

Plant species changes due to disturbance pressures are predictable:

- Perennial species that tend to be most productive and palatable, are also the most sensitive to disturbance and decline with increased disturbance such as a continuous and heavy grazing regime.
- With heavy grazing, species with greater adaptation to disturbance pressure will increase in abundance because they are provided opportunities to compete successfully. These disturbance-induced, weedy species include pussytoes, yarrow, dandelion and noxious weeds .

Range management objectives tend to favor the later stages of plant succession (late-seral to potential natural community (PNC) high range health). Late seral plant communities tend to be superior in the efficient capture of solar energy, in cycling of organic matter and nutrients, in retaining moisture, in supporting wildlife habitat values and in providing the highest potential productivity for the site. In contrast, early seral stages represent plant communities with diminished ecological processes, which are less stable and more vulnerable to invasion by weeds and non-native species. They also have diminished resource values for livestock forage production, wildlife habitat and watershed protection.

While range management goals on native rangeland generally favor

late seral stages of plant succession, it is important to stress that ecological health and function must also consider the needs of other flora and fauna when formulating range health goals. Integrated range resource planning may identify other seral stages that are required to accommodate the needs of a diversity of species. For example certain breeding birds like horned larks and burrowing owls prefer heavily grazed range with early seral stages, while Sprague's pipit favor lightly grazed range with late seral plant communities. To this end, the range health assessment may serve as a useful coarse filter tool to assess habitat quality and to gauge desired outcomes. A deliberate decision to manage for lower seral stages (and lower range health scores) must be guided by informed resource management objectives and not merely as a pretext to accommodate reduced range health scores much like the outdated range management concept of "sacrifice areas".

Managing for lower health scores poses a number of risks including the potential for invasion of exotic agronomic species and noxious weeds. Screening of sites that might be vulnerable to invasive species is an important consideration. Assessing what plant communities are the most suitable and what areas are less vulnerable to invasion by weeds or agronomic species, needs to be carefully evaluated. The goal of creating sites on the landscape that retain early seral stage components will not be met if invasive species expand on to management area.

When disturbance impacts are reduced or removed, the present plant community may react in a number of ways:

- may remain static,
- may move toward a number of native plant communities including the potential natural community,
- or may move to a modified plant community type.

Modified plant communities are communities that have become dominated by non-native species. To the best of our knowledge, long-term rest of these modified plant communities does not return them to native species composition. A separate set of questions is used to determine the health status of these community types.

Tame pastures, are areas of rangeland that have been converted to agronomic species and they can be managed using a modified version of native range health assessment. In this field workbook

there is a special set of questions for rating the health of tame pastures.

Figures 1 & 2 on pages 16 and 17 provide a simplified example of how ecological status can be recognized on the landscape through a successional pathway commonly found in the Foothills Fescue grasslands. The plant communities (figure 1), are primarily native with minor amounts of non-native plants. Range managers normally strive to maintain the reference plant community and later seral communities (figure 1, upper left), which are dominated by rough fescue and Parry's oat grass. With light to moderate levels of disturbance, and relatively stable climatic conditions, the plant community may move back and forth between these upper states.

With prolonged and heavy disturbance pressures, the plant community will shift to more disturbance resistant species (figure 1,

Some Important Ecological Concepts

- **Plant communities** are mixtures of plant species that interact with one another.
- **Succession** is the gradual replacement of one plant community by another over time.
- **Successional pathways** describe the predictable pathway of change in the plant community as it is subjected to different types and levels of disturbance over time.
- **Seral stages** are each step along a successional pathway.
- **Seral stages** begin at the pioneer stage of **early seral**, and progress upward in succession to **mid-seral**, then **late seral** and finally **potential natural community(PNC or climax)**.
- **Reference plant community (RPC)** is the term we use for the potential natural community since we use it as the "reference" for comparison.
- An **ecological site** is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.
- **Ecological status** is the degree of similarity between the present plant community and the **reference plant community**. Plant communities are **modified** when disturbance has altered them to non-native species (like smooth brome, timothy or Kentucky bluegrass) with a composition of greater than 70% non-native species.

lower left). In this example grazing resistant grasses and forbs are now dominant at successional stages termed mid to early seral. The presence and abundance of disturbance resistant species, like Idaho fescue, lupine or golden bean will help the manager to recognize these lower stages of ecological status.

These mid or early seral plant community can be further degraded with sustained heavy disturbance pressure. If there are invasive species present, the community may proceed across an ecological threshold to become a modified plant community as represented on (figure 2). To the best of our knowledge, the process in this example is not reversible as represented by the "one-way" arrow. Once the plant community has crossed this threshold, the manager must work within the limitations of the modified state. Very heavy disturbance levels will result in communities dominated by undesirable non-native species (lower right). With better range management, it may be possible to encourage a shift to more desirable non-native species (upper right).

This model is a simplified presentation of ecological successional pathways and the threshold between native and range health modified plant communities. Other ecological thresholds often exist along successional pathways. For more detail on these pathways and thresholds please refer to the plant community and carrying capacity guide for the Natural Subregion you are working in (page 121).

2. Community Structure

Nutrient cycling and energy flow is more efficient in diverse plant communities with varied canopy structures and rooting depths that can use sunlight, water and nutrients from different zones in the canopy and soil. Plant community structure is particularly important in maintaining net primary production in forested rangelands, and in the maintenance of habitat values for a spectrum of wildlife. Highest forage yields in grasslands would be associated with high community structure and the lowest yields with uniformly low community structure. Integrated range resource management objectives may require that management objectives for community structure be altered to create more diversity in the landscape. The presence of over to under grazed patches may be an important source of plant canopy structure in prairie grassland environments providing valuable habitat diversity for both wildlife and plants.

Figure 1.

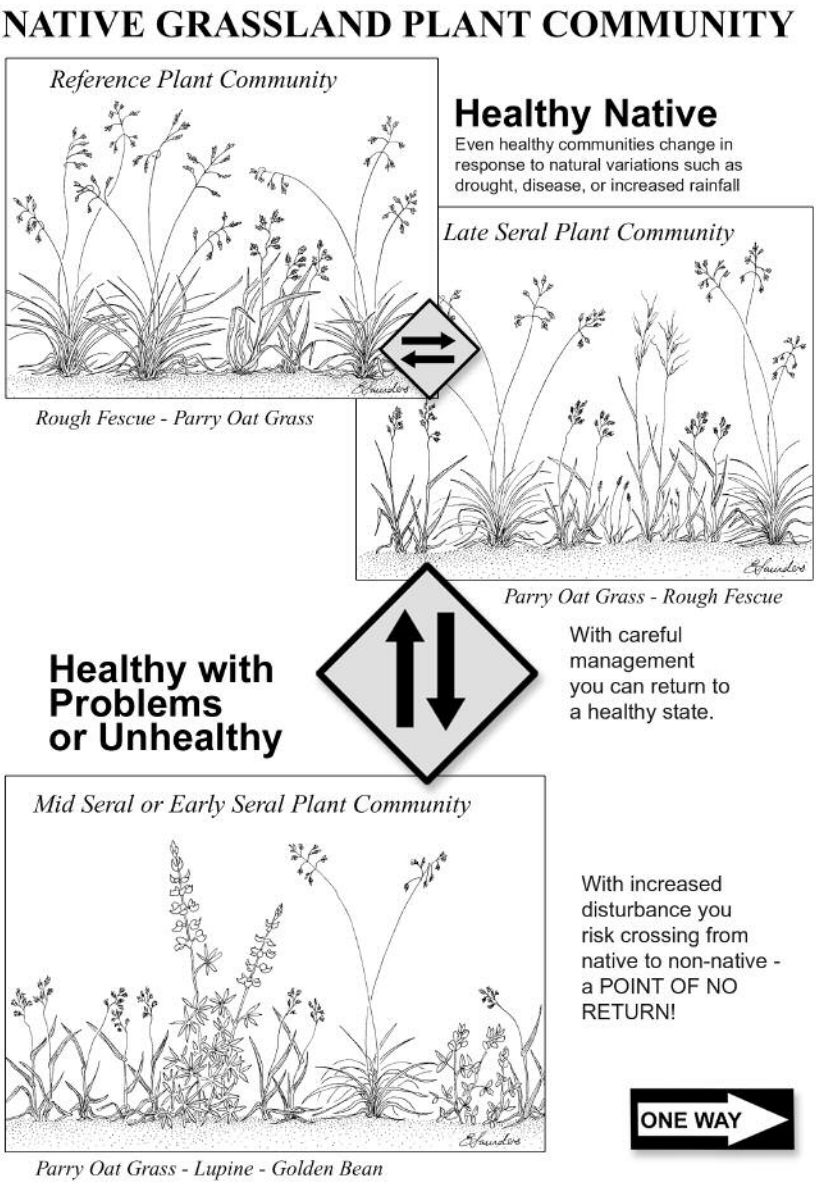
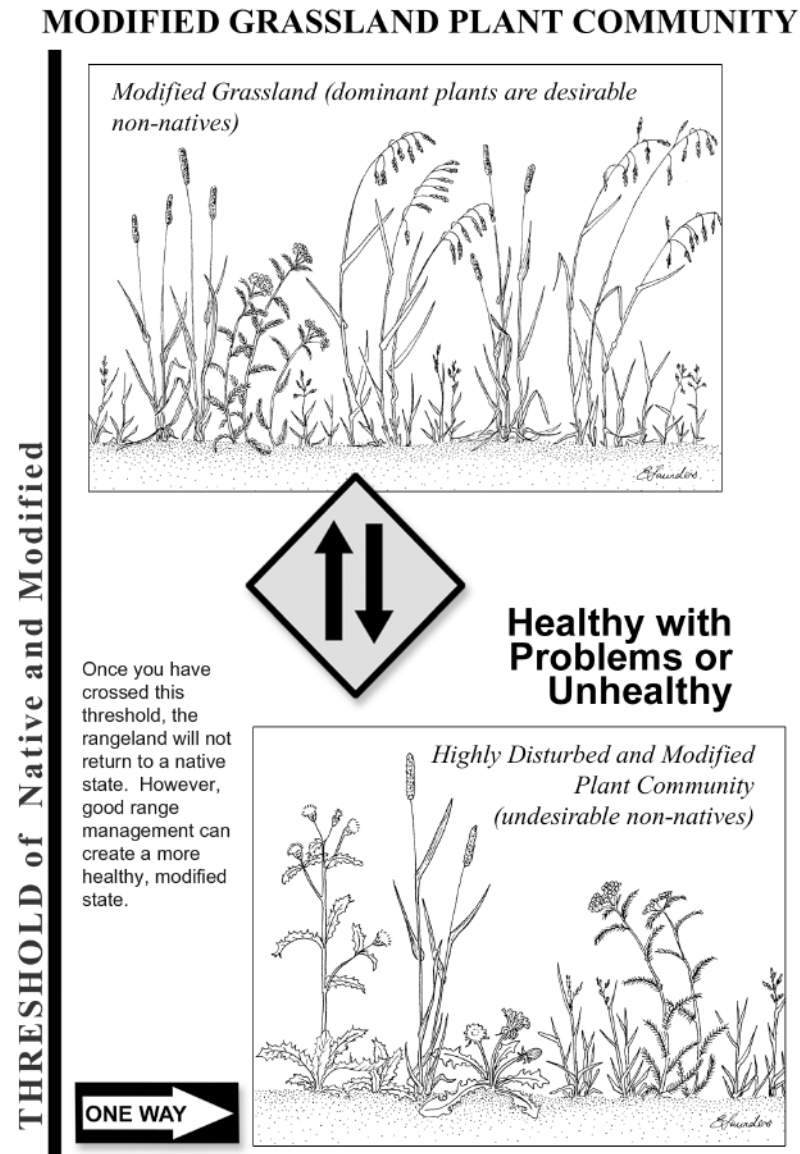

NATIVE GRASSLAND PLANT COMMUNITY
Reference Plant Community
Healthy Native
Even healthy communities change in response to natural variations such as drought, disease, or increased rainfall
Late Seral Plant Community
Rough Fescue - Parry Oat Grass
Parry Oat Grass - Rough Fescue
Healthy with Problems or Unhealthy
With careful management you can return to a healthy state.
Mid Seral or Early Seral Plant Community
With increased disturbance you risk crossing from native to non-native - a POINT OF NO RETURN!
ONE WAY
Parry Oat Grass - Lupine - Golden Bean

Figure 2.


MODIFIED GRASSLAND PLANT COMMUNITY
THRESHOLD of Native and Modified
Modified Grassland (dominant plants are desirable non-natives)
Healthy with Problems or Unhealthy
Once you have crossed this threshold, the rangeland will not return to a native state. However, good range management can create a more healthy, modified state.
Highly Disturbed and Modified Plant Community (undesirable non-natives)
ONE WAY

3. Hydrologic Function and Nutrient Cycling

This indicator deals with abundance and distribution of dead plant material on an ecological site. Plant residue promotes moisture retention and nutrient cycling and is linked to another indicator, site stability (soil exposure and erosion). When functioning properly, a watershed captures, stores and beneficially releases the moisture associated with normal precipitation events. Uplands make up the largest part of the watershed and are where most of the moisture is captured and stored during precipitation events. Live plant material and litter (either standing, freshly fallen or slightly decomposed on the soil surface) is important for infiltration (slowing runoff and creating a path into the soil), reducing soil erosion from wind and water, reducing evaporative losses and reducing raindrop impact.

Litter also acts as a physical barrier to heat and water flow at the soil surface. Litter conserves moisture by reducing evaporation making scarce moisture more effective. Litter removal will reduce forage yields by about 50% in mixed grass prairie and by about 30% during dry years in the foothills. Litter, or organic residue, acts as a nutrient pool on forested sites, is an important rooting medium for many understory plants, protects the soil surface and provides a home for decomposers. Litter performs many of the same functions in tame pastures as it does in native grasslands and forests.

4. Site Stability

Rangelands show varying degrees of natural soil stability depending on climate, site, topography and plant cover. The amount of sediment produced by water and wind erosion from a particular ecological site type is termed geologic erosion. Managers strive to prevent accelerated erosion due to land management practices, by maintaining adequate vegetation cover and minimizing exposed soil. Adequate vegetation cover protects the soil surface from the impact of raindrops, detains overland flow, maintains infiltration and permeability and protects the soil surface from erosion. Soil loss is a serious concern since erosion tends to remove the finer lighter particles like clays, silts and organic matter which are most important to soil fertility and moisture holding capacity. Long term studies show that ongoing soil loss due to overgrazing or other

RANGE HEALTH HINTS

Vegetation Canopy Protects Soil

- ✔ Like a tent or umbrella, vegetation canopy protects soil from the erosive impact of raindrops.
- ✔ Most rangeland plant communities are stable and normally have adequate vegetation to prevent soil erosion.
- ✔ Some rangelands like badlands, certain steep river slopes and sand dune environments have natural bare soil and erosional processes that are natural.
- ✔ On any type of rangeland, managers should strive to prevent accelerated erosion beyond the natural extent.

disturbances, will eventually transform the soil into a shallower, drier, less productive and less stable soil type. Excess sediment production has a negative impact on water quality since the fine particles that are eroded have a greater potential to absorb and carry nutrients and chemicals.

Some range sites are normally unstable and erosion and sediment production can be viewed as a natural process (e.g. badlands). Unstable sites will tend to exhibit significant exposed soil and have shallow soil profiles (e.g. seepage and slumping areas, badlands, thin breaks, saline lowlands, solonetzic soils, some sandy soils).

5. Noxious Weeds

Noxious weeds are invasive plants that are alien species to the rangeland plant community. Weeds are seldom a problem in vigorous, well managed rangelands although weed invasion may occasionally happen in healthy stands. Weeds may be introduced to relatively healthy stands through rodent burrows, but generally their presence indicates a degrading plant community. Weeds most often invade range where grazing practices have resulted in available niche space (bare soil, surplus moisture); available micro-habitats

normally occupied by range plants, but now available to weeds due to overgrazing or some other land use or natural disturbance. Noxious weeds diminish the agricultural productivity of a site, threaten biological diversity, reduce structure and function and sustainability of ecosystems. They also reduce the multiple uses and values that range is normally capable of providing.

Grazing management strives to maintain plant vigor and vegetation cover so that space is filled by communities that minimize weed invasion.

GETTING STARTED

How to use the field workbook?

The field workbook is a training and awareness tool and a field assessment guide to facilitate rapid, repeatable and consistent assessments of range and pasture health. Some basic training and familiarity with local plant community information is required to use the guide effectively. The workbook is intended for producers and resource managers as a tool to identify the presence, scale and magnitude of range resource issues and problems. It can be used to measure effects and impacts of management changes and to help formulate management objectives and practices to address specific issues. NOTE: Figure 4 on page 26 to select the right assessment.

The field workbook can be used at three levels:

- **Awareness.** Basic training will better "tune your eye" to the elements of range health, so that you can recognize general health impacts on the land.
- **Rapid Assessment.** With study and repeated field training, you can utilize the rapid assessment method provided in this field workbook.
- **Range Inventory.** With expert training, vegetation inventory methods and field forms (available from Alberta Sustainable Resource Development), detailed range vegetation surveys can be completed including range health assessment.

Before You Go to the Field

Range health assessment requires that you have some basic understanding about the plant communities and soils that you intend to assess. Range plant community guides provided by the Rangeland Management Branch, Public Lands Division (ASRD) are important tools in the interpretation of ecological status. Plant community type descriptions provide a standard you can compare to the plant communities on the ground. A complete list of these documents is provided in the "Range Health References" section on page 120-122.

Make use of all reference materials available to you including:
- Soil survey reports
- Natural Subregion Reports
- Forest Ecosite Guides
- Lists of native plant species including invaders and noxious weeds
- Past range inventory data and reports.

Picking the Site for Range Health Assessment

- Map and stratify the pasture unit you wish to monitor. This will allow you to better select the sites you should sample by separating different soil and vegetation types so that more uniform areas can be selected. Avoid sampling across different vegetation types (e.g. native grassland to tame pasture). Assessment areas should be representative of the dominant plant communities you are concerned about in the pasture. Keep your assessment reflective of one management regime or grazing unit.

- Consider the purpose of where you may sample. Do you want to select a portion of the pasture that is representative of the average for the management unit, or, are you wanting to select a "hot" spot where problems are apparent, which you want to monitor over time?

- If you are in a riparian area, use one of the riparian health assessment guides listed on page 120.

- Variability is normal on rangelands. No matter how hard you try to assess within like areas, you will find variation in the assessment parameters and other factors such as grazing pressure present and past. Don't worry about this. What is important is that your assessment captures and be representative of this variation.

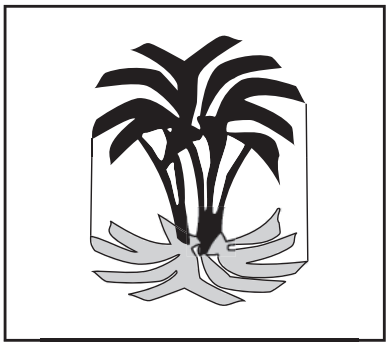
- If the pasture has a significant, uneven distribution of weeds or woody regrowth, you may want to consider dividing the pasture into smaller sample areas.

Estimating Vegetation Cover and Soil Exposure

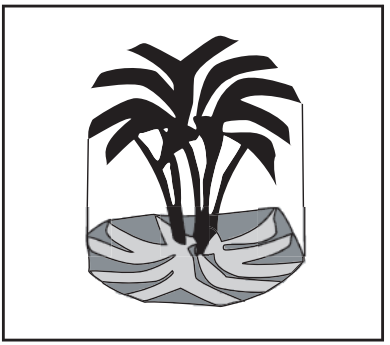
The ability to estimate the cover of plant species and the extent of soil exposure is a valuable skill for accurate range health assessment. Usually cover is defined as the vertical projection of the crown or shoot area of a plant species to the ground surface, expressed as a percent of the area of reference (e.g. a plot frame). Cover can be estimated for an individual plant species, groups of plants, dead vegetation (i.e. litter) or for bare soil. When the cover of all individual plant species are added up, the total cover may exceed 100% because of overlapping foliage from multiple species. Bare soil is the percent of the area of reference where mineral soil is not covered by live or dead vegetation or rocks [greater than 6 cm or 2.5 in.] and would be vulnerable to erosion from wind, mechanical movement [e.g. as in hoof shear], raindrop impact or overland flow of water.

Estimating vegetation cover requires training and experience to achieve repeatable observations. Most people start out with the basic concept of **canopy** cover as illustrated on the right in figure 3 below, where a line is drawn about the leaf tips of the undisturbed canopies with the this line projected onto the ground, much like an umbrella. However, with experience, the normal progression is to use **foliar** cover as illustrated in figure 3 on the left side. Foliar cover is where vegetation canopy is estimated with a similar projection of the canopy onto the ground below, but the spaces within the vegetation canopy are subtracted from the estimate. In operational range surveys and research studies, Alberta Sustainable Resource Development uses the foliar concept when assessing vegetation cover. Space is provided on the score sheets located on

pages 103 to 108 in this workbook to estimate the cover of four grasses and grass-likes, forbs, shrubs and trees to help you establish the major components of the plant community under evaluation. Procedures for conducting detailed quantitative assessment of range vegetation cover can be obtained from the Rangeland Management Branch (see contact information on page 127).



Foliar cover.



Canopy cover.

Figure 3. Two different approaches to estimating vegetation cover are the foliar cover (left) and the canopy cover (right) approaches.

When Should I Rate Range Health?

When plants can be readily identified. Common health assessment windows for native grasslands and tame pastures:

- In the Grassland Natural Region - mid-June to late July
- In the Boreal Forest and Rocky Mountain Natural Regions - July and August.

- Wetter or drier years will require that you modify assessment windows.
- If you are interested in total current annual forage production, this is best measured towards the end of the growing season and before weathering and/or frosts, commonly late July or early August.
- Repeated assessments over a series of years should be done at similar seasons and grazing conditions.

How much time does an assessment take?

- In the training phase, it may take 45 min to an hour to complete a range health assessment at a single site.
- With experience and the necessary reference materials, health assessments can be completed in 15 to 20 minutes.

Using the Range Health Worksheet

Three types of field worksheets are found at the back of this workbook:

- **Native or Modified Grassland** (page 103),
- **Forest** (page 105) or
- **Tame Pasture** (page 107).

Figure 4 on page 26 will help you to decide which health assessment protocol to select.

Worksheets allow you to record the date and location of your assessment including GPS coordinates. You can estimate range health around a single point, over a fixed distance between two points (termed a transect) or you can average range health over a polygon (a unit of landscape like a soil or vegetation type). Carefully document and describe the area you have sampled for future reference. Space is provided to list major grasses, forbs, shrubs and trees and estimate vegetation cover of the dominant species. Plant species abundance will help you to identify the plant community. Other methods and tools for detailed vegetation inventories are available from the Rangeland Management Branch (page 127).

Photographs and Record Keeping

Consider taking photographs representative of the area for range health assessment. Better yet, locate a permanent location for recording the picture and for future photographs each time you repeat the range health assessment. Over time you will have a visual record to go along with your written information. As always, it is important to keep good records and keep them organized. In addition to range health, please consider keeping rotation pasture records (See page 120 Grazing Record Booklet by Alberta Sustainable Resource Development).

A Few Words of Caution

As with any field workbook, this is just a guide that must be used with good judgment. A complex mosaic of community types will require that you subdivide your sampling area into smaller units.

In addition, you may choose to make written comments to further support the differences. In some cases, a particular question may not fit the observation area. If so you must decide whether or not to include this question in the range health score. If something does not make sense to you, ask more questions and think things over before proceeding. We are interested in your feedback as well. This workbook will improve with your questions and comments. It will be an ongoing process as we strive to make a new method work in a complex world.

What is my next step?

Determine what kind of pasture you are observing. Is it native grassland, forest or tame pasture? Go to the appropriate chapter and work through health assessment questions.

RANGE HEALTH HINTS

A Tool For Training Your Eye to Rangeland Health

Using The Range Health Guide

- ✔ **Awareness. Basic training will better "tune your eye" to the elements of range health.**
- ✔ **Rapid Assessment. With study and repeated field training, you can effectively utilize the rapid assessment method.**
- ✔ **Range Inventory. With expert training, vegetation inventory methods and field forms, detailed range vegetation surveys and range health assessments can be completed.**

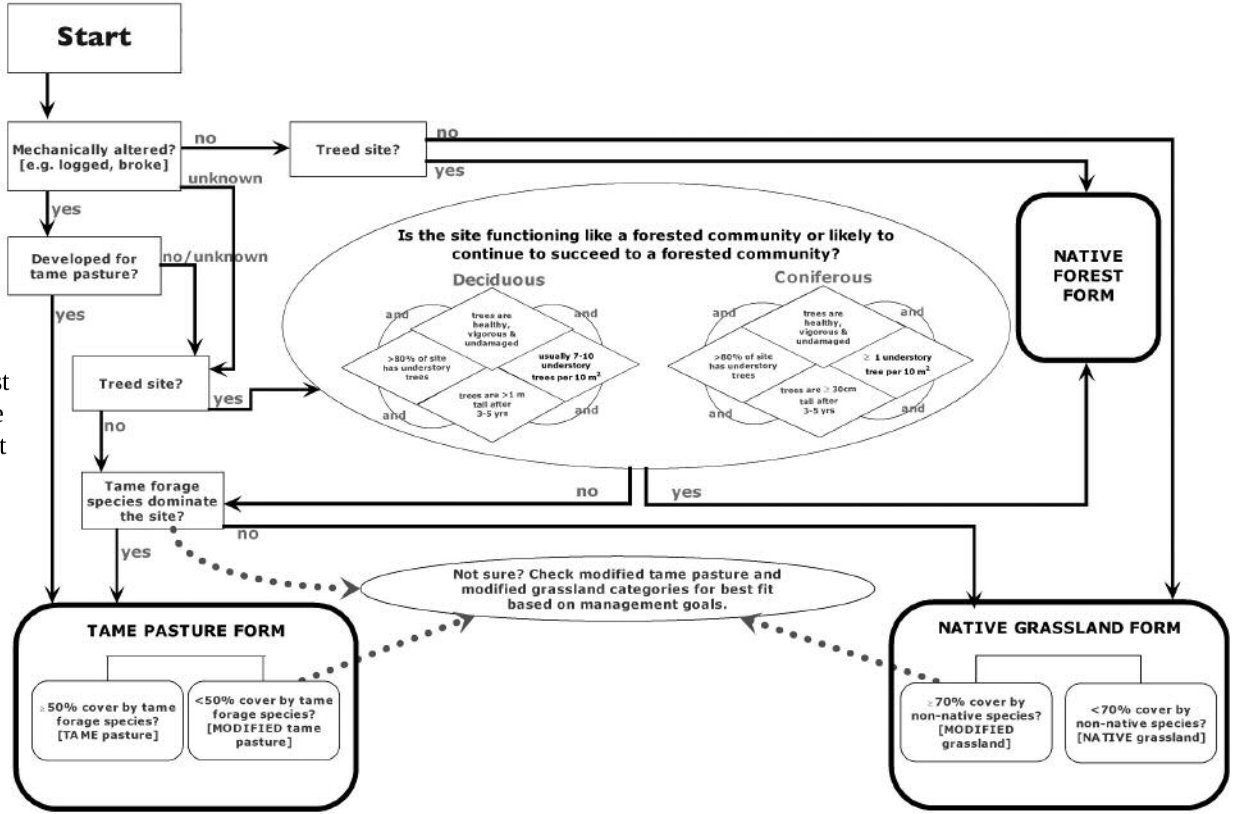


Figure 4
Diagram for selecting the most appropriate range health assessment protocol.

INSTRUCTIONS AND SCORES

Before you proceed with grassland health assessment, review the previous chapter including the sections on the *Indicators of Range Health and Getting Started*. This is not a stand-alone tool. Alberta Sustainable Resource Development has developed range plant community guides that provide necessary background information about the plant communities that you may be evaluating (see page 121). Also note the field worksheets on page 103 for recording the health assessment information and comments.

Question 1. Integrity and Ecological Status

What kind of plants are on the site?
What is the plant community?

Plant species composition is the key indicator of grassland health. It strongly influences a sites's ability to perform important ecological functions and to provide products and services. In grassland communities, a few key grass species normally provide most of the biomass and indicate ecological status. Stages of plant succession are based on the dominant plant species as well as key indicator species. These stages are called "seral stages" and they reflect the amount of disturbance to the plant community. With practice, you can use seral stages to recognize ecological status. Examples are provided in the first chapter under: *Indicators of Range Health: 1. Integrity and ecological status* (page 12) with the successional pathways figures on pages 16 and 17.

Traverse the map unit or polygon of interest and estimate plant species composition. Use available reference materials including: plant community guides, benchmark data and eco-site guides that describe potential natural communities and successional pathways.

If the plant community is a native grassland, answer **Question 1 A**. If the **integrity** of the native plant community has been lost and species are mostly non-native (greater than 70% of composition is of non-native species), the plant community is **modified** answer **Question 1 B**.

Questions 1 A
The plant community is a NATIVE GRASSLAND:

What is the ecological status of the native grassland plant community?

Scoring:

40 The plant community closely resembles the reference plant community for the site and alteration of the plant community due to grazing or other disturbances is light.

Example 1 Dry Mixed Grass: Needle-and-thread - Northern wheatgrass - Thread-leaved sedge
Example 2 Foothills Fescue Grassland: Rough fescue - Parry oatgrass - Idaho fescue
Example 3 Peace River grasslands: Western porcupine grass - Green needle grass - Northern wheat grass
Example 4 Central Parkland: Rough fescue - Western porcupine grass

27 Compared to the reference plant community, the plant community shows minor alteration, due to grazing or other disturbances. Grazing impact is light to moderate.

Example 1 Dry Mixed: Needle-and-thread-Blue grama
Example 2 Foothills Fescue: Parry oatgrass - Rough fescue and minor amount of non-native invaders like Kentucky bluegrass
Example 3 Peace River Grasslands: Northern wheat grass - Western porcupine grass - June grass
Example 4 Central Parkland: Western porcupine grass - Rough fescue with minor amounts of Kentucky bluegrass

20 On fescue grassland sites, rough fescue is co-dominant with invasives species like Kentucky bluegrass. This is an intermediate successional stage indicating declining ecological status with an increased subdominance of invasives or recovering community previously dominated

by invasives species. Grazing impact is Light to moderate.

Example 1 Foothills Fescue Grassland: Rough fescue – Kentucky bluegrass
Example 2 Foothills Parkland: Kentucky bluegrass – Parry Oatgrass
Example 3 Central Parkland: Rough fescue – Kentucky bluegrass
Example 4 Montane: Kentucky bluegrass – Rough fescue

15 Compared to the reference plant community, the plant community shows moderate alteration, due to grazing or other disturbances, compared to the reference plant community for the site. Grazing impact is moderate to heavy.

Example 1 Dry Mixed Grass: Blue grama - Needle-and-thread
Example 2 Foothills Fescue Grassland: non-native invaders form a significant component of the community, but native plant species are still present
Example 3 Peace River Grasslands: June Grass – Sedge – Northern wheat grass
Example 4 Central Parkland: Rough fescue – Kentucky bluegrass

0 Compared to the reference plant community, the plant community shows significant alterations, due to grazing or other disturbances, compared to the reference plant community for the site. Grazing impact is heavy to very heavy. If the grassland community you are evaluating is within the Montane, Lower Foothills, Upper Foothills, Foothills Fescue, Foothills Parkland, Central Parkland or Boreal Mixedwood natural subregions and is significantly invaded by non- native species (>70% are non-native) the plant community is **modified** and your should, go to question **1 B**.

Example 1	Dry Mixed Grass: Blue grama - June grass forb
Example 2	Foothills Fescue Grassland: non-native species dominate the community
Example 3	Peace River Grasslands: Sedge - June grass forb
Example 4	Central Parkland: Kentucky bluegrass - Slender wheatgrass

Scoring Notes – Question 1 A

- Only apply the 20 score option above in rough fescue grassslands.
- For grassland plant communities, the reference plant community (RPC) is the potential natural community for the site under light grazing disturbance.
- The RPC in grasslands is not assumed to be those grassland plant communities that develop under prolonged periods of rest since the natural system evolved under cyclic disturbances especially fire and grazing.
- In many grassland plant communities, prolonged rest allows a few competitive grass species to become dominant and to shade out other grasses and forbs that are normally important in the plant community.

Question 1 B
The plant community is a MODIFIED GRASSLAND

Percent desirable species of modified grassland community?

This question reflects the need to identify those grassland communities that have been modified to non-native species due to human and/or naturally caused disturbances. Recent data has shown that many native grasslands, once modified, are not likely to change back to a native plant community regardless of management changes. This is particularly true of grasslands in the Montane, Lower Foothills, Upper Foothills, Foothills Fescue, Foothills Parkland, Central Parkland or Boreal Mixedwood natural subregions. For modified grasslands, the objective is to manage the plant community for it's modified grazing potential and prevent bare soil, erosion, undesirable forage species and weedy species. Use the scoring system provided in Question 1 B. Should the plant

community recover to less than 70% non-native plant species, use the scoring system in Question 1 A.

Scoring:

15 Site is dominated by desirable and productive non-native species. Palatable plants, vigorous with tall stems, large healthy leaves and reproductive as evidenced by seed stalks
Example: Smooth brome - Timothy

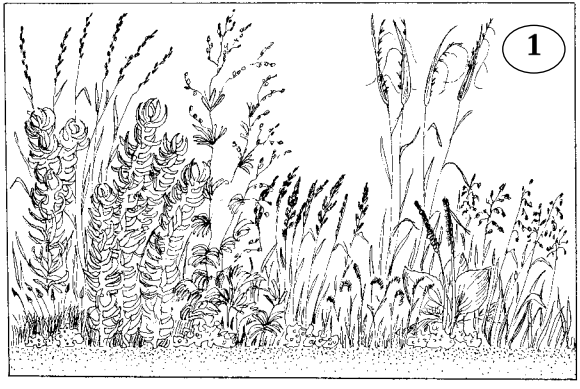
8 Site is mixture of desirable/productive and weedy/disturbance-induced non-native species. Productivity is reduced due to the abundance of lower value species. Palatable plants showing evidence of reduced vigor with shorter stems, smaller leaves and seed heads. Less palatable plants generally vigorous.
Example: Kentucky bluegrass – Timothy - Clover

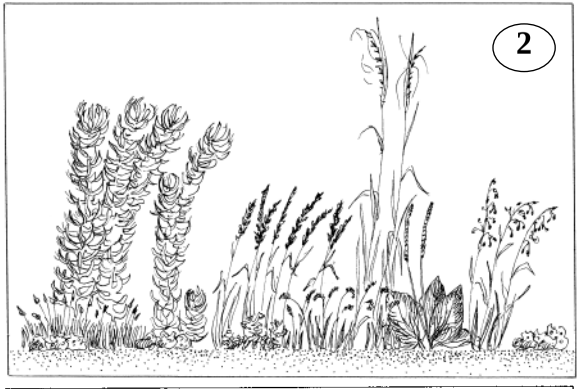
0 Site is dominated by weedy and disturbance-induced non-native species. Palatable plants are weak, with short stems and leaves and very few to no seed stalks evidenced across site. Less palatable plants also showing signs of reduced vigor from increased use.
Example Dandelion - Plantain

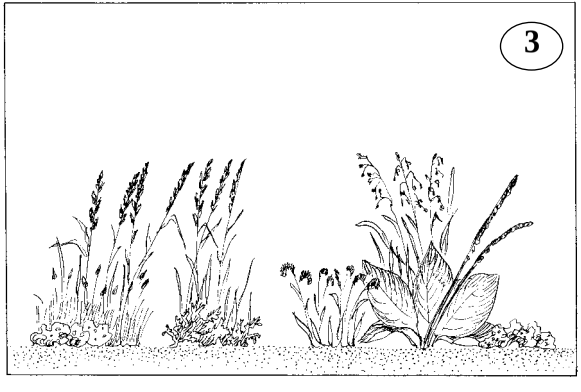
Scoring Notes – Question 1 B

- We anticipate that further field studies will allow us to better understand the successional dynamics of modified plant communities. This coarse filter approach may be replaced with specific directions on how to score these communities with plant community guides.

- To function well, modified grasslands must be dominated by desirable species with all other health parameters receiving top health scores. A healthy modified plant community is not equal in ecological function to a healthy native plant community. A healthy score for a modified plant community simply recognizes that despite changes in the plant communities integrity, the site is being managed as well as can be expected based on current knowledge.







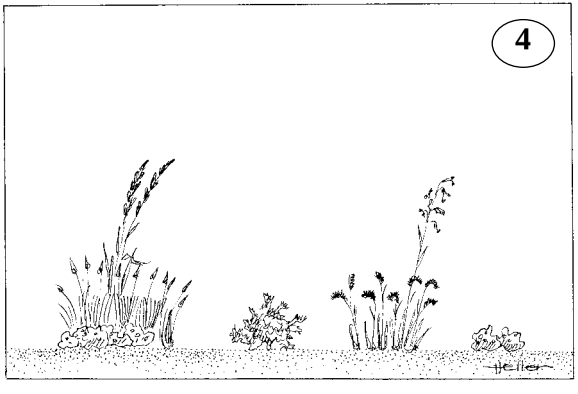


Fig. 5
Changes in grassland plant community structure as disturbance levels increase.
1) All expected layers present.
2) Tall grasses and forbs reduced.
3) Tall layer absent and mid layer reduced. 4) Low grasses and forbs; ground cover reduced.

Question 2.0 Plant Community Structure

Are the expected plant layers present?

Native grasslands normally have a diversity of plant species that vary in size, height and rooting depth. This characteristic of plants to grow in different "layers" is called structure. When plants occupy different layers, they are able to use sunlight, water and nutrients from different zones in the vegetation canopy and soil profile. This provides for efficient nutrient cycling and energy flow, supporting forage production and important habitats for wildlife.

Structural layers in grasslands include: 1) low shrubs, 2) tall graminoids and forbs 3) medium graminoids and forbs and 4) ground cover (graminoids, forbs, moss, lichen). **Always rate life form layers relative to the reference plant community (see Fig. 5).**

Scoring:

10 The life form layers closely resemble the reference plant community.

7 Compared to the reference plant community, one life form layer is absent or significantly reduced, or not fully expressed.

3 Compared to the reference plant community, two life form layers are absent or significantly reduced, or not fully expressed.

0 Compared to the reference plant community, three life form layers are absent or significantly reduced or not fully expressed.

Scoring Notes Question 2

- Use cover of major life form layers from range plant community guides to answer this question. Review benchmark data, plant community guides, photographs or adjoining lightly or

ungrazed areas to gain an understanding of expected plant layers. Where possible, compare the unit to a benchmark on a similar site in the area. Keep notes of the variety of species, life forms and age classes as you move across the unit and compare to the available data.

- In both native and modified plant communities, determine the normal life form layers expressed in the reference plant community and look for these layers, not the species (e.g. A modified plant community, where the RPC was Rough Fescue-Parry oatgrass, now dominated by a vigorous stand of Timothy and Brome, still has a tall graminoid layer and would get full marks for this layer).
- "Significantly reduced" implies that the structural layer is reduced by more than 50% compared to the reference plant community.
- If two structural layers show moderate reduction (25 to 50%), then reduce the score by one category.
- If you think a structural layer is reduced, look to see if it is under stress (e.g. low shrubs with heavy browsing use of the 2nd year and older wood).
- If you are unsure how many structural layers should be present, check for grazing impact on the plants, especially shrubs. Browsing of generally unpalatable shrubs such as snowberry and sagebrush usually indicates more desirable shrubs have been reduced or eliminated by grazing or browsing.
- Note that moss and lichens are important diagnostic layers. These layers can be reduced by trampling (hoof impact), recreation or excessive shading (non-use with heavy litter build up).
- When a natural disturbance removes a life form layer, note the missing layer in the comments section and the likely cause (e.g. insect damage, drought, fire, decadence), but don't downgrade the score.
- While it is appropriate to rate agronomic grasses when they express as an expected structural layer, **do not** rank noxious weeds as a structural layer. Their contribution to functional structure is minimal and their presence may be short lived.
- Shrubland communities are commonly found between the grassland and forest plant communities in parkland landscapes. Evaluate these transition plant communities on their own unique characteristics because their presence may be part of normal successional processes and may not relate to grazing impacts on site. Consult available range plant

community guides to see how they fit into succession.

- Site management goals may require that you manage for lower structural scores:
  - maintenance of the ratio of grassland: shrub: forest cover in parkland,
  - maintenance of patch diversity for prairie breeding birds and other wildlife - grazing practices adapted to reducing taller layers on a portion of the landscape,
  - manipulation of woody cover adjoining certain riparian area.

Question 3.0 Hydrologic Function and Nutrient Cycling

Does the site retain moisture?
Is the expected amount of litter present?

In grasslands, litter acts as a physical barrier to heat and water flow at the soil surface (review functions of litter on page 18). Litter conserves scarce moisture by reducing evaporation, improving infiltration and cooling the soil surface.

This question evaluates the ability of a site to retain scarce moisture based on amounts of organic residue. Litter weight (lb./ac.) estimates are made in representative areas and compared to "litter normals" that are appropriate to the site being evaluated. Litter is

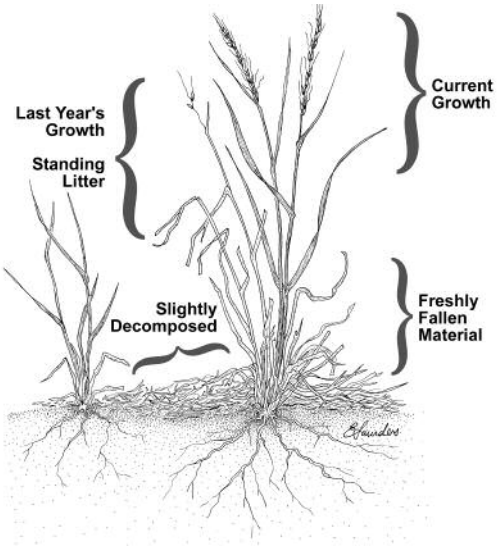


Fig. 6 Types of litter associated with native grasslands and tame pastures.

Rangeland Health Assessment Litter Thresholds (lb/ac)

Natural Subregion (Soil Zone)	Range Sites	Healthy (Base value and >65%) Average	Healthy (Base value and >65%) (65%)	Health but with Problems (65%-35%)	Unhealthy (<35)
Aspen Parkland (Black)	Loamy	1500	(>975)	975 - 525	<525
	Sandy	1100	(>715)	715 - 385	<385
	Sands	800	(>520)	520 - 280	<280
	Choppy sandhills	400	(>260)	260 - 140	<140
Foothills Fescue, Foothills Parkland and Montane (Black)	Thick Black Loamy	1400	(>910)	910 - 490	< 490
	Orthic Black Loamy	1200	(>780)	780 - 420	< 420
	Shallow-to Gravel and Limy	1000	(>650)	650 - 350	<350
	Thin Breaks	500	(>325)	325 - 175	<175
Mixed Grass (Dark Brown)	Loamy (>1100 m*)	900	(>585)	585 - 315	<315
	Loamy (<1100 m*) + Limited	600	(>390)	390 - 210	<210
	Thin Breaks Limey and Shallow to Gravel	300	(>195)	195 - 105	<105
Dry Mixed Grass (Brown)	Loamy	400	(>260)	260 - 140	<140
	Blowout	250	(>160)	160 - 85	<85
	Thin Breaks	150	(>95)	95 - 50	<50

*Elevation > means greater than

Fig. 7 Litter thresholds for native grassland communities.

sampled from a number of representative areas by hand raking from a .25 m^2 area or plot frame. Figure 7 provides litter normals for a broad range of natural subregions and range site types. Litter normals are developed from long-term benchmark monitoring of healthy and productive sites under light to moderate grazing. Litter includes ungrazed residue from previous years growth including standing stems, fallen stems and leaf material, and partially decomposed material. Estimate litter across the entire unit. Your reference should be light to moderately grazed range with enough litter to retain moisture. Look at the distribution, evenness and patchiness of litter across the site.

Scoring:

25 Litter amounts are more or less uniform across site and include standing dead plant material, fallen dead plant material and variably decomposed material on the soil surface. Litter standing crop (lb./ac.) is in the range of 65 to 100% of expected levels under moderate grazing levels.

13 Litter amounts appear slightly to moderately reduced and are somewhat patchy across the site. The standing dead plant material is less frequent in distribution with fallen dead plant material and variably decomposed material on the soil surface being the dominant litter types. Litter standing crop (lb./ac.) is in the range of 35 to 65% of expected levels under moderate grazing levels.

0 Litter amounts appear greatly reduced or absent. The extent and distribution of exposed soil has increased. There is little or no standing or fallen litter. Decomposing material on the soil surface is the main type of litter. The distribution of litter is fragmented across the site. Litter standing crop (lb./ac.) is in the range of less than 35% of levels expected under moderate grazing levels.

Scoring Notes – Question 3

- In the grassland natural region, litter reserves are closely linked to forage yield. The extra effort it takes to estimate litter levels provides a strong prediction of the sites ability to retain moisture.
- Another option for learning to measure litter amounts is by collecting litter and making your own litter bags. You can then compare these bags to the area being scored for litter. Hand rake litter from a .25 m^2 frame, oven dry it and weigh it into kg/ha (grams x 1.12) or lbs./acre (grams x 35.6). Obtain a variety of bags that represent the thresholds of the RPC found in litter normals (Figure 7). Note: The litter normals in Figure 7 are a limited sample of commonly used values. See the appropriate range plant community guide to determine litter normals for ecological sites not provided in the table.
- Examples of sample weights and corresponding lb./ac. value: (Sample 1 25.5 gms = 910 lb./ac., Sample 2 21.8 gms = 780 lb./ac., Sample 3 18.2 gms = 650 lb./ac., Sample 4 16.4 gms = 585 lb./ac., Sample 5 10.9 gms = 390 lb./ac., Sample 6 7.3 gms = 260 lb./ac., Sample 7 4.5 gms = 160 lb./ac.).
- These values represent most of the key litter threshold values listed in Figure 7.
- When rating range health practice hand raking litter from representative areas (from .25 m^2 frames; 50 cm x 50 cm or 18 inches by 18 inches) and then make comparisons to the standards found in the ziplock litter samples or the pictures in Figure 7.
- When raking litter don't include in the sample, any herbage that grew in the current year. Only include the standing stems that appear to be from previous growing seasons.
- Compared to native plant communities, modified communities produce less forage during dry periods. Litter on modified sites is more subject to loss from weathering processes. As a result, modified sites may not be capable of sustaining litter reserves at the threshold level for healthy moisture holding capacity.

- In the Chinook prone foothill environment, litter weathering loss on wind scoured slopes, crests and saddles can be significant and may retard the rate at which litter accumulates on a site in response to management changes.

Question 4.0 Site Stability

Is the site subject to accelerated erosion?
Is there human-caused bare ground?

Accelerated erosion occurs when disturbance impacts reduce vegetation cover and/or increase physical impact on rangeland resulting in increased rates of wind erosion, water erosion from rainfall and snowmelt over and above what is expected for the site. Also is included are possible increases in erosion of sites adjoining riparian areas from overland flow associated with streams and rivers.

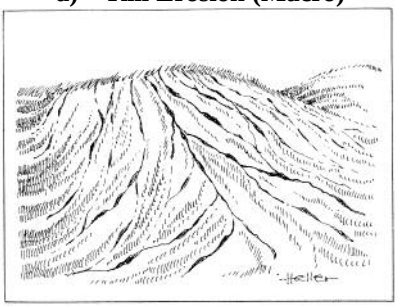
To estimate "human-caused" bare ground and recognize accelerated erosion, you need to know what normal soil exposure and erosion processes are like for your site. Most sites in Alberta have continuous ground cover. If the ecological site is normally unstable, then you must look for human-caused erosion over and above normal or geologic rates. Early or initial erosion may require close observation by getting down close to the ground and looking under green live plant cover to see if there is any movement of light surface material (litter or soil). Look for evidence of erosion on any slope as deposition of soil particles at the bottom of slopes.

Use benchmark data or field guides applicable to the site to determine if it is naturally unstable or if the extent of bare ground is within the normal range for the site. Reduced live plant and litter cover from excessive disturbance can lead to erosion. Indicators of a heavy to very heavy grazing regime include abundant manure, hoof tracks and plant pedastalling (Fig. 8). Slopes may show signs of hoof shearing and soil exposure from higher stock or wildlife trampling.

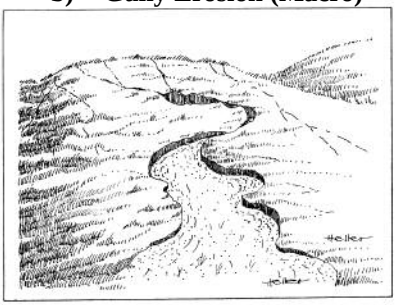
Is the site being observed normally stable or unstable, check below?

Site normally stable: ☐ Site normally unstable: ☐

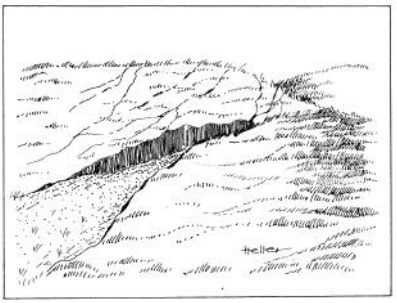
a) Rill Erosion (Macro)



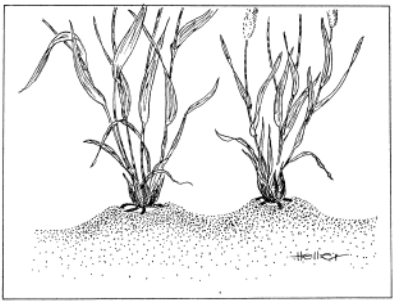
b) Gully Erosion (Macro)



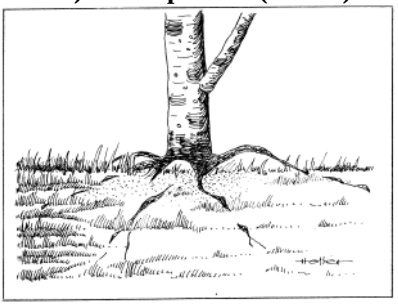
c) Gully Erosion (Macro)



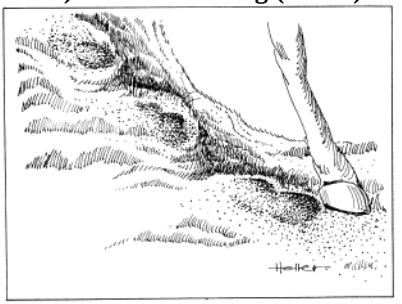
d) Pedastalling (Micro)



e) Compaction (Macro)



f) Hoof Shearing (Micro)



g) Trailing (Macro)

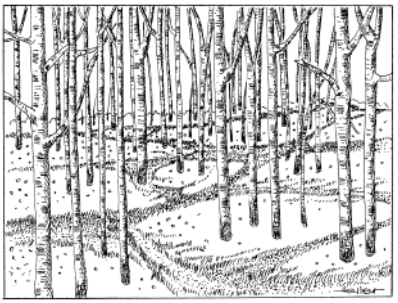


Fig. 8 Examples of soil erosion, compaction, hoof shearing and trailing.

Question 4.1
Evidence of site instability (accelerated erosion, see Fig. 8).

Scoring:

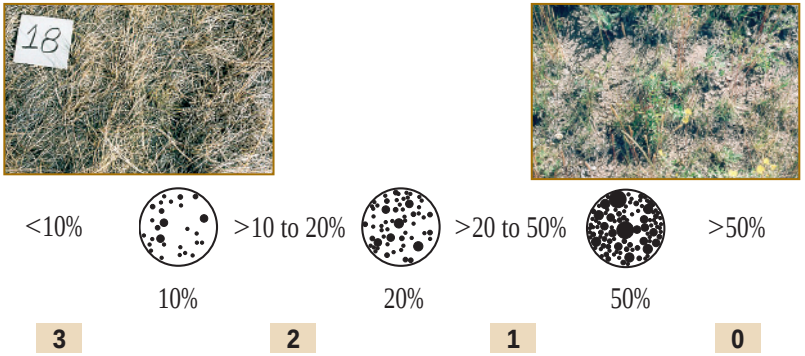
10 No sign of soil movement, deposition of soil/litter, plant pedestalling, coarse sand or aggregate remnants, flow patterns and/or scouring, or hoof sheering beyond the natural extent for the site.

7 Some evidence of slight soil movement or deposition of soil/litter, plant pedestalling, coarse sand or aggregate remnants, flow patterns and/or scouring, that is human-caused and beyond the natural extent for the site. Old erosion features may be stable and vegetated. Flow patterns may be short and shallow. Extent of exposed soil is only slightly greater than expected for the site.

3 Moderate amounts of soil movement or deposition of soil/litter, plant pedestaling, flow patterns and/or scouring is visible across site. Erosion features are active but limited to the site with no off-site movement of material. Flow patterns have a well-defined branching pattern. The extent of exposed soil is obviously greater than expected for the site but vegetation (live plants and litter) still protects most of the site. Signs of hoof sheering may be evident in localized patches.

0 Extreme amounts of soil movement with material being carried off site. Flow patterns are obvious and fan deposits may be present. Rills are abundant and deep. Gullies are deep with sharp edges. Erosion features are active. Pedestalled plants with exposed roots and rocks exposed or sitting on the surface. Hoof sheering may be common across the site, beyond localized patches. Evidence of instability.

Fig. 9 Increase in human-caused bare soil as disturbance levels increase.



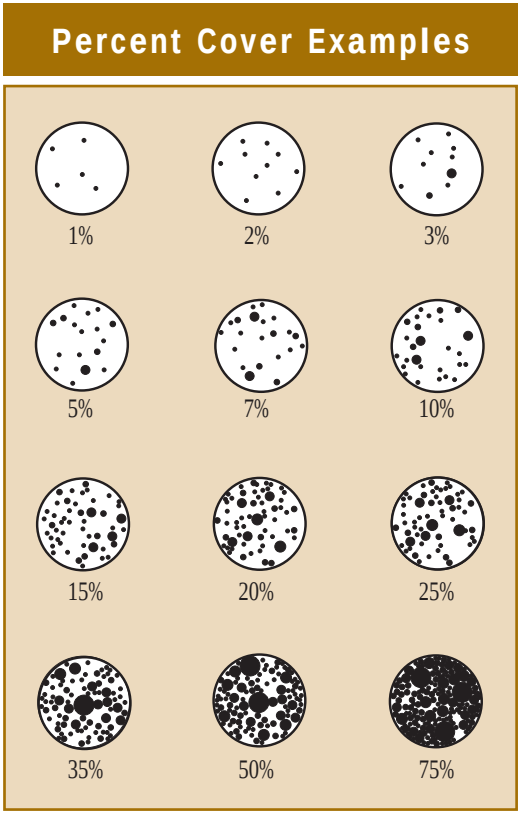


Fig. 10 This graphic helps to develop a mental picture of the percent cover of bare soil or vegetation . It will appear a number of times in this workbook for easy reference.

Question 4.2 **Increase in human-caused bare soil (read scoring notes first and see Fig. 9 & 10)**

5	less than 10% cover of exposed soil is human-caused.
3	greater than 10 and up to 20% cover of exposed soil is human-caused.
1	greater than 20 and up to 50% cover of exposed soil is human-caused.
0	greater than 50% cover of exposed soil is human-caused.

Scoring Notes – Question 4.2

General Scoring Comments

- The check box allows you to recognize the significance of hazards associated with increased soil exposure on normally stable sites.
- Human-caused bare soil is the result of disturbance processes that are subject to human control (e.g. grazing, OHV, recreational impacts). Human-caused bare soil is that portion that is over and above what is normally expected for the site.
- To estimate human-caused bare soil, first estimate total bare soil, subtract the amount considered to be expected or naturally occurring. The difference will be considered human-caused bare soil. Report this amount on the field sheet. Take time to record moss and lichen cover as well as this layer helps stabilize the site.
- Range plant community guides provide soil exposure standards for judging the "human-caused" portion.
- This question focuses on increased soil exposure and the increased potential for soil erosion on range sites that are normally stable and less of a concern where ongoing soil loss is a natural process.
- Note that Little Club Moss should be included in the estimate of moss/lichen cover.

Rodent Burrowing and Bare Soil

- On healthy sites, rodent burrowing activity is normally limited in its extent and impact on the amount of bare soil.

- Bare soil from rodent burrows tends to increase on modified and heavily grazed sites.
- Ground squirrel and pocket gopher activity increases in response to foraging opportunities associated with introduced and weedy species, especially tap-rooted forbs like dandelion.
- Therefore on modified and heavily grazed sites, a significant portion of the bare soil from rodent burrows should be considered human-caused.

Livestock and Wildlife Impacts on Bare Soil

- Large numbers of elk and deer may increase bare soil on preferred range sites.
- Winter ranges may be especially prone to hoof shear resulting in increased bare soil.
- When wildlife impacts result in increased soil exposure, treat it as human-caused and note the source of the impact in the comment section.

Question 5.0 Noxious Weeds

Are noxious weeds present on the site?
Infestation of the polygon with noxious weeds.

The cover and density distribution of noxious weeds in grassland can provide clues as to the health and function of the site. When the presence of noxious weeds becomes noticeable, they can have a negative impact on forage production and the many other values of rangeland. Detecting the presence of noxious weeds at an early stage can alert you to make changes in management practices to prevent further spread and increase costs of controlling these noxious weeds. Noxious weeds commonly establish where excessive disturbance has caused an increase in bare ground and available moisture and nutrients (See scoring notes for information regarding included weeds).

This question considers the degree of weed infestation on the site. Infestation is a function of cover, density, and distribution (patchiness or evenness) of weeds over the area being sampled. Record, on the field sheet, the cover and density distribution of each noxious weed species observed. Although individually recorded, for scoring all noxious weeds are to be considered collectively. Use the

record of individual species to guide weed control programs and the collective cover to score range health.

Recording the size of the infestation will give a quick reference to the size of the infestation that is being assessed. This data will assist in assessing the risk of further weed expansion. Depending on the size of the infestation and invasive potential of the weed species present this data may trigger an Invasive Plant Survey Form. Page 126.

Question 5.1 Cover of Noxious Weeds (see Fig. 10)

Scoring:

5 No noxious weeds present.

3 Noxious weeds present with a total cover less than or equal to 1%

1 Noxious weeds present with a total cover between 1 and 15%

0 Noxious weeds present with a total cover of greater than 15%

Question 5.2
Density Distribution of Noxious Weeds (see Fig. 11)

5 No noxious weeds on the site (see Scoring Notes)

3 Noxious weeds are present at a low level of infestation. (density distribution 1, 2, 3)

1 Noxious weeds are present at a moderate level of infestation. (density distribution 4, 5, 6, 7)

0 Noxious weeds are present at a heavy level of infestation. (density distribution 8, 9, 10, 11, 12, 13)

INFESTATION SIZE: **ha or ac**

Scoring Notes – Question 5.0

- The cover and density distribution of noxious weeds in the pasture can provide clues as to the health and function of the pasture. Noxious weeds commonly establish where excessive disturbance has caused an increase in open ground and available moisture.
- Variations in weed infestation can be averaged across the polygon. Your observation is a cumulative evaluation of all the noxious weed species present. You can record specific cover and density distribution of specific weed species in the comment section in the field worksheet.
- The density and distribution of dots in Figure 11 relates to the density and distribution of weeds in the sampling area (polygon). Scores decline as infestation increases and the values are on the right side of the figure.
- Include noxious and restricted weed species defined in the Weed Act (see suggested list of weed species on page 124). Use a weed list that is standard for the community (i.e. County or Municipal District). **Do not** rate nuisance weeds or disturbance species in this question (e.g. dandelion, strawberry, plantain, yarrow).
- If the pasture has a significant, uneven distribution of weeds, you may want to consider dividing the pasture into smaller sample areas.

Fig. 11 Density distribution guide for rating weed infestation.

Density Distribution

Class	Description of abundance in polygon	Distribution	Weeds Score
0	None		5
1	Rare		3
2	A few sporadically occurring individual plants		
3	A single patch		
4	A single patch plus a few sporadically occurring plants		1
5	Several sporadically occurring plants		
6	A single patch plus several sporadically occurring plants		
7	A few patches		
8	A few patches plus several sporadically occurring plants		0
9	Several well spaced patches		
10	Continuous uniform occurrences of well spaced plants		
11	Continuous occurrence of plants with a few gaps in the distribution		
12	Continuous dense occurrence of plants		
13	Continuous occurrence of plants with a distinct linear edge in the polygon		

BACKGROUND

Before you proceed with the forest health assessment, be sure you have reviewed the first chapter including the sections on the *Indicators of Range Health and Getting Started*. This is not a stand¬alone tool. Alberta Sustainable Resource Development has developed range plant community guides that provide necessary background information about the plant communities that you may be evaluating (see page 121). Also note the field worksheet on page 105 which can be used to record dominant plant species, associated cover values, and to record your scores and specific comments for each of the range health parameters.

Assessing the health of forested rangelands involves comparing the ecological functions being performed on a site to a standard representing the potential plant community type for that ecological site and forest successional stage. This is considered to be the Reference Plant Community.

On a forested site, the reference plant community must be established in relation to the successional status of the forest canopy. For example, on a given ecological site, a forest may establish and progress from deciduous to mixed-wood and eventually to coniferous forest cover. When establishing ecological status, the observer must evaluate the impact that current management is having on the plant community, taking into account the successional stage it is presently in. Range plant community guides provided by ASRD will enable the user to better understand forest succession and determine the appropriate reference plant community.

The Forested Health Assessment can be used in deciduous and coniferous forests at any successional stage including cutblocks and burns throughout the province and in the treed areas of the Parkland Natural Regions.

Cutblock Assessments:

Timber harvesting and silviculture practices used in cutblocks can have an impact on every category of the health assessment, even in

the absence of grazing. Therefore, it may be difficult to discern whether impacts on range health are due to livestock grazing or timber harvesting. It is recommended that impacts to the regenerating cutblocks be assessed regardless of the cause of the disturbance [i.e. record what you see without judgment to maintain assessment consistency]. Any impacts that can be clearly attributed to one disturbance type or the other should be documented in the comments.

The assessment of cutblocks can be very complex. The most comprehensive information related to the ecological status of cutblocks is presented in the range plant community guide for the natural subregion where the assessment is being done. The Reference Plant Community to which a cutblock is compared, is the forest community of the same ecosite phase prior to logging. The potential of the cutblock to achieve its goal of regeneration can then be assessed throughout successional stages. For example, a zero year cutblock may not express this potential as much as another closer to free to grow standards. The ASRD range plant community guides will have descriptions of these successional communities. The following criteria are a good benchmark to determine if the site is functioning as a healthy deciduous or coniferous forest (Alberta Regeneration Survey Manual 2008).

Deciduous Forest

- Saplings should be healthy, vigorous and undamaged.
- Understory tree density is usually 7 to 10 trees/10m^2, distributed over 80% of the block.
- After 3-5 years post harvest, a minimum tree height of 100 cm is expected.
- After 8-14 years post harvest, a minimum tree height of 200-250 cm is expected.

Coniferous Forest

- Seedlings should be healthy, vigorous and undamaged.
- Understory tree density is usually 1 tree/10m^2 (circular plot radius of 1.78 m), distributed over 80% of the block.
- After 3-5 years post harvest, a minimum tree height of 30 cm is expected.
- After 8-14 years post harvest, a minimum tree height of 100 cm is expected.

For further information on cutblock regeneration as it relates to grazing and timber harvesting see the Alberta Cutblock Assessment Tool (Level 1 Status Assessment 2008).

Prior to doing an assessment, two criteria check boxes must be completed (see score sheet pg. 105). The purpose of these are:

☐ 1. Cutblock: Check this box if the assessment is being performed on a cutblock. A cutblock is an area recently logged and is in the process of regeneration. Although cutblocks vary in regeneration times, generally, this should be checked if the logging has occurred within 25 years for coniferous and 15 years for deciduous from the assessment. Once checked a number of the questions change slightly to incorporate harvesting succession as well as silviculturual prescriptions. Fires may also fit these criteria and should be noted on the health form.

☐ 2. Cutblock Assessment Tool Level 1 Status Assessment: Check this box if a cutblock assessment has been completed. If it is believed that the restocking is being hampered by livestock or livestock grazing management it is very important that a Cutblock Assessment Level 1 Status Assessment be completed.

Other cleared sites:

Occasionally, areas that were cleared for tame pasture development will have a substantial amount of deciduous tree regeneration. The criteria described in the Alberta Regeneration Survey Manual (2008, see above) is a good benchmark to determine if the site is functioning like a forest or a tame pasture. Areas that meet these criteria should be assessed using the Forest Health Assessment. If woody regrowth management (controlling the timing and intensity of grazing, applying herbicides, breaking, discing, or other mechanical treatments) maintains the tree regeneration below the regeneration standard, then the Tame Pasture Health Assessment should be used. See decision diagram on page 26.

Question 1.0 Integrity and Ecological Status

What kinds of plants are on the site?
What is the plant community?

This parameter considers species composition of the plant community.

- Plant species composition is a key indicator of forest health.
- Plant species influence a site's ability to provide forage.
- Shrubs, forbs and grasses provide a diversity of forage and nutrient values.
- Changes to plant species composition can reduce forage production and management flexibility.

Management goal is to maintain the production potential of the plant community at the level produced under a light to moderate grazing scheme. As grazing pressure increases from light to moderate to heavy and very heavy, there is a change in the understory species composition.

When establishing ecological status, the observer must evaluate the impact that current management is having on the plant community. Observers must compare the ecological functions being performed on the assessment site, to a standard representing the potential plant community type for that ecological site and forest successional stage[1].

Scoring:

25 Observed plant community composition resembles the Reference Plant Community. Disturbance is undisturbed to light. There is no reduction in decreaser species and no evidence of invader species.
Example Aspen-Rose-Low bush cranberry

20 Observed plant community still resembles the Reference Plant Community composition. Disturbance is light to moderate. A reduction in decreaser species is noted in unprotected areas. Decreasers are not reduced in

[1] Please see cutblock section above and plant community and carrying capacity guide for the natural subregion you are working in for additional information regarding assessment of cutblocks.

protected areas. There is a greater proportion of increaser species within the plant community.
Example Aspen-Rose-Tall Forb

15 Observed plant community changes are minor. Decreaser species are reduced. Small discontinuous patches of invader species are present but not dominant. Disturbance is moderate.
Example Aspen-Rose-Low Forb

10 Patches of invader species are significant. Decreaser species are limited to small protected areas or absent. Disturbance is heavy.
Example Aspen-Rose-Clover

5 Invader species are dominant. Palatable increaser and invader species are common. Disturbance is heavy throughout.
Example Aspen-Kentucky Bluegrass-Dandelion

0 Disturbance is very heavy. Invader species are dominant throughout. Palatable increaser and invader species are uncommon.
Example: Aspen-Weeds-Bare ground

Scoring Notes – Question 1:

- Perennial species that tend to be most productive and palatable (decreasers), are also the most sensitive to disturbance. They decline with increased disturbance such as a continuous and heavy grazing regime. Disturbance can be caused in many ways. Examples include grazing, recreation, fire and forest harvesting.
- Decreaser species include: low bush cranberry, red osier dogwood, tall lungwort, and showy aster.
- As the level of grazing or other disturbances increases, species with greater adaptation to disturbance pressure (increasers) will initially increase in abundance. Under sustained heavy disturbance, the occurrence of these species will be reduced and they may eventually be eliminated from the site.

- Invader species are non-native grass, forbs, and shrubs. These plants can be weeds such as dandelion, but also agronomic grasses such as Kentucky bluegrass, clover, smooth brome and Timothy.
- In the Montane and Parkland subregions, sparse occurrences of invader species may be present. If they are not significant enough to be considered patches, a 20 score is suitable.
- In some cases the changes in plant community can be the result of the natural maturity of the forest understory. As a sapling poplar stand matures, it shifts along the successional pathway towards a mixedwood stand and finally a coniferous stand. These changes take many years, so for the purposes of the assessment, if the deciduous stand is 20 to 60 years of age, consider the natural succession influence minor. The objective is to score the changes caused by disturbance.

Question 2.0 Plant Community Structure

Are there any changes in forest plant community structure?
Are the expected plant layers present?
What level of utilization is occurring and how is this affecting growth form and vigour?

Forest plant communities are biologically diverse with a variety of woody, broad-leaved plants and grass species present. Commonly, shrubs and forbs dominate the understory. The characteristic growth of plants in different "layers" is termed structure. When plants occupy different layers, they are able to use sunlight, water and nutrients from different vertical zones in the plant community and soil profile. This diversity supports many uses and values including optimum grazing values for livestock and provides diverse habitats for many wildlife species.

When rating structure and utilization, compare the forest plant community being assessed to the Reference Plant Community. Structural layers in forest communities may include up to five distinct layers (see Fig. 12):

1. overstory tree layer (eg. aspen, balsam poplar)
2. understory tree and tall shrub layer (e.g. aspen and conifer regeneration, alder or willow)
3. medium shrub layer (less than 3 m; e.g. rose, raspberry, low bush cranberry)

4. tall forb layer (e.g. fireweed, wild sarsaparilla, cow parsnip, tall grasses)
5. ground cover layer (e.g. low growing grasses and forbs, ground shrubs (e.g. bearberry), mosses and lichens)

When comparing the assessed plant community to the Reference Plant Community, structural layers will be reduced as grazing pressure or other types of disturbance increases (e.g. recreation, oil and gas, logging, forest fire, insects). These changes appear as modifications to the expected plant community layers and plant growth form and vigour. With a reduction in structure the values and benefits from the site decline.

Utilization by livestock and wildlife, as well as other disturbances, can affect the appearance or growth form of plants. Repeated browsing of shrubs can lead to a hedged or umbrella shaped appearance. Many forbs and grasses develop a low-growing, ground-hugging, growth form in response to prolonged heavy grazing. Heavy grazing of rhizomatous species can result in a low, mat-like growth form. Livestock preference for different plants varies between kinds of livestock (e.g. cattle vs. sheep) and can change depending on season of use. Preferred species vary between plant community types as preferences are often relative to what other plants are available. In this question, the amount of utilization or browsing of shrubs observed is used as an indicator of grazing pressure. As grazing pressure increases and preferred shrubs become more heavily utilized, livestock and wildlife browsing increasingly shifts to less preferred species. (Note: in Question 1 historical utilization is used as a guide to determine the long term effect of grazing).

Plant vigour is an expression of overall health or robustness and can refer to an individual, species or class of plant. Plant vigour must be good before range health can improve. When assessing plant vigour, consider the plant's size, reproductive capability, number of shoots or tillers and the amount of new growth. Also, look at the mixture of age classes (there should be young, medium and mature plants), the amount of dead or decadent plants, as well as, the number and density of plants. Keep in mind that current growing conditions have a big influence on the apparent health of plants. If possible compare the site to surrounding areas (of the same ecological site

type that are not disturbed), this will provide an indication of plant vigour relative to other areas.

Scoring:

35 All expected life form layers are present and growth form and vigour closely resembles the Reference Plant Community. Utilization of woody species is light.

27 All expected life form layers are present, however due to utilization and disturbance, the preferred plants are showing reduced vigour and a change in growth form (see table 3 and scoring notes). Utilization of preferred shrubs is moderate and utilization of non-preferred shrubs is light.

18 One life form layer is absent or significantly reduced compared to the Reference Plant Community. Significant reduction in vigour and alteration of growth form of preferred plants due to utilization and disturbance. Utilization of preferred shrubs is heavy. Non-preferred plants may be showing reduced vigour and some alteration in growth form. Utilization of non-preferred shrubs is moderate.

9 Two life form layers are absent or significantly reduced compared to the Reference Plant Community. Vigour of preferred plants is poor and their growth form has been severely altered through utilization and disturbance. Preferred shrubs are absent or very heavily utilized. Non-preferred plants are showing significant changes in both vigour and growth form. Utilization of non-preferred shrubs is heavy.

0 Compared to the Reference Plant Community three life form layers are absent or significantly reduced. Preferred plants are absent or have severely altered growth form and very poor vigor. Non-preferred plants show poor vigour and severely altered growth form due to utilization and disturbance. Non-preferred shrubs are absent or very heavily utilized.

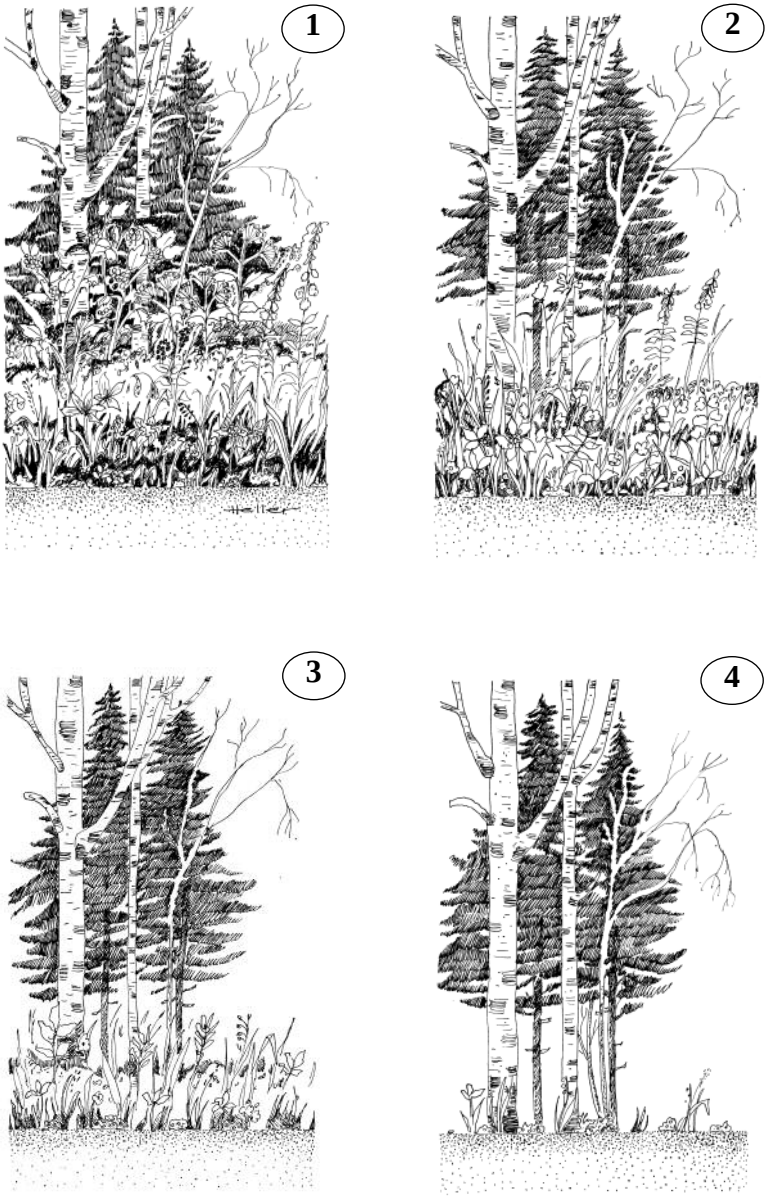


Fig. 12 Changes in forest plant community structure as disturbance increases.

1) All expected layers present.
2) Tall shrubs reduced.
3) Tall and medium shrubs eliminated.
4) Two shrub layers missing, as well as the tall forb layer.

Table 3: Assessing life form layers, utilization, plant growth form and vigour

			Preferred Shrubs, Forbs and Grasses			Non-preferred Shrubs, Forbs and Grasses	
SCORE	**Life Form Layers**	**Preferred shrub utilization**	**Vigour**	**Growth form**	**Non-preferred shrub utilization**	**Vigour**	**Growth form**
35	All present	Light	Good	Normal	None - Light	Good	Normal
27	All present	Moderate	Slightly reduced	Slightly altered	Light	Good	Normal
18	1 absent or reduced	Heavy	Significantly reduced	Significantly altered	Light to Moderate	Good to Slightly reduced	Slightly altered
9	2 absent or reduced	Very heavy or absent	Poor	Severely altered	Heavy	Significantly reduced	Significantly altered
0	3 absent or reduced	Preferred shrubs absent	Very poor or absent	Severely altered or absent	Very heavy to non-preferred shrubs absent	Poor	Severely altered

Scoring Notes – Question 2:

- In general, for cattle, preferred species include shrubs like low-bush cranberry, red-osier dogwood and saskatoon, forbs like tall lungwort, asters, peavine and vetch and most grasses. Non-preferred species for cattle include shrubs like buffalo-berry, hazelnut, snowberry and gooseberry and forbs like bedstraw and wild sarsaparilla. For additional information on the forage value of individual plant species, refer to the book Northern Range Plants (Stone, C and D. Lawrence, 2000).
- When assessing forage utilization, include both livestock and wildlife use.
- When assessing shrub utilization randomly select 2 or 3 plants of each preferred species. Determine the percentage of utilization by comparing the number of leaders browsed with the total number of leaders available on the branch (count only the 2nd year growth and older).
- Use the following guidelines for shrub utilization:
    - Light = less than 25% of available second year and older leaders browsed
    - Moderate = 26 to 50% of available second year and older leaders browsed
    - Heavy = 51 to 75% of available second year and older leaders browsed
    - Very Heavy = more than 76% of available second year and older leaders browsed
- When assessing growth form and vigour, both woody (shrubs) and herbaceous plants (grasses and forbs) must be considered.

Question 3.0 Hydrologic Function and Nutrient Cycling

What is the thickness of the surface organic layer (LFH)/ has the LFH been compacted?
In forest systems that lack the LFH layer, has the mineral soil been compacted?

In forest plant communities, water and nutrient cycles are related to the organic layer of litter, fermenting and humified vegetation above the mineral soil (referred to as the LFH). In its natural state, LFH is a spongy and uncompacted layer. The thickness of the LFH varies between dry and moist sites, so some field sampling is required to determine normal thickness for your site.

A healthy LFH layer performs important functions including storing and releasing energy and water, buffering erosive forces, reducing evaporation and providing nutrients for forest plants. By measuring the sponginess of LFH (compressibility and resistance) and thickness, you can obtain an indirect measurement of the health of the nutrient and water cycling processes on the site (Fig. 13). Be sure to review the LFH scoring method (page 60) and definitions before you try this procedure. **Note that "protected areas" refers to areas of the forest understory where use has been limited (Fig. 14). "Disturbed" refers to representative areas that are typical of the disturbance regime for the site (disturbance may include grazing, recreation, and industrial use) (Fig. 14).**

There are successional stages of forests (cutblocks, recent burns and certain conifer forests) that lack a developed LFH layer. On these forest types, assessment of compaction should be performed on mineral soil and compared between protected and disturbed areas.

Scoring:

20 **LFH Thickness** - When measuring the LFH thickness between protected and disturbed areas there is no significant difference. For average sites the difference is minimal (less than 10%). LFH is continuous and trailing is absent to light.
Mineral Soil Compaction/ LFH Compressibility - When measuring compaction between disturbed and protected areas, there is no significant difference. There is less than 20% difference in effort in the compressibility or resistance to penetration by a pencil between protected and grazed areas.

14 **LFH Thickness** - There is a difference in LFH thickness between protected and disturbed areas. For average sites the difference is between 10 to 25%. LFH is somewhat patchy due to thickness variation.
Mineral Soil Compaction/LFH Compressibility - Disturbed areas are more compacted and more difficult to compress; significantly more resistant to penetration (up to 50% more effort required). Some trailing and hoof damage is noticeable in places.

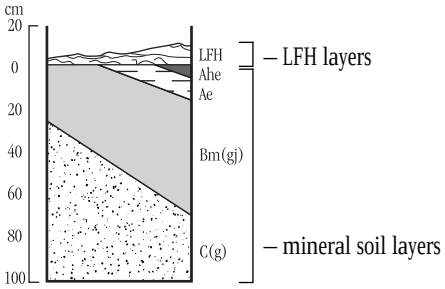
8 **LFH Thickness** - Difference in LFH thickness between protected and disturbed areas is typically 26 to 50%.LFH is clearly patchy both by measurement and by visual assessment.
Mineral Soil Compaction/ LFH Compressibility - Disturbed areas are significantly compressed and much more resistant to penetration by a pencil relative to that in protected areas (50 to 200% more effort required). Trailing and hoof shearing is common across the site. Protected areas are relatively small and isolated.

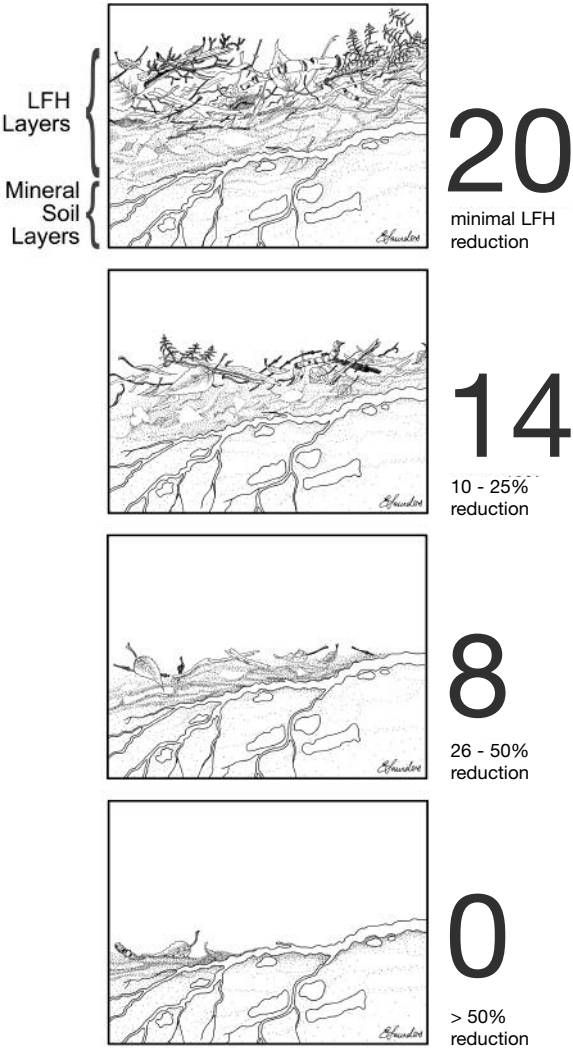
0 **LFH Thickness** - Difference in LFH thickness between protected and disturbed areas is typically greater than 50%. LFH thickness is typically less than 1.5 cm on disturbed areas.
Mineral Soil Compaction/ LFH Compressibility - Compaction and resistance to penetration very high (greater than 200% more effort required, which might even break the pencil). Protected areas tend to be very small.

Scoring Notes – Question 3:

- You will need a pencil for sampling LFH thickness and mineral soil compaction or LFH compressibility. You may find a knife or a shovel useful as well.
- **Protected areas** refer to areas that grazing animals find difficult to utilize and therefore are likely to be ungrazed or lightly grazed and relatively untrampled (e.g. between clumps of closely spaced trees, underneath dense shrub cover, or areas with considerable deadfall). Recreational or industrial activities have not impacted these areas.
- Sample **representative disturbed/grazed areas** which are any surrounding areas freely accessed by grazing animals, recreation or industrial activities.
- When selecting representative sites for comparison ensure that the sites have the same soil texture.
- Compared to dry sites, average to moist sites often have fine-textured parent materials (i.e. silts and clays) and are mainly on gentler slopes or where slopes are steep on easterly or northerly aspects. Plant diversity is greater and plant cover is

Fig. 13 Impact of increasing disturbance on LFH thickness. The inset drawing (below) shows the presence of the LFH layer overlaying mineral soil layers.

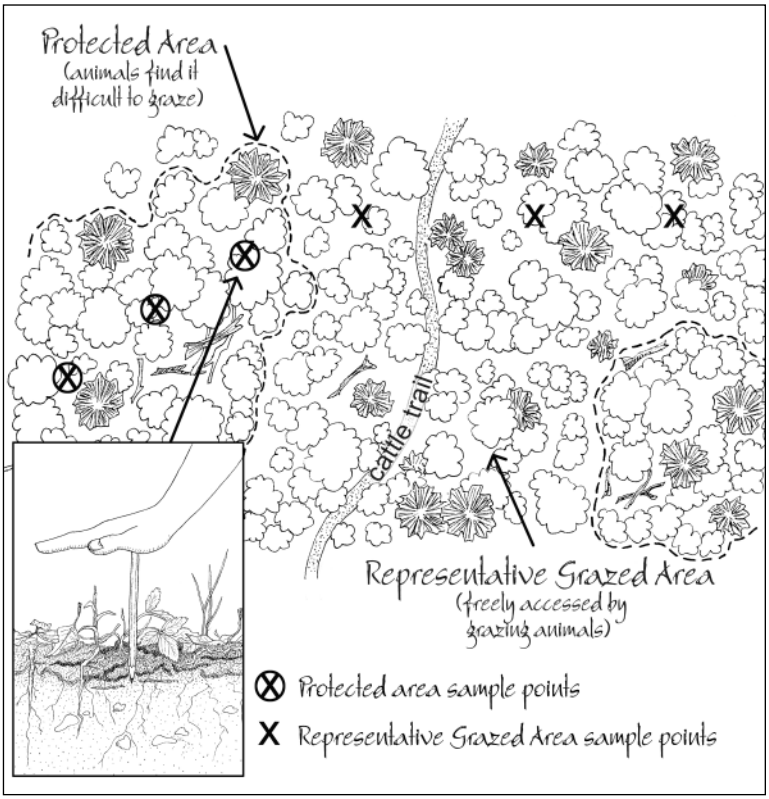




thicker with denser layering.

- Within the assessment site, look for representative disturbed and protected areas (Fig. 14). Push your pencil into the LFH or mineral soil at various locations to compare the ease of penetration between disturbed and protected areas. For a more systematic approach, sample in a transect beginning no closer than 40 cm from a tree and moving out to grazed areas stopping before you come to a trail.
- If sampling after leaf fall, carefully brush away the leaves from the current year to ensure an accurate measure of LFH thickness.
- Practice the method before sampling to better perfect the "Poke Test Method". You may want to do several samples to represent the variation found, for example, do at least three protected and three similar disturbed sites.
- If you need additional information to score the health and function of the LFH, use a shovel or knife as the sampling tool. Take samples of the LFH in a protected area compare them to the LFH in a similar, disturbed site. Consider taking at least three samples of each to better represent the variation found. It is very important to sample in the same moisture regime because any differences may be due to natural variation. Use the measurements found here along with the "Poke Test Method" to determine the score that fits best.
- **Earth Worms -** In the **Lower Foothills Natural Subregion** of the province you may encounter earthworms in the forest soil. If so, the above LFH comparative sampling methods should still apply. How do you tell if earthworms are present?
  - soil mixing altering the natural thickness of the LFH.
  - earthworm casts (feces), round cylinders about 2 mm in diameter by 5 mm long may be found in clumps.
  - the soil mixing provides a light and dark streaking in the soil profile, and parts of the LFH, i.e. the H part may be found below the lightly coloured layers.

Fig. 14 Example of representative sample site selection in protected versus disturbed/grazed areas for the "Poke Test".



The **"Poke (Pencil) Test Method"** can be used to assess LFH thickness and mineral soil compaction or LFH compressibility. To do this, place the eraser end of a sharp pencil (or similar object) in the middle of your palm and then, with a straight arm, push the pencil into the LFH. Thickness of the LFH can be estimated by the distance the pencil penetrates before it hits mineral soil. Gauge the resistance you feel as the pencil moves through the LFH. Generally more resistance is found where management has affected the site.

Question 4.0 Site Stability

Is there evidence of site instability (accelerated erosion)?
Is there human-caused bare ground?

Accelerated erosion due to human management activities is a serious issue, leading to long-term negative impacts on the site potential. If we recognize the early signs of accelerated erosion, or increases in human-caused bare ground, we can make management changes before the situation becomes serious.

To estimate "human-caused" bare ground and recognize accelerated erosion, you need to know what normal soil erosion processes are expected for the Reference Plant Community. Sandy forest sites or steep river breaks may be naturally unstable and erodible. The majority of forest range sites in Alberta have continuous ground cover and are stable.

Is the site being observed normally stable or unstable? (Check one)

Site normally **stable:** ☐ Site normally **unstable:** ☐

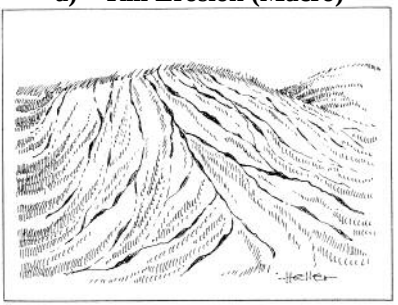
Question 4.1 Evidence of site instability (accelerated erosion) (Use Fig. 15)

Scoring:

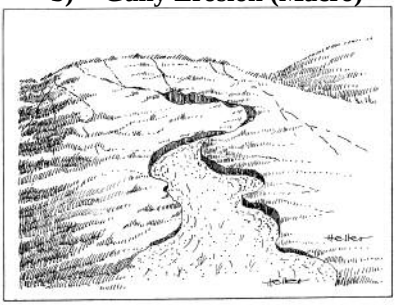
5 No visual evidence of soil movement, deposition of soil/organic material, plant pedestalling, coarse sand or aggregate remnants, hoof shear, soil compaction, flow patterns and/or scouring beyond the natural extent for the site.

3 Some micro evidence of the above. Hoof shear may be present on slopes. Old erosion features may be stable and vegetated or flow patterns on site short and shallow. Extent of exposed soil is only slightly greater than expected for the site.

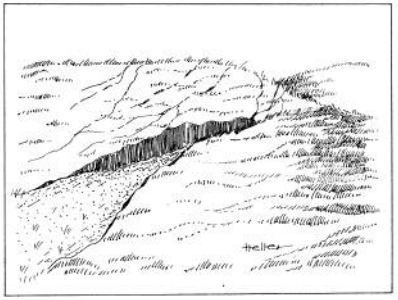
a) Rill Erosion (Macro)



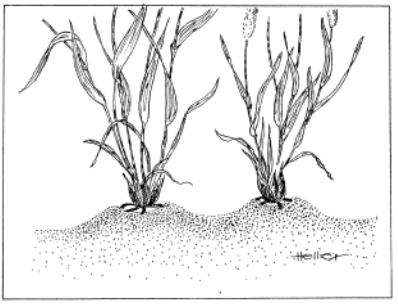
b) Gully Erosion (Macro)



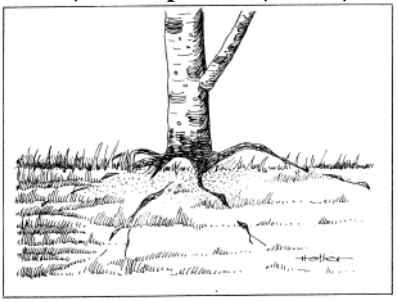
c) Gully Erosion (Macro)



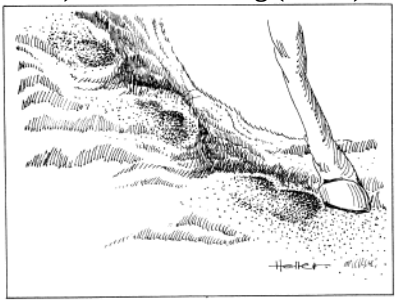
d) Pedastalling (Micro)



e) Compaction (Macro)



f) Hoof Shearing (Micro)



g) Trailing (Macro)

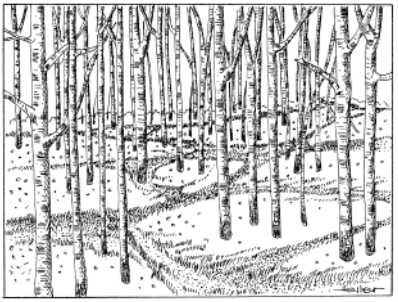


Fig. 15 Examples of soil erosion, compaction, shearing and trailing

1 Macro evidence of moderate amounts of soil movement or deposition of soil or organic material. Erosion features are active but limited to the site with no off-site movement of material. Flow patterns have a well-defined branching pattern. The extent of exposed soil is obviously greater than expected for the site but vegetation (live plants and litter) still protects most of the site.

0 Macro evidence of extreme amounts of soil movement with most material being carried off site. Flow patterns are obvious and fan deposits may be present. Rills are abundant and deep. Gullies are deep with sharp edges. Hoof shear is significant. Erosion features are active. Pedestalled plants with exposed roots and rocks exposed or sitting on the surface.

Question 4.2 Increase in human-caused bare soil (see Fig. 16)

Scoring:

5 Human caused bare soil is less than 1% cover of the area assessed.

3 Human caused bare soil is 1 to 5% cover of the area assessed.

1 Human caused bare soil is 6 to 15% cover of the area assessed.

0 Human caused bare soil is greater than 15% cover of the area assessed.

Scoring Notes – Question 4:

- Indicate if the site is normally stable (i.e. not highly susceptible to erosive forces) or not by checking the appropriate box on the score sheet. Use this knowledge to evaluate the site's "tolerance" to disturbance.

- **Human-caused bare soil is that portion that is over and above what is normally expected for the site.** It is the result of disturbance processes that are subject to human control (e.g. grazing, OHV, recreational impacts, timber harvesting).
- To estimate human-caused bare soil, first estimate total bare soil, subtract expected or naturally occurring bare soil and the difference is human-caused bare soil. Report this amount on the score sheet. Take time to record moss and lichen cover since this layer helps to stabilize the site.
- Include the bare soil percent found in livestock trails in the human-caused portion.
- Ecological site descriptions may include soil exposure standards for judging the "human-caused" portion. Generally, most forested sites have very little naturally occurring bare soil (<5%)
- Bare soil from rodent burrows tends to increase on heavily grazed sites. Rodent activity increases when there is an increase of weedy, tap rooted species. On heavily grazed sites, most of the bare soil from rodent burrows should be considered human-caused bare soil.
- High ungulate use may lead to increased bare soil on their preferred ranges. Winter sites are especially prone to hoof shear resulting in increased bare soil. When wildlife impacts result in increased soil exposure, treat it as human-caused and note the source of the impact in the comments section.
- For earthworm activity see page 61.

Bare Soil in Regenerating Cutblocks

- Bare soil (up to 30%) may be present in the early stages of cutblock regeneration. However, as the block undergoes succession, bare soil will decrease over time.
- If timber harvesting or silviculture methods have contributed to human caused bare soil, record this information in the comments.
- On conifer cutblocks, site preparation is often intentionally planned to achieve an even distribution of mineral and organic soil mixing in order to create suitable soil micro sites for young tree seedlings. Site preparation results in widely varying degrees of soil exposure.

Percent Cover Examples

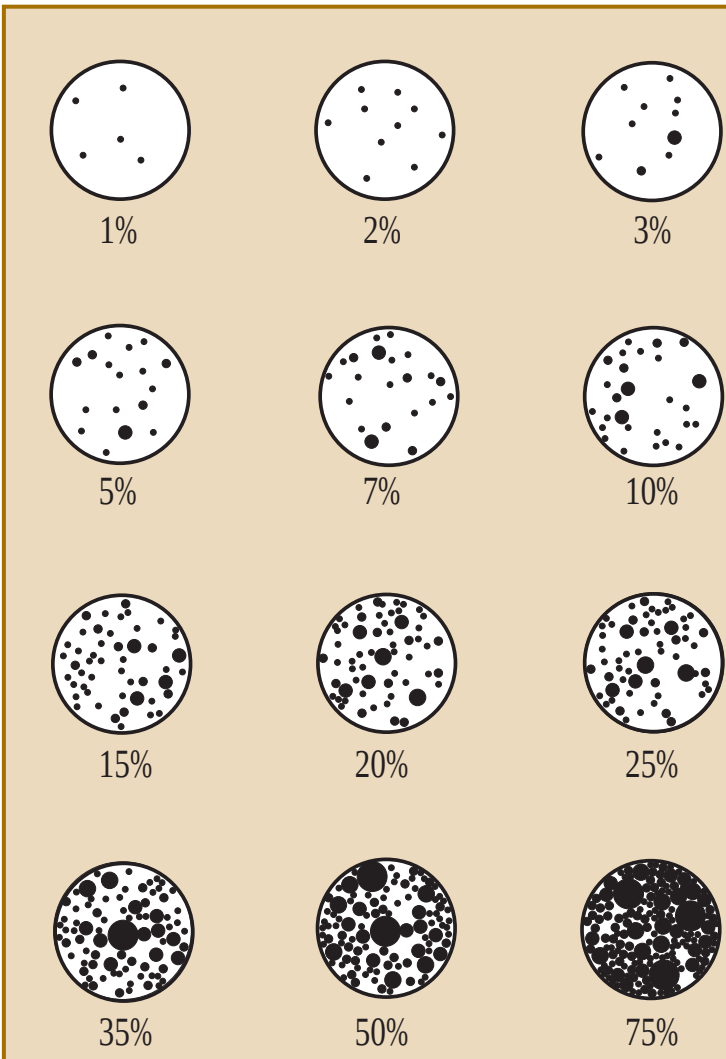


Fig. 16 This graphic helps to develop a mental picture of the percent cover of bare soil or vegetation.

Question 5.0 Noxious Weeds

Are noxious weeds present on the site?
Infestation of the site with noxious weeds.

The cover and density distribution of noxious weeds in the forest can provide clues as to the health and function of the site. Noxious weeds commonly establish where excessive disturbance has caused an increase in bare ground, available moisture and/or nutrients. When present, they can have a negative impact on forage production and the many other values of forest rangeland. Early detection of noxious weeds is required to limit their spread and reduce control costs.

This question considers the degree of weed infestation on the site. Infestation is a function of cover, density, and distribution (patchiness or evenness) of weeds over the area being sampled. Record on the score sheet the cover and density distribution of each noxious weed species observed. (See scoring notes for information on the weeds considered noxious). Although weeds are individually recorded, they are considered collectively for scoring . Use the record of individual species to guide weed control programs and the collective cover to score range health.

Record the size of the infestation. This data helps in assessing the risk of further weed expansion. Depending on the size of the infestation and invasive potential of the weed species present, this data may also trigger the need to complete an Invasive Plant Survey Form. Page 126.

Question 5.1 What is the cover of noxious weeds? (Use Fig. 16)

Scoring:

5 No noxious weeds present

3 Noxious weeds present with a total cover less than 1%

1 Noxious weeds present with a total cover of 1 to 15%

0 Noxious weeds present with a total cover of greater than 15%

Question 5.2 Noxious Weed Density Distribution Class? (Use Fig. 17)

Scoring:

5 No noxious weeds present

3 A low level infestation of noxious weeds (density distribution class 1, 2 or 3)

1 A moderate infestation of noxious weeds (density distribution class 4, 5, 6 or 7)

0 A heavy infestation of noxious weeds (density distribution class 8, 9, 10, 11, 12 or 13).

INFESTATION SIZE: _____ ha or ac

Scoring Notes – Question 5:

- Variations in weed infestation can be averaged across the site. Your observation is a cumulative evaluation of all the noxious weed species present. You can record specific cover and density distribution of specific weed species in the comment section in the score sheet.

- The density and distribution of dots in Figure 17 relates to the density and distribution of weeds in the sampling area. Scores decline as infestation increases as indicated on the right side of the figure.
- Include noxious and restricted weed species defined in the Weed Act (see suggested list of weed species on page 123). Use a weed list that is standard for the community (i.e. County or Municipal District). Do not rate nuisance weeds or disturbance species in this question (e.g. dandelion, strawberry, plantain, yarrow).
- If the assessment site has a significant but uneven distribution of weeds, you may want to consider dividing it into two smaller assessment areas.

Fig. 17 Density distribution chart for rating weed infestation.

Density Distribution

Class	Description of abundance in polygon	Distribution	Weeds Score
0	None		5
1	Rare		3
2	A few sporadically occurring individual plants		
3	A single patch		
4	A single patch plus a few sporadically occurring plants		1
5	Several sporadically occurring plants		
6	A single patch plus several sporadically occurring plants		
7	A few patches		
8	A few patches plus several sporadically occurring plants		0
9	Several well spaced patches		
10	Continuous uniform occurrences of well spaced plants		
11	Continuous occurrence of plants with a few gaps in the distribution		
12	Continuous dense occurrence of plants		
13	Continuous occurrence of plants with a distinct linear edge in the polygon		

INSTRUCTIONS AND SCORES

The Tame Pasture Health Assessment should be used on areas that were originally developed for tame pasture. Do not include areas that were left as native vegetation (e.g. riparian areas, knolls and slopes, buffer strips, patches of forested cover, etc.) or regenerating cutblocks being managed for sustained timber yield. For assistance deciding which assessment to use, please see the diagram on page 26.

When forest cover is cleared for tame pasture development, livestock producers usually implement management practices such as controlling the timing and intensity of grazing, applying herbicides, breaking, discing or other mechanical treatments to control the regeneration of trees and shrubs.

Occasionally, areas that were cleared for tame pasture development will have a substantial amount of deciduous tree regeneration. It can sometimes be difficult to decide if a cleared area is a functioning forest or a tame pasture[1]. The following criteria (from the Alberta Regeneration Survey Manual, 2008) are benchmarks to determine if the site is functioning as a forest or as a tame pasture. Areas that meet the criteria below should be assessed using the Forest Health Assessment. Areas that do not meet the criteria should be assessed using the Tame Pasture Health Assessment.

Deciduous Forest

- Saplings should be healthy, vigorous and undamaged.
- Understory tree density is usually 7 to 10 trees/10m2 (circular plot radius of 1.76 m) distributed over 80% of the block.
- After 3-5 years post harvest, a minimum tree height of 100 cm is expected.
- After 8-14 years post harvest, a minimum tree height of 200-250 cm is expected.

Coniferous Forest

- Seedlings should be healthy, vigorous and undamaged.
- Understory tree density is usually 1 tree/10m2 (circular

[1] For further information on cutblock regeneration as it relates to grazing and timber harvesting see the Alberta Cutblock Assessment Tool (Level 1 Status Assessment 2008).

plot radius of 1.78 m), distributed over 80% of the block.
- After 3-5 years post harvest, a minimum tree height of 30 cm is expected.
- After 8-14 years post harvest, a minimum tree height of 100 cm is expected.

Before you proceed with the tame pasture health assessment, be sure you have reviewed the sections "What Are The Indicators of Range Health?" and "Getting Started". Refer to page 107 for sample field worksheets. Record the dominant plant species, their associated cover values (see page 98 for information on estimating cover) and the scores for each of the tame pasture health parameters as shown in the example on page 117. When you have completed the assessment, read the section beginning on page 109 to learn more about what your score means and how you can incorporate this information into your management plans.

Question 1.0 Plant Composition

Do introduced forage plants dominate the site?

The tame pasture plant community should resemble its reference plant community, that is, the **introduced** (i.e. non-native) forage species that were initially seeded. Tame grasses and legumes are fundamental to a productive tame pasture. Maintaining these planted species maximizes forage production. When pastures are homogenous (i.e. dominated by plants that grow at the same time, with similar forage quality, etc.), management is easier and more effective. Therefore, it is important that managers know what plants are currently growing in the pasture.

In some cases, a tame pasture may be modified to the point where introduced forage species no longer dominate the stand. This can be due to individual or a combination of factors, including the development method (e.g. scarifying and broadcast seeding) and past grazing regime. In some situations, the amount of introduced forage species is so low that it is questionable if the pasture can be managed to regain the dominance of these forage plants. A mixture of tame and native species makes effective management of a pasture difficult, as different species will mature at different times and

require different rest intervals following grazing. If your management goal is to have the pasture revert back to native plants, then consider using the health assessment protocol for native grasslands or forests.

If the management goal is to manage the site as a tame pasture, continue to use this health assessment protocol. The observer must first determine if the pasture is a tame pasture (Question 1A) or a modified tame pasture (Question 1B). This decision is based on the % cover of introduced forage plants in the pasture. (Refer to page 98 for information on estimating cover.)

- If 50% or more of the vegetation cover (relative) in the pasture is from introduced forage plants, proceed to Question 1A. The pasture is considered a tame pasture.
- If less than 50 % of the vegetation cover (relative) in the pasture is from introduced forage species, proceed to Question 1B. The pasture is considered a modified pasture.

An absence of seeded forages or desirable native forage species may be an indication that the grazing regime is too heavy and that range health is declining.

Question 1A Tame Pasture

To be considered a "tame pasture", at least 50% of the vegetation cover must be from introduced forage species. Introduced forage species include tame forage species that were seeded or that have established in the pasture by natural means (e.g. wind, animals, and water) or through livestock grazing. This question indirectly estimates (through cover) the contribution of introduced forage species towards the total productivity of the pasture (adapted from Wroe et al. 1988). The observer should use representative observations or sample plots within the pasture.

In this question, the % cover being estimated is **relative cover**. To score this question, the observer must determine the % cover of all **introduced forage species relative to the total % vegetation cover** (live vegetation excluding noxious weeds and woody regrowth) found in the assessment area. In other words, estimate how much introduced forages contribute to the total vegetation cover.

Scoring:

12 90% or greater of the cover (relative) is from introduced forage species

9 75 to 89% of the cover (relative) is from introduced forage species

5 50 to 74% of the cover (relative) is from introduced forage species

Scoring Notes:

- Introduced forage species do not include native species, noxious weeds, woody plants and weedy or disturbance induced species. See Table 3 for a list of species commonly found in tame pastures. Further information regarding 'noxious' weeds and disturbance species is found in question 5 and on pages 123 - 125. (NOTE: This list was originally developed for native plant communities so some tame forage species are listed as disturbance species. For the purposes of tame pasture assessment, ignore this classification of tame forages.)
- Do not include bare soil, litter, and any areas covered **only** by noxious weed species or woody regrowth in the estimate of total % vegetation cover, as these elements are considered in other health questions. If noxious weeds or woody regrowth are layered over other vegetation, only include the other vegetation in the estimates of cover.

Question 1B Modified Tame Pasture

The pasture is "modified" if less than 50 % of the cover in the pasture is from introduced forage species. Modified tame pastures can be managed for their "modified" potential, while preventing weed and erosion problems. In a modified tame pasture there is more emphasis placed on the contribution of desirable native forage species towards the total productivity.

This question indirectly estimates (through cover) the contribution of native and introduced forage species towards the total

productivity of the pasture (adapted from Wroe et al. 1988). The observer should use representative observations or sample plots within the pasture. Only include native forage species, plus any introduced forage species that were seeded or that have established in the pasture by natural means (e.g. wind, animals, water) or through livestock grazing. This collection of forage species will be referred to as "included" species in following text.

In this question, the % cover being estimated is **relative cover**. To score this question, the observer must first determine the % cover of all **included forage species relative to the total % vegetation cover** (live vegetation excluding noxious weeds and woody regrowth) found in the assessment area. In other words, estimate how much the included forages contribute to the total vegetation cover.

Scoring:

9 75% or greater of the cover (relative) is from included species (i.e. a mixture of desirable native species and introduced forage species)

5 40 to 74% of the cover (relative) is from included species

0 less than 40% of the cover (relative) is from included species

Scoring Notes:

- Include desirable native forage species that have the potential to make a substantial contribution to forage production and are readily grazed by livestock. Do not include noxious weeds, woody plants and weedy or disturbance induced species. See Table 3 for a list of species commonly found in tame pastures. Further information regarding 'noxious' weeds and disturbance species is found in question 5 and on pages 123-125. (NOTE: This list was originally developed for native plant communities so some tame forage species are listed as disturbance species. For the purposes of tame pasture assessment, ignore this classification of tame forages.)

- Do not include bare soil, litter, and any areas covered only by noxious weed species or woody regrowth in the estimate of total % vegetation cover, as these elements are considered in other health questions. If noxious weeds or woody regrowth are layered over other vegetation, only include the other vegetation in the estimates of cover.

Table 3 Commonly occurring plants in tame pastures categorized to assist in answering questions 1 and 2.

	1A introduced forages	**1B** included forages	**2.1** tall productive forages	**2.1** grazing induced forages	**2.2** weedy/ disturbance induced non-forages
Cover estimation method	relative	relative	relative	relative	absolute
Introduced					
Kentucky bluegrass	Y	Y	-	Y	-
smooth and meadow brome	Y	Y	Y	-	-
timothy	Y	Y	Y	-	-
crested wheat grass	Y	Y	Y	-	-
quack grass	Y	Y	-	Y	-
creeping red fescue	Y	Y	-	Y	-
alfalfa	Y	Y	Y	-	-
low growing legumes (clovers)	Y	Y	-	Y	-
dandelion	N	N	-	-	Y
Native (naturally occurring)					
marsh reed grass	N	Y	Y	-	-
rough fescue	N	Y	Y	-	-
hairy wild rye	N	Y	Y	-	-
wheat grasses	N	Y	Y	-	-
June grass	N	Y	-	Y	-
needle and thread	N	Y	Y	-	-
Canada bluegrass	N	Y	-	Y	-
peavine, vetch	N	Y	Y	-	-
pussy-toes (everlasting)	N	N	-	-	Y
strawberry	N	N	-	-	Y
yarrow	N	N	-	-	Y
prickly pear cactus	N	N	-	-	Y

Question 2.0 Plant Species Composition Shift

Are there changes in the type of plants that are growing in the tame or modified tame pasture?

Introduced and native forage plants may respond differently to a particular grazing regime. Tame or modified tame pastures are most often maintained at moderate stocking levels. When the grazing regime increases to heavy (i.e. continuous heavy grazing without effective rest), plant species changes occur. Under this regime, grazing resistant plants thrive better than plants less resistant to grazing and become dominant in the pasture. Alfalfa and taller, more productive grasses with high growing points are replaced by grasses and legumes with low growing points and growth forms that are more resistant to grazing (e.g. Kentucky bluegrass, creeping red fescue, and white clover). These plants are considered grazing induced species. (Note: In areas where moisture is not limited, Kentucky bluegrass and creeping red fescue can produce a significant amount of forage. Most often, however, moisture is limited and their productivity is severely reduced.)

Good range management should maintain taller, more productive forage species, which are often better able to withstand drought conditions, provide a more stable forage supply, and permit more flexibility in grazing options. Pastures dominated by shorter and shallow rooted species, particularly when or where moisture is limited, provide fewer grazing management options and usually have reduced stocking rates.

Question 2.1 Forage Species Shift

To score this question, the observer must first determine the cover of the **taller, more productive species (both introduced and native) relative to the total cover of all forage species.**

Scoring:

14 75% or greater of the forage cover (relative) is from tall, productive, introduced and native forage species. Minor amounts of grazing induced species present.

7 40 to 74% of the forage cover (relative) is from tall, productive, introduced and native forage species. Plants may be declining in health and vigor. Grazing induced species may be replacing the taller, more productive species. Shift may be due to grazing or other causes.

0 less than 40% of the forage cover (relative) is from tall, productive, introduced and native forage species. Plants may be weak and have reduced vigor. Taller, more productive species may have been largely replaced by grazing induced species. Shift in composition may be due to grazing or other causes.

Scoring Notes:

- When estimating relative cover, you are determining the % cover that part of a group (tall, productive introduced and native forage species) has relative to the % cover of the whole group (live forage plants - do not include weedy and disturbance induced species, non-forage plants, noxious weeds and woody regrowth).
- Do not include bare soil or litter in your % cover estimates,
- See Table 3 for a list of species commonly found in tame pastures.

Question 2.2 Weedy and Disturbance Induced Species Shift

This question considers the abundance of undesirable species such as dandelion, strawberry, yarrow, everlasting and other disturbance induced species that increase with grazing pressure and as the competitiveness of seeded forages or desirable native species

declines. As the cover of weedy and disturbance-induced species increases, a corresponding and serious decline in forage production occurs.

In this question, the % cover being estimated is absolute cover, not relative cover as was used in the previous questions. In this case, you are estimating the actual percent of the area that is covered by weedy and disturbance induced species. Refer to page 98 for additional information on estimating cover.

Scoring:

14 25% or less cover (absolute) from weedy and disturbance induced species.

7 26 to 49% cover (absolute) from weedy or disturbance induced species.

0 50% or greater cover (absolute) from weedy or disturbance induced species.

Scoring Notes:

- See Table 3 for examples of weedy and disturbance induced species commonly found in tame pastures.
- When estimating the absolute cover of nuisance weeds such as dandelion and strawberry, consider and record the time of year. Dandelion and strawberry are more noticeable early in the grazing season and tend to shrivel and die off later in the season. Try to time your assessment so that the cover of these species is accurately captured. If this is not possible, look carefully for dried leaves and estimate how much area they would have covered before they dried up.
- Include nuisance weeds but not noxious weeds. Further information regarding 'noxious' weeds and disturbance species is found in question 5 and on page 123-125. (NOTE: This list was originally developed for native plant communities so some tame forage species are listed as disturbance species. For the purposes of tame pasture assessment, ignore this classification of tame forages.)

Is there adequate litter present to retain moisture?

Litter is linked to rangeland health because it performs several important functions that are vital to the maintenance of resource values for livestock, forage production, wildlife habitat, and watershed protection. Litter's light-tan color will tend to reflect the sun's rays, insulating the soil surface thereby slowing the loss of moisture and minimizing temperature fluctuations. It also acts as a kind of latticework at the soil surface that promotes infiltration of water. Litter, along with other live plant material, slows runoff and creates a pathway for water to flow into the soil. By improving the retention and percolation of water, soil erosion is greatly reduced. Litter will also reduce wind erosion, the same way that a good stand of stubble will in a grain field, by causing the wind to be deflected upward and by capturing any airborne soil particles. The presence of a litter layer reduces soil exposure to weedy plant species and insects such as grasshoppers that might take advantage of such conditions to establish new plants or lay eggs. As soil micro-organisms break down the litter to humus, nutrients are recycled to support plant vigor and growth, thereby reducing the need for costly applications of inorganic fertilizer.

Litter is of particular importance on tame pastures found in the drier

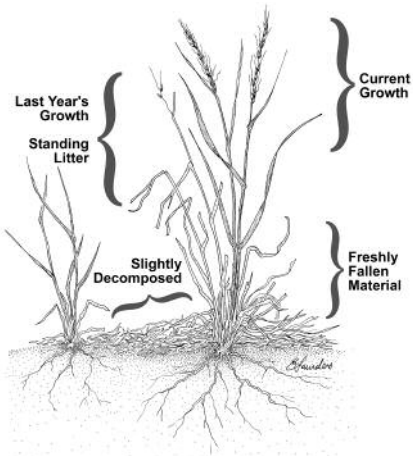


Fig. 18 Types of litter associated with tame pastures.

parts of the province (e.g. Dry Mixedgrass, Mixedgrass, Central Parkland and Dry Mixedwood natural subregions). Litter includes any plant residue from previous years' growth (standing or fallen stems or leaf material) as well as partially decomposed fragments of plant material lying on the surface (See Figure 18). Litter can be distinguished from the current year's growth by its color, integrity (i.e. brittleness, pliability, etc) and sometimes its position. Current year's growth will have a green to yellowish tinge, will be somewhat flexible and will usually be firmly connected to the plant.

Question 3.0 evaluates the ability of a site to retain moisture based on the amount of organic residue. Litter estimates provide an indirect measurement of the health and function of the nutrient and water cycles. Litter weight estimates (lbs./ac.) are made in representative areas and compared to litter thresholds that are appropriate to the site being evaluated. Your reference area should be a moderately grazed tame pasture with enough litter to adequately perform the stated biophysical functions of litter (See Table 1, page 8). As litter amounts decline, the benefits that litter provides is usually diminished.

Is it possible to have too much litter? Yes and no. Climate and plant characteristics cause litter to accumulate and break down at different rates. Where local climate conditions restrict plant growth and increase the rate of litter loss and/or break down, it may not be possible to accumulate too much litter. In tame pastures where moisture is less restricted and wind is not a factor, it maybe possible with very light or nonuse of forage to accumulate too much litter. In this case forage production will likely be temporarily reduced due to shading. Overall, the benefits of litter retention far outweigh any potential risk of forage production loss.

The litter thresholds provided are based on averaging litter amounts found on a variety of grazed tame pastures across the province. The amount of litter required to contribute to a healthy and functional rangeland will vary according to climate, soil and mix of species. Further studies will help us better define litter thresholds in tame pastures.

A quick estimate of litter levels can be based on the amount of larger litter fragments that can be readily raked up by hand within

sample plots (50 cm by 50 cm). The observer can then compare this amount to the examples shown in Figure 19. This method of rapidly estimating litter (i.e. hand raking), does not include some of the smaller litter fragments.

The health assessment must be repeatable (i.e. answers do not widely vary among observers) and as objective as possible. In order to achieve this, assessment methods must be standardized and observers instructed on how to deal with complicated factors. Manure is one of these factors. Manure (cow pies) and urine contribute to the nutrient cycle much the same as does plant litter, however they lack some of the qualities important to the hydrological cycle, such as creating pathways for water to flow into the soil. When sampling litter, including cow pies has the potential to skew the average amount of litter that is used to score the site, particularly when the pieces are large and/or fresh. Therefore, when estimating litter amounts, avoid sample plots that have large or fresh cow pies. To maintain consistency from observation to observation, and pasture to pasture, only include decomposed pieces of cow pie smaller than about the size of a deer pellet in your estimates.

Scoring:

25 A distinct litter layer is visible. Litter has a uniform distribution across the pasture with less than 5 % of the pasture lacking adequate cover. Hand raked litter from a 1/4 m^2 plot is estimated at 450 lbs./ac. or more, an amount equal to about one handful of litter.

16 A distinct litter layer is visible, but litter cover is reduced and is no longer uniform. Litter is reduced on 5 to 25% of the pasture with these areas having little or no litter. Hand raked litter from a 1/4 m^2 plot is estimated at 250 to 450 lbs./ac., an amount equal to about 1/2 to 1 handful of litter.

8 A thin litter layer is present throughout the pasture or acceptable litter cover may exist only in small scattered patches with the rest of the pasture having little or no litter. About 25 to 67% of the pasture area has inadequate

litter cover. Hand raked litter from a 1/4 m^2 plot is between 125 and 250 lbs./ac., an amount equal to about 1/4 to 1/2 handful of litter.

0 Litter is sparse or absent from the majority of the site (greater than 67% of the area). Hand raked litter from a 1/4 m^2 plot produces less than 125 lbs./ac., an amount less than 1/4 handful of litter.

Scoring Notes:

- A 1/4 m^2 plot measures 50 cm x 50 cm.
- The scoring of litter considers litter amounts and distribution (spread and cover). To award a particular score, the criteria of both the litter amount and litter distribution must be satisfied. For example, a pasture that has 450 lbs./ac. of hand raked litter but patchy litter distribution would score 16 points (not 25 points).
- In areas that are classified as exceedingly stony and/or have rocky outcrops, the amount and distribution of litter can be affected by surface rock. Large rocks (e.g. > 6 inches in diameter) can contribute to moisture retention and soil protection. Record the % of rock cover in your comments and score the litter as your see it, regardless of rock cover. This method is recommended to maintain consistency of assessments from observer to observer over time and among pastures. Consider the influence of rock cover when making management decisions. For example, if rock is negatively affecting site litter cover, you may decide to: 1) take no management action to increase litter cover (assuming that non-rocky areas have enough litter); or 2) reconsider plans to develop tame pasture on sites with similar rock cover.

Question 4.0 Site Stability

Is the site subject to accelerated erosion?
Is there human-caused bare ground?

Recognizing the process of human-caused erosion on tame and modified pastures is very important. Erosion can cause serious reductions in the long-term ability of the site to produce forage and

Litter Examples

450 lb/ac

250 lb/ac

125 lb/ac

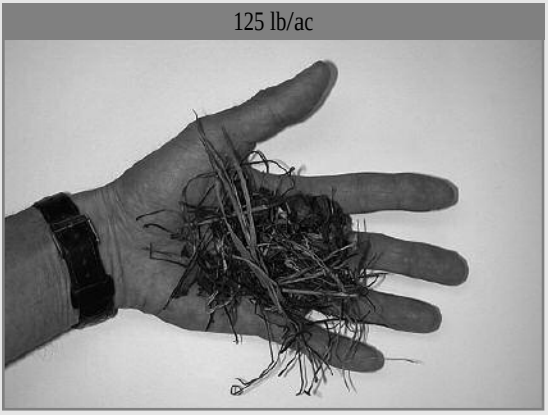


Fig. 19 Litter standards for tame pasture.

provide other values. Early stages of soil erosion indicate the need for immediate changes in management before soil loss becomes serious and costly.

Question 4.1 Evidence of Accelerated Erosion (see Figure 20)

Scoring:

10 No visible macro or micro evidence of soil movement, deposition of soil/litter, plant pedestalling, coarse sand or aggregate remnants, hoof shear, soil compaction, flow patterns and/or scouring beyond the natural extent for the site.

7 No macro evidence as above. Some micro evidence of hoof shear and/or plant pedestalling. Old erosion features may be stable and vegetated or show short and shallow flow patterns on the site.

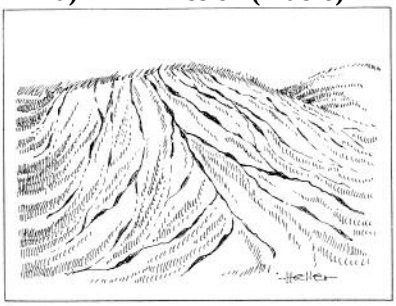
4 Macro and micro evidence of moderate amounts of soil movement or deposition as described above. Erosion features are active but limited to the site, with no off-site movement of material. Flow patterns have well-defined branches.

0 Macro and micro evidence of extreme soil movement with most material being carried off site. Flow patterns are obvious and fan deposits may be present. Rills are abundant and deep. Gullies are deep with sharp edges. Hoof shear is significant. Erosion features are active. Soil erosion has uncovered rocks or caused pedestalled plants with exposed roots.

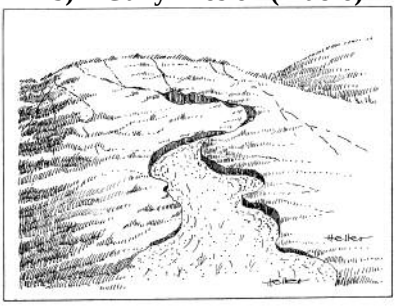
Scoring Notes:

- Look for human-caused erosion above normal or geologic rates expected for the site.
- To observe early signs of erosion, you may need to get very close to the ground, looking in and around plants at ground level. Look for micro evidence such as dishing (small depressions caused by wind erosion), hoof shear, and pedestalling.

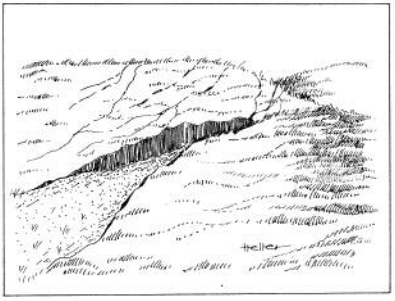
a) Rill Erosion (Macro)



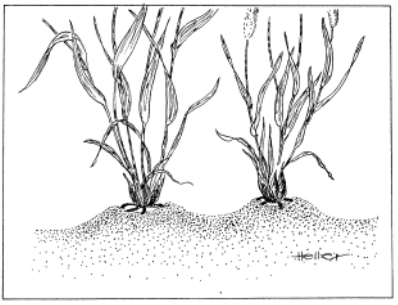
b) Gully Erosion (Macro)



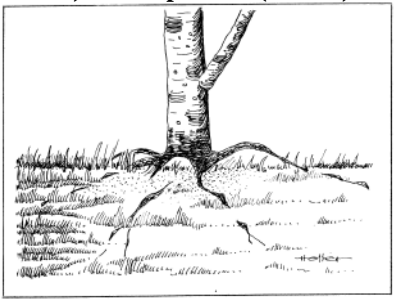
c) Gully Erosion (Macro)



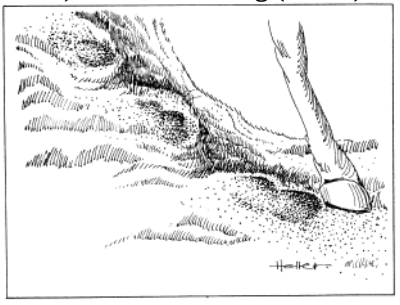
d) Pedastalling (Micro)



e) Compaction (Macro)



f) Hoof Shearing (Micro)



g) Trailing (Macro)

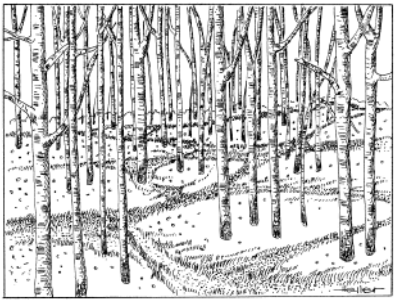


Fig. 20 Examples of soil erosion, compaction, hoof shearing and trailing.

Question 4.2 Human-Caused Bare Soil

Human-caused bare soil will alert you to the need for changes in management. Human-caused bare soil can result from the direct impacts of pasture establishment methods, grazing or equipment use, or indirectly where rodent burrowing is in response to weedy and disturbance species in the pasture. Bare soil is an obvious indicator of loss of forage production and the many other values found in a well-vegetated tame pasture.

Scoring:

To estimate human-caused bare soil, first determine the percentage of bare ground on the site (use Figure 21 to assist you). Decide which subregion the tame pasture is located in, then use Table 4 to determine the percentage of naturally occurring bare soil in that natural subregion. Subtract the amount of naturally occurring bare soil from the observed amount. The result is an estimate of human-caused bare soil used to answer this question. (See examples 1 and 2 below.)

Example 1 for Boreal Mixedwood: total observed bare soil is 20% minus 5% naturally occurring = 15% human-caused bare soil.

Example 2 for Dry Mixedgrass, Blowout site type: total observed bare soil is 50% minus 15% natural occurring = 35% human-caused bare soil.

Use your estimate of human-caused bare ground to answer the appropriate question below. Answer Question 4.2A if the pasture is in the Mixedgrass or Dry Mixedgrass subregion; or answer 4.2B for any other subregion.

4.2A Dry Mixedgrass or Mixedgrass:

5 10% or less human-caused bare soil

3 11 to 20% human-caused bare soil

1 21 to 49% human-caused bare soil

0 50% or greater human-caused bare soil

Table 4. Natural Variation of Bare Soil found in Natural Subregions of Alberta

Natural Subregion (soil zone)	Percent naturally occurring bare soil on sites suitable for tame pasture development
Boreal	5 (0 to 5)
Foothills Fescue, Foothills Parkland, and Montane	Loamy sites 5 (1 to 5)
Central Parkland	Loamy sites 5 (1 to 5)
Mixedgrass (Dark Brown)	Loamy sites 7 (3 to 7) Sandy sites 6 (4 to 6) Blowout sites 12 (6 to 12)
Dry Mixedgrass (Brown)	Loamy sites 10 (1 to 10) Sandy sites 12 (5 to 12) Blowout sites 15 (5 to15)

4.2B Foothills Fescue, Foothills and Central Parkland, Montane, Boreal Mixedwood:

5 5% or less human-caused bare soil

3 6 to 10% human-caused bare soil

1 11 to 15% human-caused bare soil

0 16% or greater human-caused bare soil

Scoring Notes:

- Bare soil may be present in the early stages of tame pasture establishment before plant density and vegetation canopy increases to normal levels for the site. Be sure to note if the pasture is still in the forage establishment phase (e.g. 1 to 3 years, depending on climate). Alternatively, you may wish to consider delaying the assessment until forage has been established.
- If forage seeding practices such as wide row spacing, (prevalent with Crested Wheatgrass) have contributed to the human-caused bare soil, record this information in the comments, but score it as you see it. Review these comments when considering the overall health of the tame pasture and when making management decisions. For example, you may

Percent Cover Examples

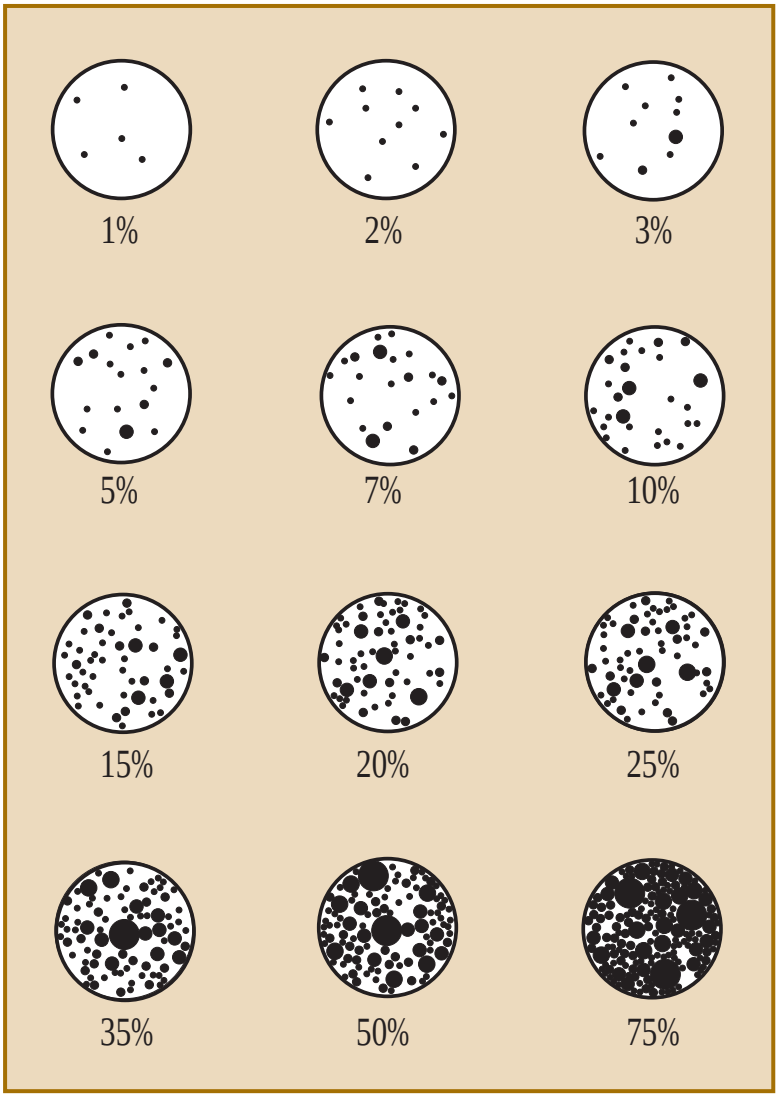


Fig. 21 This graphic helps to develop a mental picture of the percent cover of bare soil or vegetation. It will appear a number of times in this workbook for easy reference.

decide to reject sites prone to soil erosion as potential tame pasture sites, or you may decide to adjust establishment methods to reduce the short and long term risks of soil exposure and erosion.

- Consider the amount of bare soil in livestock trails to be part of human-caused bare soil.
- On heavily grazed sites, a significant portion of the bare soil from rodent burrows should be considered human-caused bare soil. Burrowing rodent populations tend to increase on pastures where there is an abundance of weedy taprooted species and less vegetation to obstruct the rodent's view of predators.
- High ungulate use may lead to increased bare soil on their preferred ranges. Wintering sites may be especially prone to hoof shear resulting in increased bare soil. When wildlife impacts result in increased soil exposure, treat it as human-caused and note the source of the impact in the comments section. For earthworm activity see page 61.

Question 5.0 Noxious Weeds

Are noxious weeds present on the site?
Infestation of the polygon with noxious weeds.

The cover and density distribution of noxious weeds in tame pastures can provide clues as to the health and function of the site. When the presence of noxious weeds becomes noticeable, they can have a negative impact on forage production and the many other values of tame pastures. Detecting the presence of noxious weeds at the early stages can alert you to make changes in management practices to prevent further spread and increased costs of controlling these noxious weeds.

Noxious weeds commonly establish where excessive disturbance has caused an increase in bare ground and available moisture and nutrients. This question considers the degree of weed infestation on the site. Infestation is a function of cover, density, and distribution (patchiness or evenness) of weeds over the area being sampled.

Record, on the score sheet, the cover and density distribution of each noxious weed species observed. (See scoring notes for information regarding included weeds). Although individually recorded, for scoring all noxious weeds are to be considered

collectively. Use the record of individual species to guide weed control programs and the collective cover to score range health.

Record the size of the infestation that is being assessed. This data will assist in assessing the risk of further weed expansion. Depending on the size of the infestation and invasive potential of the weed species present this information may trigger the need for an Invasive Plant Survey Form. (Page 126.)

Question 5.1 Total Cover of Noxious Weeds (use Figure 21 to assist you)

Scoring:

5 no noxious weeds present

3 noxious weeds present with a total cover (absolute) less than 1%

1 noxious weeds present with a total cover (absolute) between 1% and 15%

0 noxious weeds present with a total cover (absolute) of greater than 15%

Question 5.2 Density Distribution of Noxious Weeds (refer to Figure 22)

Scoring:

5 No noxious weeds present

3 A low level infestation of noxious weeds (density distribution class 1, 2 or 3)

1 A moderate infestation of noxious weeds (density distribution class 4, 5, 6 or 7)

0 A heavy infestation of noxious weeds (density distribution class 8, 9, 10, 11, 12 or 13)

Scoring Notes:

- For the purpose of scoring range health, include restricted, noxious, and other particularly invasive weed species. Please refer to the text and list on pages 123-125. (Note that the list was originally developed for native plant communities so some tame forage species are listed as disturbance species.) You may also include weeds from a list that is standard for the local area (i.e. your County or Municipal District). If you add weeds from a local list, record this in your comments. Do not include nuisance weeds or disturbance species for this question (e.g. dandelion, strawberry, plantain, yarrow).
- In this question, the % cover being estimated is **absolute** cover, not relative cover as was used questions 1 and 2.1. In this case, use your plot, polygon or frame to represent 100% of the sample area. Then determine the actual percent of this area that is covered by noxious weeds. Make sure your samples are representative of the entire assessment area (i.e. pasture or polygon). Refer to page 98 for additional information on estimating cover.
- Score the questions using the cumulative (combined) cover of all noxious weeds. (e.g. 10% Canada thistle + 5% downy brome = 15% cover of noxious weeds)

Density Distribution

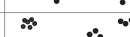
Class	Description of abundance in polygon	Distribution	Weeds Score	Regrowth Score
0	None		5	4
1	Rare		3	
2	A few sporadically occurring individual plants			
3	A single patch			
4	A single patch plus a few sporadically occurring plants		1	2
5	Several sporadically occurring plants			
6	A single patch plus several sporadically occurring plants			
7	A few patches			
8	A few patches plus several sporadically occurring plants		0	2
9	Several well spaced patches			
10	Continuous uniform occurrences of well spaced plants			
11	Continuous occurrence of plants with a few gaps in the distribution			
12	Continuous dense occurrence of plants			
13	Continuous occurrence of plants with a distinct linear edge in the polygon			

Fig. 22 Density distribution guide for rating weed infestation and woody regrowth.

- The density and distribution of dots in Figure 22 represents the density and distribution of weeds in the sampling area (polygon). Scores decline as infestation increases. The scores for each density distribution class are indicated in Figure 22.
- If the pasture has a significant, uneven distribution of weeds, you may want to divide it into different polygons.

Question 6.0 Woody Regrowth

Is there a woody regrowth problem?

The kinds, proportions and amounts of woody species that grow in tame or modified tame pasture depend on many factors including:

- site conditions (rocks, soil, natural vegetation type [forest, parkland or grassland]).
- range improvement method used
- grazing management practices
- age of pasture

Depending on the cover, density and species of plants, woody regrowth may act as complementary forage or compete with seeded forage plants. You may choose to maintain some woody regrowth to support resource goals like timber production or maintaining wildlife habitat and riparian area values. In some cases, woody plants may be beneficial to the pasture. For example, they may increase site moisture through snow trapping; they may be important for wildlife or other values; and they might be important to the health and function of the site (e.g. riparian areas).

Riparian areas (those green strips of vegetation that are found around ponds, lakes, sloughs, and along creeks, rivers and streams) are very important to the health and function of the watershed. It is desirable to have woody cover in riparian areas that may be found within a tame pasture. These woody plants should not be considered undesirable woody regrowth. Woody plants in riparian areas should be maintained to help meet the health and function needs of riparian areas, and to that end, pasture managers should proceed with caution in any brush control considerations. Riparian areas should be maintained and managed in their natural state to maximize

watershed values and riparian health. For additional information, refer to the Cows and Fish website (www.cowsandfish.org).

In the Dry Mixedgrass Natural Subregion, sagebrush is an important woody plant for the endangered species Sage-Grouse. To help protect Sage-Grouse habitat, sage brush should not be considered a woody regrowth problem, and should not be removed from pastures. For further information see Beneficial Grazing Management Practices for Sage-Grouse (Centrocercus urophasianus) and Ecology of Silver Sagebrush (Artemisia cana Pursh subsp. cana) in Southeastern Alberta (Adams et al. 2004).

In northern Alberta tame pastures, poplar species, willow, rose and buckbrush may be a problem if their cover and density distribution is too high. In the Parkland, buckbrush and rose can sometimes become a problem. In the Mixedgrass and Dry Mixedgrass subregions, woody plants are generally not considered a problem. Shrubs are an important source of structure in prairie grasslands with particular value for wildlife species and they can also enhance site moisture by trapping snow. Any potential advantages that may occur through removal of woody species from these sites should be carefully weighed against the benefits that woody species provide. In these drier regions, if the integrated benefits of retaining woody species outweigh the potential loss of forage production, or if woody vegetation does not grow in the area, you may decide not to score this question. If you do not score the question, remember that you need to adjust the total score so that the % range health is representative of the questions that you answered. In the grassland natural region, refer to the Range Plant Community Guides (Adams et al, 2004 & 2005) for additional information and range health scoring guidelines for woody species like silver sagebrush and forbs like prickly pear cactus.

The health assessment must be repeatable (i.e. answers do not widely vary among observers) and as objective as possible. In order to achieve this, assessment methods must be standardized and observers instructed on how to deal with complicated factors. Woody plants are one of these factors. Record, on the score sheet, the cover and density distribution of the 3 dominant woody species. For reasons explained previously, exclude all woody plants in

riparian areas. If a woody species is to be excluded in the estimation of woody cover and density distribution, comments to that effect must be recorded.

Question 6.1 Woody Regrowth Cover

Estimate the combined cover of included woody plant species (use Figure 21 to assist you).

Scoring:

6 Woody regrowth present with a total cover (absolute) of less than 5%

3 Woody regrowth present with a total cover (absolute) of 5 to 15%

0 Woody regrowth present with a total cover (absolute) greater than 15%

N/A not scored

Question 6.2 Density Distribution of Woody Regrowth

Estimate the combined density distribution of woody plant species (refer to Figure 22).

Scoring:

4 A low density of woody regrowth is present (density distribution class 0, 1, 2 or 3)

2 A moderate density of woody regrowth is present (density distribution class 4, 5, 6 or 7)

0 A high density of woody regrowth is present (density distribution class 8, 9, 10, 11, 12 or 13)

N/A not scored

Scoring Notes:

- For the purpose of scoring this question, only assess areas that were originally developed for tame pasture. Do not include areas that were left as native vegetation (e.g. riparian areas, knolls and slopes, rocky areas, buffer strips, patches of forested cover, etc). Use the combined cover and density distribution of all included woody species that are not in riparian or other areas of native vegetation. Indicate in the comments any areas that were not included in the assessment.
- In this question, the % cover being estimated is absolute cover, not relative cover as was used questions 1 and 2.1. In this case, use your plot, polygon or frame to represent 100% of the sample area. Then determine the actual percent of this area that is covered by woody regrowth. Make sure your samples are representative of the entire assessment area (i.e. pasture or polygon). Refer to page 98 for additional information on estimating cover.
- In order to maintain consistency of assessments, do not attempt to compensate for multiple values of woody regrowth when estimating cover. Score what you see. Consider multiple benefits of woody regrowth when evaluating the overall health of the pasture and when making management decisions regarding brush control.
- The density and distribution of dots in Figure 22 represents the density and distribution of woody regrowth in the polygon. The scores for each density distribution class are indicated in the figure's right column. If the pasture has a significant, uneven distribution of woody regrowth, you may want to divide it into different polygons.
- In the comments section, record your observations on the average height of the woody regrowth. This will assist you in assessing the need for brush control measures.
- If woody regrowth is a problem, provide specific comments on the need for control measures like biological, chemical or mechanical treatments

Determining the Scale of Observation

The field workbook has been designed to assess range health of grassland, forest and tame pasture at a variety of scales (plant community, field or pasture, management unit, or polygon – the observation assessment area). The scale you choose depends on your specific needs and constraints.

- Consider the purpose of the assessment – what do you want to accomplish? Is the sample site an area of concern or is it broadly representative of the pasture as a whole? You may want to know the cover and density of specific weed species in addition to the cumulative measurements for the health indicators. Tame pasture can be assessed on a field basis but woody re-growth is highly variable and will normally require more detailed sampling.

- Determine the amount of time, money and labor you can apply to conduct the range health assessment. Once you have started to measure range health, future assessments allow you to establish trend; upward or downward in response to ongoing management practices.

- Sample "like-with-like". This increases the confidence that observations are representative and accurate. For example, always sample within the same fenced management unit, and if you have time, consider sampling within different plant communities. The complexity of the rangeland and the number of intermixed plant communities, will determine the number of samples required.

How Many Points Do I Sample Within a Plant Community, Management Unit or Polygon?

We suggest you pace off a representative distance of the landscape or crisscross the plant community, management unit, or polygon to

get a thorough impression of key health indicators. Consider a minimum of three observation points, making mental notes of variability before you complete the question form. It's a good idea to record information in pencil and refine as you gather more information.

In some cases, you may wish to complete measurements representative of the polygon and break down individual questions into more specific details. In the case of noxious weeds (question 5) or woody regrowth (tame pastures- question 6), the field worksheet allows you to identify specific species in the comments section.

What Sampling Equipment Do I Need?

- Field work book, a pencil and eraser,

- For grassland and tame pasture, a quarter meter frame (50 x 50 cm) for estimating litter amounts. Alternatively you can use a measuring tape and spikes to mark off a quarter meter square or perhaps you can use your feet (boot size),

- For forest, a pencil, knife and/or a shovel and a tape or ruler to measure the LFH.

- Many of the questions ask about vegetation cover. You can use a plotless method, visually estimating canopy characteristics of the sample area, be it a plant community, management unit, or polygon.

- A plot frame can tune your eye to measure vegetation cover. For grasslands and tame pasture, the frame can be a 20 cm by 50 cm (open on one of the 20 cm sides). For forest, the frame can be 50 by 50 cm (open on one of four sides).

Estimating Vegetation Cover and Soil Exposure
The ability to estimate the cover of plant species and the extent of soil exposure is a valuable skill for accurate range health assessment. Usually cover is defined as the vertical projection of the crown or shoot area of a plant species to the ground surface, expressed as a percent of the area of reference (e.g. a plot frame).

Cover can be estimated for an individual plant species, groups of plants, dead vegetation (i.e. litter) or for bare soil. When the cover of all individual plant species are added up, the total cover may exceed 100% because of overlapping foliage from multiple species. Bare soil is the percent of the area of reference where mineral soil is not covered by live or dead vegetation or rocks [greater than 6 cm or 2.5 in.] and would be vulnerable to erosion from wind, mechanical movement [e.g. as in hoof shear], raindrop impact or overland flow of water.

Estimating vegetation cover requires training and experience to achieve repeatable observations. Most people start out with the basic concept of **canopy** cover as illustrated on the right in figure 23 below, where a line is drawn about the leaf tips of the undisturbed canopies with the this line projected onto the ground, much like an umbrella. However, with experience, the normal progression is to use **foliar** cover as illustrated in figure 23 on the left side. Foliar cover is where vegetation canopy is estimated with a similar projection of the canopy onto the ground below, but the spaces within the vegetation canopy are subtracted from the estimate. In operational range surveys and research studies, Alberta Sustainable Resource Development uses the foliar concept when assessing vegetation cover. Space is provided on the score sheets located on pages 103 to 108 in this workbook to estimate the cover of four grasses and grass-likes, forbs, shrubs and trees to help you establish the major components of the plant community under evaluation. Procedures for conducting detailed quantitative assessment of range vegetation cover can be obtained from the Rangeland Management Branch (see contact information on page 127).

Foliar cover. Canopy cover.

Figure 23. Two different approaches to estimating vegetation cover are the foliar cover (left) and the canopy cover (right) approaches.

Taking Photos

We recommend taking a planned series of photographs that support your written observations. Note the date, direction of view and location of where you took the picture. Here are a few simple steps for taking reference photos:

- Mark the name or number of the sample plot on a piece of paper with felt pen. Place this marker on the ground at your feet along with a plot frame or some other object to provide scale. Take photo 1, looking as close to straight down as possible.
- Turn 180 degrees on your heel, take four paces away from the spot marked on the ground and turn back towards your first photo plot.
- Sit on the ground; a low camera angle will allow you to look into the structure of the plant community. Point your camera back towards photo plot 1, frame the first site so there is only a thin sliver of horizon in the top of your field of view. Take picture number 2.
- These photos can be captured with a digital camera and then transferred to your home computer.
- A simple graphics program can be used to combine photos with the health score and provide a powerful monitoring record.

How to Use the Form?

Samples of field worksheets are provided on the following pages. The abridged range health guide also includes field worksheets that can be photocopied for additional sample sites. Because the range health questions differ slightly depending on type of range, select the appropriate form for grasslands, forest or tame pasture.

Take time to fill out the top of each form. This information (i.e. date, location, plant community, photo information, etc.) will be important when you are summarizing all your observations and deciding on management actions. A good set of records will allow you to look back over many years and determine if the grazing management practices are in balance with a healthy and functioning rangeland. Basic questions can be answered from these records: Has a site with a “healthy with problems” rating recovered to “healthy”? What indicators have responded (litter, species composition, structure, reduced bare soil)?

Note the species table that is found immediately before the health questions. This is a place to record your best estimate of the dominant plant species and the plant community.
Each health question (five each on the grassland and forest forms, six questions on the tame pasture form) requires you to select the best-fit score for that area. We recommend that you select only the scores provided; don't try to score values between the numbers provided.

In addition to the health questions you have the opportunity to estimate other important management factors, such as utilization and trend.

We encourage you to answer all questions. However, in some unique situations you may find one of the questions not applicable. You may want to think it over and ask questions. If you decide to not answer a question, remember that you need to adjust the total score so that the % range health is representative of the questions you answered.

When you have completed the questions, tally up the scores for all the questions and calculate the percentage range health based on the actual score divided by the total possible score.

Is it healthy, healthy with problems or unhealthy? Once you have health scores to look at, go to the following chapter to better understand what the scores mean.

Abridged Range Health Worksheets:

We have also developed a condensed version of the two range and tame pasture health assessment procedures, that we call the abridged range health forms. Copies of these worksheets can be obtained from the local offices of the Rangeland Management Branch, Lands Division, Alberta Sustainable Resource Development.
The abridged health forms can also be downloaded from our website at: http://srd.alberta.ca/lands/managingpublicland/rangemanagement/healthassessment.aspx

Click on the link to: Range and Pasture Health Assessment

NOTES

Grassland Range Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

1a	40	27	20	15	0
1b			15	8	0

Comments

Score

2. Are the expected plant layers present?

10 7 3 0

Comments

Score

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 13 0

Comments

Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence	10	7	3	0
4.2 Bare Soil	5	3	1	0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover	5	3	1	0
5.2 Denisty Distribution	5	3	1	0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Grassland Range Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

1a	40	27	20	15	0
1b			15	8	0

Comments

Score

2. Are the expected plant layers present?

10 7 3 0

Comments

Score

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 13 0

Comments

Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 3 0

4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Grassland Range Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

1a	40	27	20	15	0
1b			15	8	0

Comments

Score

2. Are the expected plant layers present?

10 7 3 0

Comments

Score

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 13 0

Comments

Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 3 0

4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Grassland Range Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

1a	40	27	20	15	0
1b			15	8	0

Comments

Score

2. Are the expected plant layers present?

10 7 3 0

Comments

Score

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 13 0

Comments

Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 3 0

4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | 50-74% Healthy with problems | 75-100% Healthy

Grassland Range Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

1a	40	27	20	15	0
1b			15	8	0

Comments

Score

2. Are the expected plant layers present?

10 7 3 0

Comments

Score

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 13 0

Comments

Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 3 0

4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Grassland Range Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

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Comments

Score

2. Are the expected plant layers present?

10 7 3 0

Comments

Score

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 13 0

Comments

Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 3 0

4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | 50-74% Healthy with problems | 75-100% Healthy

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GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

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SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

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Comments

Score

2. Are the expected plant layers present?

10 7 3 0

Comments

Score

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 13 0

Comments

Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 3 0

4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

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GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

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SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

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1b			15	8	0

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Score

2. Are the expected plant layers present?

10 7 3 0

Comments

Score

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 13 0

Comments

Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

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4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
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Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

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Special Observations (climate, changes in management) _____

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SCORING (circle appropriate values and add their sum to the Score box)

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Plant Community Name (code)_____

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25 13 0

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Score

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Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

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Dominant Species	%Cover	Density Dist.	Infestation Size
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Comments

Score

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Observed Utilization_____%

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Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Forest Range Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

Check box if this is a cutblock site ☐ **Check box if a Level 1 assessment was completed** ☐

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

25 20 15 10 5 0	Comments	Score

2. Are there any changes in forest plant community structure?

35 27 18 9 0	Comments	Score

3. Thickness and compaction of the surface organic layer (LFH)?

20 14 8 0	Comments	Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 5 3 1 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____ Moss & Lichen cover (%) _____	Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

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Comments

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Moss & Lichen cover (%) _____

Score

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Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

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5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species / %Cover / Density Dist. / Infestation Size (ac or ha) Comments	Score

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LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

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25 20 15 10 5 0

Comments

Score

2. Are there any changes in forest plant community structure?

35 27 18 9 0

Comments

Score

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Comments

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Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

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Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

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LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

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Moss & Lichen cover (%) _____

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Comments

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Special Observations (climate, changes in management) _____

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25 20 15 10 5 0 | Comments | Score

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Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

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Dominant Species	%Cover	Density Dist.	Infestation Size
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Comments

Score

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LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

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SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

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Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

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5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

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LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

Check box if this is a cutblock site ☐ **Check box if a Level 1 assessment was completed** ☐

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

25 20 15 10 5 0 | Comments | Score

2. Are there any changes in forest plant community structure?

35 27 18 9 0 | Comments | Score

3. Thickness and compaction of the surface organic layer (LFH)?

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4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 5 3 1 0

4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

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LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

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Special Observations (climate, changes in management) _____

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SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

25 20 15 10 5 0	Comments	Score

2. Are there any changes in forest plant community structure?

35 27 18 9 0	Comments	Score

3. Thickness and compaction of the surface organic layer (LFH)?

20 14 8 0	Comments	Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 5 3 1 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____ Moss & Lichen cover (%) _____	Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species / %Cover / Density Dist. / Infestation Size (ac or ha) Comments	Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

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GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

Check box if this is a cutblock site ☐ **Check box if a Level 1 assessment was completed** ☐

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

25 20 15 10 5 0 | Comments | Score

2. Are there any changes in forest plant community structure?

35 27 18 9 0 | Comments | Score

3. Thickness and compaction of the surface organic layer (LFH)?

20 14 8 0 | Comments | Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 5 3 1 0

4.2 Bare Soil 5 3 1 0

Comments

Human Caused Bare Soil (%) _____

Moss & Lichen cover (%) _____

Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0

5.2 Denisty Distribution 5 3 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size ac or ha

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____%

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture	12	9	5	Comments	Score
1B Modified Tame Pasture	9	5	0		

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native	14	7	0	Comments	Score
2.2 Weedy & Disturbance	14	7	0		

3. Is the site covered by litter?

Litter cover & distribution				Comments	Score
25	16	8	0		

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence	10	7	4	0	Comments
4.2 Bare Soil	5	3	1	0	Human Caused Bare Soil (%) _____

Score

5. Are noxious weeds present?

5.1 Cover	5	3	1	0
5.2 Denisty Distribution	5	3	1	0

Dominant Species	%Cover	Density Dist.	Infestation Size
			ac or ha

Comments

Score

6. Does the site have woody regrowth?

6.1 Cover	6	3	0
6.2 Denisty Distribution	4	2	0

Dominant Species	% Cover	Density Dist.

Comments

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score	

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score	

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score	

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species / %Cover / Density Dist. / Infestation Size (ac or ha) Comments	Score	

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species / % Cover / Density Dist. Comments	Score	

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50%	50-74%	75-100%
Unhealthy	Healthy with problems	Healthy

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score	

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score	

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score	

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species / %Cover / Density Dist. / Infestation Size (ac or ha) Comments	Score	

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species / % Cover / Density Dist. Comments	Score	

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species	%Cover	Density Dist.	Infestation Size ac or ha
	Comments			

Score

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species	% Cover	Density Dist.
	Comments		

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | 50-74% Healthy with problems | 75-100% Healthy

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species	%Cover	Density Dist.	Infestation Size
				ac or ha
	Comments			

Score

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species	% Cover	Density Dist.
	Comments		

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species	%Cover	Density Dist.	Infestation Size ac or ha
	Comments			

Score

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species	% Cover	Density Dist.
	Comments		

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | 50-74% Healthy with problems | 75-100% Healthy

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score	

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score	

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score	

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species	%Cover	Density Dist.	Infestation Size ac or ha	Score
	Comments				

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species	% Cover	Density Dist.	Score
	Comments			

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy **50-74% Healthy with problems** **75-100% Healthy**

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species	%Cover	Density Dist.	Infestation Size ac or ha
	Comments			

Score

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species	% Cover	Density Dist.
	Comments		

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | 50-74% Healthy with problems | 75-100% Healthy

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score	

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score	

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score	

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species	%Cover	Density Dist.	Infestation Size	Score
				ac or ha	
	Comments				

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species / % Cover / Density Dist. Comments	Score	

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **75-100% Healthy**

Tame Pasture Health Assessment - SCORE SHEET

Site _____ Observer _____ Date _____

LSD ___ Quarter ___ Section ___ Township ___ Range ___ Meridian ___ Photo # _____

GPS Coord (NAD 83) Lat. _____ Long. _____ Est. usable forage prod'n _____

Special Observations (climate, changes in management) _____

_____

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Plant Community Name (code)_____

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 9 5 1B Modified Tame Pasture 9 5 0	Comments	Score	

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 0 2.2 Weedy & Disturbance 14 7 0	Comments	Score

3. Is the site covered by litter?

Litter cover & distribution 25 16 8 0	Comments	Score

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence 10 7 4 0 4.2 Bare Soil 5 3 1 0	Comments Human Caused Bare Soil (%) _____	Score

5. Are noxious weeds present?

5.1 Cover 5 3 1 0 5.2 Denisty Distribution 5 3 1 0	Dominant Species	%Cover	Density Dist.	Infestation Size ac or ha
	Comments			

Score

6. Does the site have woody regrowth?

6.1 Cover 6 3 0 6.2 Denisty Distribution 4 2 0	Dominant Species	% Cover	Density Dist.
	Comments		

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M M-H H

Observed Utilization_____% Vegetation Height _____cm/in

Trend (apparent - circle): Upward Downward Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50%	50-74%	75-100%
Unhealthy	Healthy with problems	Healthy

Range Health Categories

The range health score is a cumulative measure of the health and function observed and measured in your sample area. It is a rapid assessment tool and provides a snapshot of the health of the site and possible impacts of management. Range health monitoring alerts livestock producers to potential issues and problems on rangelands so that management changes can be made. First, consider the health categories and what they mean.

Health Categories

***Healthy*:**
A health score between 75 to 100 %. All of the key functions of health rangeland are being performed. This rating provides a positive message about your current management practices. It may tell you that current stocking levels, distribution and grazing practices are maintaining range health. Optimum grazing opportunities for livestock are possible.

Healthy with Problems:
A health score of 50 to 74%. Most, but not all of the key functions of healthy range are being performed. Sites in this category should be on the "watch list" requiring further monitoring. This score is an early warning of the need for minor to major adjustments to management. There may be a reduction in livestock grazing opportunities. Recovery to a healthy class can normally be accomplished within a few years. In rough fescue grasslands invaded by agronomic grasses like Kentucky bluegrass, smooth brome or Timothy, recovery potential may be very limited and a health score of healthy with problems may be the maximum attainable given current knowledge.

Unhealthy:
A health score of less than 50%. Few of the functions of healthy range are being performed. An unhealthy rating means urgent action is required. Significant management changes are essential and it may take years to regain a healthy class. Livestock grazing opportunities are seriously reduced.

RANGE HEALTH HINTS

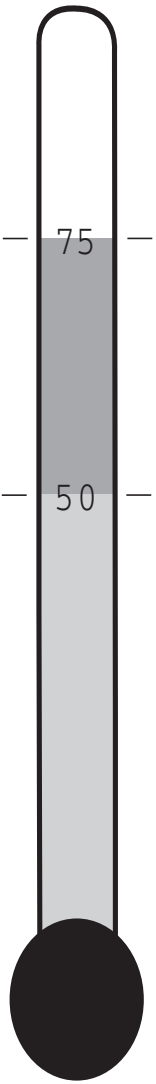
What do the health scores mean?

Range Health Categories

Healthy
A health score of 75 to 100%. All of the key functions of healthy rangeland are being performed.

Healthy with Problems:
A health score of 50 to 74%. Most but not all key functions of healthy range are being performed.

Unhealthy:
A health score of less than 50%. Few of the functions of healthy range are being performed.



Healthy
Good job!

Healthy with problems
Minor to major change in grazing practices required

Unhealthy
Major change in grazing practices required

What Do the Scores of Individual Health Questions Tell You?

Individual health question scores allow you to take a closer look at the specific indicators of range health. The scores for individual health questions or combinations of questions can help you formulate management objectives. Consider the possible score for each question; this tells you the relative importance of the question to the overall rating.

Evaluation of Individual Questions:

- In grasslands - ecological status and in forests - plant community structure, are most important. High scores here will contribute most to establishing a healthy rating. Low scores indicate a large negative impact on the function of the plant community.

- In tame pastures, species shifts to disturbance induced or weedy species will be of greatest concern as they replace the more productive forage plants.

- In modified grassland, forest and tame pastures, the presence of erosion, bare soil and noxious weeds will be of greatest concern and indicate a large negative impact on the function of the plant community.

Litter and LFH

In grasslands and tame pasture, litter scores provide insight into moisture retention functions of the site. High scores mean moisture is being retained and that conditions are favorable for water to infiltrate into the soil. Medium scores mean that moisture retention is being measurably reduced. Lighter stocking, longer and more effective rest periods and improved rotational grazing can usually restore litter levels in a number of years. Low litter ratings mean that little moisture is being retained and the stage may be set for increased soil erosion from the site. Other impacts may come into play, for example the invasion of weeds.

In forests, a combination of reduced LFH thickness and compaction will reduce moisture retention functions and can lead to drying of the site. A secondary impact may be a decline in the plant community composition and structure. Many years of effective rest may be required to restore plant community structure and LFH thickness and sponginess.

Bare Soil and Soil Erosion

Any human-caused erosion and bare soil puts management on "high alert" status and requires immediate attention and correction. Similar to a domino effect, allowing erosion processes to accelerate will have drastic impacts to the health and function of the plant community and site.

Noxious Weeds

Noxious weed species are another one of those key early warning signs that the system may be under stress and that both weed control measures and management changes are required. Better management to reduce weed levels, like lighter grazing and more rest, will set off a beneficial chain of events. Plant vigor will increase, improving the reproduction of desirable plants and leading to more vegetation cover which in turn adds more litter to the site and reduces bare soil. The outcome will be less space for weeds to establish.

Woody Regrowth In Tame Pastures

Woody regrowth levels are often a function of a combination of site, tame pasture development method, and grazing management practices. Forest regeneration after pasture development is a natural occurence just like after a wildfire. At low densities woody regrowth may serve as a complementary forage as livestock browse woody plants. As tame pasture regenerates back to secondary forest, woody regrowth competes with tame forages as the density, height and stem diameter of shrubs and trees increase, reducing light and increasing shade over the seeded forages. Measuring the cover and density of woody species can help determine if control measures are required.

Rotational grazing systems that maintain healthy and productive stands of seeded grasses and legumes often do not have serious woody regrowth problems since control is provided by livestock. In contrast, ineffective grazing systems may stimulate woody regrowth and also have negative impacts on surrounding native rangeland health.

Evaluation of Combined Questions:

When the health assessment indicates problems, think about the questions as they relate to each other. This reduces chances of changes in practice dealing with the symptoms instead of correcting the problem. For example, the tame pasture health score may indicate woody regrowth, disturbance-induced and weedy species problems as well as low litter reserves. It won't be possible to heal one problem without addressing the others.

Natural, Human-Caused or Both?

A number of natural events and processes may affect a health rating. Events such as drought, wildfire, insect damage, flood, disease and extreme wind events can also effect range health. Maintaining historical records, particularly on moisture, disturbance and disease, and carrying out range health assessments, can help you determine which impacts are natural and which are human-caused. We want to focus on any grazing management problems and correct them.

Sample Range Health Ratings

Example 1-Healthy Category

A native grassland site rates as healthy but the score of 76% falls at the low end of the range. The reduced health score is due to low litter values. A review of management practices suggests that stocking rates may not have been reduced sufficiently during recent dry years. A recent increase in cow size also contributed to increased forage demands on the pasture. Plans are made to reduce stocking slightly and defer grazing in spring.

Example 2 - Healthy with Problems

A forest health assessment has scored 56% and has plant community and structure problems. Corrective management includes deferred entry until mid June and only one grazing period per growing season. The stocking rate is further adjusted by recognizing that unpalatable shrubs (e.g. alder) should not be included as forage.

Example 3 - Unhealthy:

A tame pasture has a range health score of 28% indicating species, litter, erosion, noxious weed and woody regrowth problems. Years of overgrazing has reduced forage production and limited the ability of the pasture to withstand the recent dry conditions. A review of management practices suggests that the stocking rate should be reduced and extended rest periods are required to rebuild litter levels. Weed control and/or pasture rejuvenation may be required depending on cost/benefit analysis.

Range Health Assessment – A Tool for Adaptive Range Management

Repeated range health assessments can ensure livestock stocking rates are sustainable. Range plant community guides give you recommended or initial stocking rates for each plant community. Range health assessment allows you to fine tune your management. These tools along with livestock grazing records, weather records and photographs, can help you manage through drought cycles and identify early signs of declining pasture health.

Grassland Range Health Assessment - EXAMPLE SCORE SHEET

Site McKinnon Observer L.E. CEE Date June 24, 2009

LSD 8 Quarter SE Section 27 Township 17 Range 18 Meridian 4 Photo # 16

GPS Coord (NAD 83) Lat. 50.51534 Long. -112.61498 Est. usable forage prod'n 950 lb/ac

Special Observations (climate, changes in management) Dry spring with normal summer ppt

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %
West Wheat Gr	15	Scarlet Mallow	3	Snowberry	1	N/A	
Northern Wheat	6	Fringed Sage	2				
Sedges	14	Golden Aster	3				
Needle & Thread	20						

Plant Community Name (code) MGA 21 Wheatgrass - Needle and Thread

1. What kind of plants are on the site? What is the plant community?

1a 40 (27) 20 15 0
1b 15 8 0

Comments Wheatgrass Cover reduced from reference plant community

Score 27

2. Are the expected plant layers present?

10 (7) 3 0

Comments Tall grass layer is reduced in stature

Score 7

3. Does the site retain moisture? Is the expected amount of plant litter present?

25 (13) 0

Comments Litter has been reduced - 310 lb/ac

Score 13

4. Is there accelerated soil erosion? Site normally (circle) Stable / Unstable

4.1 Erosion Evidence (10) 7 3 0
4.2 Bare Soil (5) 3 1 0

Comments Minor increase with livestock trailing.
Human Caused Bare Soil (%) 3
Moss & Lichen cover (%) 40%

Score 15

5. Are noxious weeds present?

5.1 Cover 5 (3) 1 0
5.2 Denisty Distribution 5 (3) 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
Canada Thistle	<1%	2	<0.1 ac
			(ac) or ha

Comments - minor amount flixweed on trail edges - nuisauce species

Score 6

Grazing Intensity (est. Long Term (circle): U U-L (L-M) M M-H H

Observed Utilization _____%

Trend (apparent - circle): Upward Downward (Stable) Unknown

Site Score (total score) 68

0 ---------- 50 ---------- 74 ---------- 100

< 50% Unhealthy	(50-74% Healthy with problems)	75-100% Healthy

Forest Range Health Assessment - EXAMPLE SCORE SHEET

Site *Saskatoon Pasture* Observer *Jan Brown* Date *July 25/09*

LSD *10* Quarter *SW* Section *07* Township *57* Range *09* Meridian *4* Photo # *7*

GPS Coord (NAD 83) Lat. *53.9098* Long. *-111.3210* Est. usable forage prod'n *500lb:ac*

Special Observations (climate, changes in management) *3 yrs after introducing complimentary grazing system*

Check box if this is a cutblock site ☐ **Check box if a Level 1 assessment was completed** ☐

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %
marsh reed grass	*5*	*peavine*	*2*	*low bush cranberry*	*5*	*aspen*	*60*
harry wild rye	*3*	*sarsaparilla*	*4*	*rose*	*15*	*balsam*	*4*
		aster	*3*	*raspberry*	*2*		
		fireweed	*3*	*dewberry*	*5*		

Plant Community Name (code)_____

1. What kind of plants are on the site? What is the plant community?

25 (20) 15 10 5 0

Comments *Decreasers (low bush cranberry) slightly reduced in open, unprotected areas*

Score *20*

2. Are there any changes in forest plant community structure?

35 (27) 18 9 0

Comments *preferred shsrubs have a slight alteration in growth form. All expected layers present*

Score *27*

3. Thickness and compaction of this surface organic layer (LFH)?

20 (14) 8 0

Comments *LFH thickness similar in protected and unprotected areas, but compaction is slightly greater in open, unprotected areas.*

Score *14*

4. Is there accelerated soil erosion? Site normally (circle) (Stable) Unstable

4.1 Erosion Evidence (5) 3 1 0

4.2 Bare Soil (5) 3 1 0

Comments *Trails are revegetating*

Human Caused Bare Soil (%) *less than 1%*

Moss & Lichen cover (%) *3%*

Score *10*

5. Are noxious weeds present?

5.1 Cover 5 (3) 1 0

5.2 Denisty Distribution 5 (3) 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
Canada Thistle	*1*		*no infestation*
			ac or ha

Comments *5 or 6 plants by the gate*

Score *6*

Grazing Intensity (est. Long Term (circle): U U-L L-M (M) M-H H

Observed Utilization *10* %

Trend (apparent - circle): (Upward) Downward Stable Unknown

Site Score (total score) *77*

0----------50----------74----------100

< 50% Unhealthy | **50-74% Healthy with problems** | **(75-100% Healthy)**

Tame Pasture Health Assessment - EXAMPLE SCORE SHEET

Site Buck pasture Observer L.E. Cee Date July 18/09

LSD 10 Quarter NE Section 15 Township 65 Range 9 Meridian 4 Photo # 3

GPS Coord (NAD 83) Lat. 53,800 Long. -111.314 Est. usable forage prod'n 1000 lb/ac

Special Observations (climate, changes in management) Drought

SCORING (circle appropriate values and add their sum to the Score box)

Dominant Species

Grasses & Grasslikes	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %
Kentucky bluegrass	45	Dandelion	7	Rose	3	Aspen	1
Quack grass	20	Strawberry	5	Snowberry	1		
Smooth brome	15	Pussy-toes	5				
Creeping Red fescue	10	Yarrow	3				

Plant Community Name (code) Kentucky Bluegrass = DMB14

1. Do introduced forage plants dominate the site?

1A Tame Pasture 12 (9) 5
1B Modified Tame Pasture 9 5 0

Comments Tame pasture, a few native plants. Kentucky bluegrass production low due to drought.

Score 9

2. What kind of plants are on the site? Shift in stand composition.

2.1 Tame & desireable native 14 7 (0)
2.2 Modified Tame Pasture (14) 7 0

Comments Stand has lost the majority of seeded spieces like Brome and alfalfa. Dandelions dried up.

Score 14

3. Is the site covered by litter?

Litter cover & distribution
25 16 (8) 0

Comments Stand Litter is thin where Kentucky bluegrass & creeping redfesue are due to last years drought.

Score 8

4. Is there accelerated soil erosion? Site normally (circle) (Stable) Unstable

4.1 Erosion Evidence 10 (7) 4 0
4.2 Bare Soil 5 (3) 1 0

Comments Some hoof shear

Human Caused Bare Soil (%) 6%

Score 10

5. Are noxious weeds present?

5.1 Cover 5 3 (1) 0
5.2 Denisty Distribution 5 (3) 1 0

Dominant Species	%Cover	Density Dist.	Infestation Size
Canada Thistle	2	3	< 1 ac
			(ac) or ha

Comments patch near repiles. Spot control

Score 4

6. Does the site have woody regrowth?

6.1 Cover (6) 3 0
6.2 Denisty Distribution 4 (2) 0

Dominant Species	% Cover	Density Dist.
Rose	3	5
Snowberry	1	2
Aspen	1	2

Comments Woody regrowth is not a problem yet.

Score

Grazing Intensity (est. Long Term (circle): U U-L L-M M (M-H) H

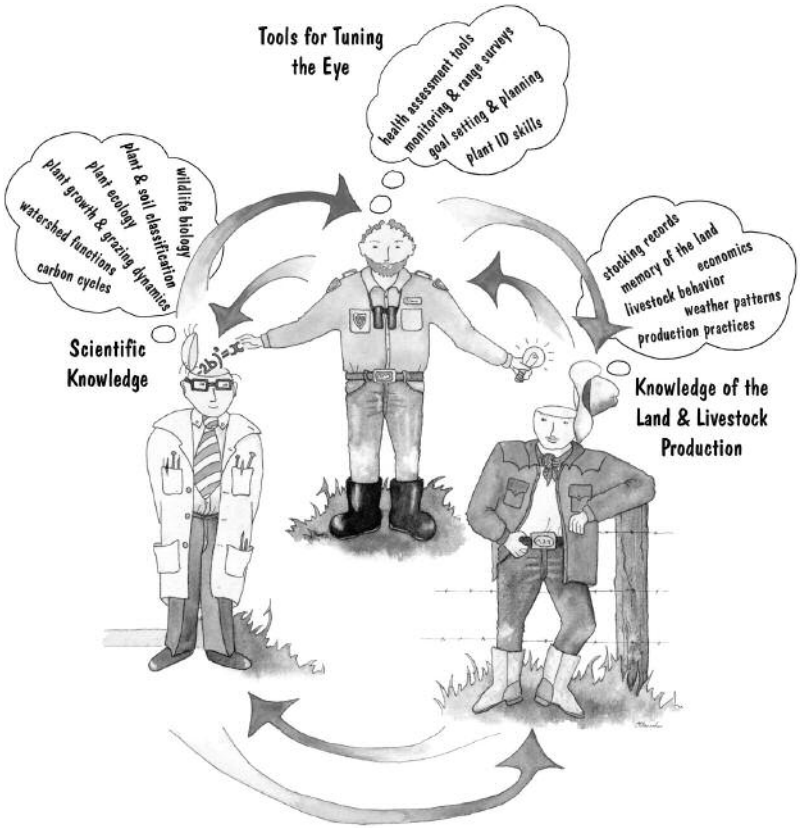
Observed Utilization 80 % Vegetation Height 2 cm (in)

Trend (apparent - circle): Upward (Downward) Stable Unknown

Site Score (total score)

0----------50----------74----------100

< 50% Unhealthy	(50-74% Healthy with problems)	75-100% Healthy



A wise person once said, *"No one is as smart as all of us"*. That's the philosophy we like to foster with range health tools. Livestock producers possess tremendous wisdom, knowledge and experience on the land. Science can provide valuable insight into how ecosystems function. Range health tools help to link science and wisdom to improve range management, to make livestock production more sustainable and to help resolve or head off resource conflicts among resource users.

CREDITS

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REFERENCE MATERIALS FOR RANGE HEALTH ASSESSMENT

Background References

Branson, A., Gifford, G.F., Renard, K.G. and Hardley, R.F. 1981. Rangeland hydrology. Kendall/Hull Publishing Company, Dubuque, Iowa. 340 pp.

Butler, L.D. 1997. National Range and Pasture Handbook. Grazing Lands Technology Inst, NRCS – USDA, Washington D.C.

Busby, F.E. 1994. Rangeland Health – New Methods to Classify, Inventory and Monitor Rangelands. National Academy of Science Report, National Research Council, Washington D.C. 180 pp.

Daubenmire, R. F. 1958. A canopy-coverage method of vegetational analysis. *Northwest Sci.* 53:43-64.

Ehlert G., D. Lawrence and C. Stone. 1999. Grazing Management of Northern Rangelands . Public Lands and Home Study Program, Alberta Agriculture, Food and Rural Development.

Fitch, L., B.W. Adams and G. Hale. 2001. Riparian Health Assessment for Streams and Small Rivers – Field Workbook. Lethbridge, Alberta: Cows and Fish Program. 90pp.

Forest Management Branch. 2008. Alberta Regeneration Survey Manual. Alberta Sustainable Resource Developemnt, Alberta. Pub. No. T.181.

Forest Range Health Assessment WorkingGroup. Cutblock Assessment Tool. Rangeland Management Branch, Lands Division, Alberta Sustainable Resource Development, Edmonton, Alberta. Pun. No. T/182.

Hansen, P.L., R.D. Pfister, K. Boggs, B.J. Cook, J. Joy, and D.K. Hinckley. 1995. Classification and Management of Montana's Riparian and Wetland Sites. Miscellaneous Publication No 54. Montana Forest and Range Conservation Experiment Station, School of Forestry, University of Montana, Missoula, Montana. 646 pp. plus posters.

Johnston, A. 1961. Comparison of lightly grazed and ungrazed range in fescue grassland of southwestern Alberta. Can. J. Plant Sci. 41:615-622.

Johnston, A., S. Smoliak, L.M. Forbes and J.A. Campbell. 1966. Alberta guide to range condition and recommended stocking rates. Alberta Department of Lands and Forests, Edmonton, Alberta. Pub. No. 134/14-1, 17 pp.

Lawrence, D., C. Stone and G. Ehlert. 2003. Grazing Notebook. Public Lands Division, Alberta Sustainable Resource Development. 84 pp.

Naeth, M.A., A.W. Bailey, D.J. Pluth, D.S. Chanasyk, and R.T. Hardin. 1991. Grazing impacts on litter and soil organic matter in mixed prairie and fescue grassland ecosystems of Alberta. J. Range Manage. 44:7-12.

Robertson, A. and B.W. Adams. 1990. Two worksheets for range vegetation monitoring. Range Notes Issue No. 8. Alberta Forestry, Lands and Wildlife, Public Lands Division. 19 pp.

Simons, I. and M.G. Willoughby. 1990. Range Survey Manual. Forest Land Use Branch. Alberta Forest Service. Edmonton, AB.

Stone, C. and D. Lawrence. 2000. Northern Range Plants. Alberta Agriculture, Food and Rural Development. 206 pages.

Task Group on Unity in Concept and Terminology. 1995. New concepts for assessment of rangeland condition. J. Range Manage. 48:271-225.

Thompson, W.H., R.C. Ehrhart, P.L. Hansen, T.G. Parker, and W.C. Haglan. 1998. Assessing health of a riparian site; in Proceedings of AWRS Specialty Conference - Rangeland Management and Water Resources. Donald F. Potts, editor. American Water Resources Association, Herndon, Virginia, TPS-98-1. 474 pp.

Wroe, R.A., S. Smoliak, B.W. Adams, W.D. Willms, and M.L. Anderson. 1988. Guide to Range Condition and Stocking Rates for Alberta Grasslands. Alberta, Forestry Lands and Wildlife Publ., 33pp.

Plant Community and Ecosite Guides

Adams, B.W., R. Ehlert, D. Moisey and R. McNeil. 2003. Rangeland plant communities and range health assessment guidelines for the foothills fescue natural subregion of Alberta. Rangeland Management Branch, Public Lands Division, Alberta Sustainable Resource Development, Lethbridge, Pub. No. T/038 79 pp.

Adams, B.W., L. Klein, D. Moisey and R. McNeil. 2004. Rangeland plant communities and range health assessment guidelines for the mixed grass natural subregion of Alberta. Rangeland Management Branch, Public Lands Division, Alberta Sustainable Resource Development, Lethbridge, Pub. No. T/039 92 pp.

Adams, B.W., L. Klein, D. Moisey and R. McNeil. 2005. Rangeland plant communities and range health assessment guidelines for the dry mixed grass natural subregion of Alberta. Rangeland Management Branch, Public Lands Division, Alberta Sustainable Resource Development, Lethbridge, Pub. No. T/040 90 pp.

Archibald, J.H., G.D. Klappstein and I.G.W. Corns. 1996. Field guide to ecosites of southern Alberta. Nat. Resour. Can., Can. For. Serv., Northwest reg., North. For. Cent., Edmonton Alberta. Spec Rep. 8.

Beckingham, J.D. and J.H. Archibald. 1996a. Field guide to ecosites of northern Alberta. Nat. Resour. Can., Can. For. Serv., Northwest reg., North. For. Cent., Edmonton Alberta. Spec Rep. 5.

Beckingham, J.D., I.G.W. Corns and J.H. Archibald. 1996b. Field guide to ecosites of west-central Alberta. Nat. Resour. Can., Can. For. Serv., Northwest reg., North. For. Cent., Edmonton Alberta. Spec Rep. 9.

Beckingham J.D., D.G. Nielsen and V.A.Futoransky. 1996. Field Guide to Ecosites of the Mid-Boereal Ecoregions of Saskatchewan. Northern Forestry Centre, Northwest Region, Canadian Forest Service. Special Report 6.

Burkinshaw, A., M. G. Willoughby, H. Loonen, K. France, and R.L. McNeil. 2009. Range Plant Communities and Range Health Assessment Guidelines for tthe Central Parkland Subregion of Alberta. Alberta Sustainable Resource Development, Edmonton, Alberta. Pub. No. T/125.

Ehlert G. and D. Downing, 1994. Managing Aspen Rangelands in Alberta's Boreal Mixedwood. Public Lands, Alberta Agriculture, Food and Rural Development. Range Notes Issue No. 17.

Lane, C.T., M.G. Willoughby and M.J. Alexander. 2000. 3rd approximation. Range plant community types and carrying capacity for the Lower Foothills subregion. Alberta Environment, Alberta Agriculture Food and Rural Development. Edmonton, AB. Pub. no. T/532. 232 pp.

Stone, C., M. Willoughby and A. Rosendal. 2007 Guide to range plant community types and carrying capacity for the Peace River Parkland subregion in Alberta. Rangeland Management Branch, Public Lands Division, Alberta Sustainable Resource Development. Edmonton, AB. Pub. No. T/143. 143 pp.

Willoughby, M.G. and M.J. Alexander, 2003. Range plant communities and carrying capacity for the Subalpine and Alpine subregions. ASRD, Public Lands Division, Edmonton, AB. Pub. no. T/034. 175 pp.

Willoughby, M.G. 2003. 4th approximation. Guide to range plant community types and carrying capacity for the Dry and Central Mixedwood subregions in Alberta. Alberta Sustainable Resource Development, Rangeland Management Branch, Public Lands Division. Edmonton, AB. Pub. no. T/526. 187 pp.

Willoughby, M.G. 2001. 4th approximation. Range plant community types and carrying capacity for the Upper Foothills Subregion. Alberta Sustainable Resource Development. Public Lands Division, Edmonton, AB. Pub. No. T/003. 120 pp.

Willoughby, M.G., M. Alexander and B.W. Adams. 2003. 5th approximation. Range plant community types and carrying capacity for the Montane subregion. Alberta Sustainable Resource Development. Pub. No. T/033. 223 pp.

How to Read the Species Table

Species Code (in the species table) refers to the seven letter code used to record the Latin (scientific) name of a species during range health assessments and inventories. The first four letters are usually composed of the beginning of the genus, while the last three letters of the code are the start of the species name. If the genus is only three letters, then four letters are taken from the species portion. If only the genus is known, then the code is derived from the first six letters of the genus name. These codes are used for consistency and speed of data collection. If you are unfamiliar with the codes or scientific name, ensure that whatever common name you use is verified with a scientific name at a later date, since common names tend to be more variable (and less common) than you might think.

This is a generic species list that is also used for riparian health assessment. Not all plants will be found in all environments.

Regulated Category refers to the designation given weeds (restricted, noxious, or nuisance) under the Weed Designation Regulations.

Based on the Weed Designation Regulation (Weed Control Act) in Alberta:

- Restricted weed species are indicated by '1'. Because of the serious management implications these species pose, they are indicated by bold;
- Noxious weeds are indicated by '2'
- Nuisance weeds are indicated by '3'
- Species that are not regulated are indicated by '0'

Range Health Plant Category refers to the suggested categorization of these plants for range health assessment and inventory purposes. Two plant categories are important in range health assessments and inventories:

- Invasive species are indicated by 'I'. Invasive species include all restricted, most noxious species, and a few nuisance species
- Disturbance-caused undesirable herbaceous species are indicated by 'D'. They include mostly nuisance weed species and some noxious weed species, as well as native species that increase with disturbance on rangelands.

Species	Latin Name	Common Name	Regulated	Range Health
BROMTEC	*Bromus tectorum*	downy chess/brome	3	I
CARDCHA	*Cardaria chalepensis*	hoary cress	2	I
CARDPUB	*Cardaria pubescens*	globe-podded hoary cress	2	I
CARDNUT	*Carduus nutans*	nodding thistle	1	I
CENTDIF	*Centaurea diffusa*	diffuse knapweed	1	I
CENTMAC	*Centaurea maculosa*	spotted knapweed	1	I
CENTREP	*Centaurea repens*	Russian knapweed	2	I
CENTSOL	*Centaurea solstitialis*	yellow star thistle	1	I
CHRYLEU	*Chrysanthemum leucanthemum*	ox-eye daisy	2	I
CIRSARV	*Cirsium arvense*	Canada thistle	2	I
CONVARV	*Convolvulus arvensis*	field bindweed	2	I
CUSCGRO	*Cuscuta gronovii*	common dodder	1	I
CYNOOFF	*Cynoglossum officinale*	hound's tongue	2	I
ECHIVUL	*Echium vulgare*	viper's-bugloss; blueweed	2	I
ELAEANG	*Elaeagnus angustifolia*	Russian olive	0	I
ERODCIC	*Erodium cicutarium*	stork's bill	2	I
EUPHCYP	*Euphorbia cyparissias*	cypress spurge	2	I
EUPHESU	*Euphorbia esula*	leafy spurge	2	I
GALIAPA	*Galium aparine*	cleavers	2	I
GALISPU	*Galium spurium*	false cleavers	2	I
KNAUARV	*Knautia arvensis*	blue buttons, field scabious	2	I
LINADAL	*Linaria dalmatica*	broad-leaved/ Dalmatian toadflax	3	I
LINAVUL	*Linaria vulgaris*	butter-and-eggs/ toadflax	2	I
LOLIPER	*Lolium persicum*	Persian darnel	2	I
LYCHALB	*Lychnis alba*	white cockle	2	I
LYTHSAL	*Lythrum salicaria*	purple loosestrife	2	I
MATRPER	*Matricaria perforata*	scentless chamomile	2	I
MYRISPI	*Myriophyllum spicatum*	Eurasian water milfoil	1	I
ODONSER	*Odontites serotina*	late-flowering eyebright/ red bartsia	1	I
RANUACR	*Ranunculus acris*	tall buttercup	2	I
SILECUC	*Silene cucubalus*	bladder campion	2	I
SONCARV	*Sonchus arvensis*	perennial sow thistle	2	I
TANAVUL	*Tanacetum vulgare*	common tansy	2	I
AGROPEC	*Agropyron pectiniforme*	crested wheat grass	0	D
AGROREP	*Agropyron repens*	quack grass	3	D
AMARRET	*Amaranthus retroflexus*	red-root pigweed	3	D
ANTENN	*Antennaria species*	pussy-toes and everlastings	0	D
APOCAND	*Apocynum androsaemifolium*	spreading dogbane	2	D
ARCTMIN	*Arctium minus*	common burdock	0	D
AVENFAT	*Avena fatua*	wild oat	3	D
AVENSAT	*Avena sativa*	oats	0	D
BRASNAP	*Brassica napus*	canola (Argentine)	0	D
BRASKAB	(*Sinapis arvensis)* *Brassica kaber*	wild mustard	3	D
BRASRAP	*Brassica rapa*	canola (Polish)	0	D
BROMINE	*Bromus inermis*	smooth brome	0	D
BROMJAP	*Bromus japonicus*	Japanese brome	0	D
CAMPRAP	*Campanula rapunculoides*	creeping bellflower/ garden bluebell	0	D
CAPSBUR	*Capsella bursa-pastoris*	shepherd's purse	3	D

Species	Latin Name	Common Name	Regulated	Range Health
CERSARV	*Cerastium arvense*	field mouse-ear chickweed	3	D
CERSNUT	*Cerastium nutans*	long-stalked chickweed	0	D
CERSVUL	*Cerastium vulgatum*	common mouse-ear(ed) chickweed	3	D
CHENALB	*Chenopodium album*	lamb's quarters	0	D
CONVSEP	*Convolvulus sepium*	hedge bindweed/ wild morning-glory	3	D
CREPTEC	*Crepis tectorum*	narrow-leaved/ annual hawk's beard	3	D
DESCPIN	*Descurainia pinnata*	green tansy mustard	3	D
DESCSOP	*Descurainia sophia*	flixweed	3	D
ERUCGAL	*Erucastrum gallicum*	dog mustard	3	D
ERYSCHE	*Erysimum cheiranthoides*	wormseed mustard	3	D
FAGOTAR	*Fagopyrum tartaricum*	tartary buckwheat	3	D
FRAGAR	*Fragaria species*	strawberries	0	D
GALETET	*Galeopsis tetrahit*	hemp-nettle	3	D
HORDJUB	*Hordeum jubatum*	foxtail barley	0	D
HORDVUL	*Hordeum vulgare*	barley	0	D
LAMIAMP	*Lamium amplexicaule*	henbit	3	D
LAPPECH	*Lappula echinata*	bluebur	3	D
MALVROT	*Malva rotundifolia*	round-leaved mallow	3	D
MELILO	*Melilotus officinalis and alba*	sweet clovers	0	D
NESLPAN	*Neslia paniculata*	ball mustard	3	D
PHLEPRA	*Phleum pratense*	timothy	0	D
PISUSAT	*Pisum sativum*	peas (field)	0	D
PLANTA	*Plantago species*	plantains	0	D
POACOMP	*Poa compressa*	Canada bluegrass	0	D
POAPRAT	*Poa pratensis*	Kentucky bluegrass	0	D
POLYCON	*Polygonum convolvulus*	wild buckwheat	3	D
POLYPER	*Polygonum persicaria*	lady's thumb	3	D
POTEANS	*Potentilla anserina*	silverweed	3	D
POTENOR	*Potentilla norvegica*	rough cinquefoil	3	D
POTEREC	*Potentilla recta*	sulfur cinquefoil	0	D
RAPHRAP	*Raphanus raphanistrum*	wild radish	3	D
SALSKAL	*Salsola kali*	Russian thistle	3	D
SCLEANN	*Scleranthus annuus*	knawel	2	D
SECACER	*Secale cereale*	rye (cereal)	0	D
SETAVIR	*Setaria viridis*	green foxtail	3	D
SILECSE	*Silene cserei*	smooth catchfly/ biennial campion	3	D
SILENOC	*Silene noctiflora*	night-flowering catchfly	3	D
SINAARV	*Sinapis arvensis*	wild mustard	3	D
SONCOLE	*Sonchus oleraceus*	annual sow thistle	3	D
SPERARV	*Spergula arvensis*	corn spurry	3	D
STELMED	*Stellaria media*	common chickweed	3	D
TARAOFF	*Taraxacum officinale*	common dandelion	3	D
THLAARV	*Thlaspi arvense*	stinkweed	3	D
TRIFOL	*Trifolium species*	clovers	0	D
TRITAES	*Triticum aestivum*	wheat	0	D
VACCPYR	*Vaccaria pyramidata*	cow cockle	3	D
XTRITIC	*X Triticosecale*	triticale	0	D

Invasive Plant Survey Form

Date: _____ Activity Number: _____ Reinspection: _____ No invasive Plants Found: _____

Observer: _____ Occupant: _____

Lan Use Type ____ As per disposition ____ Private Land ____ Vacant Public Land ____ SRD Facility ____ Cutblock ____ Other _____

Natural Sub Region: _____ Community Type: _____ Lat: _____ Long: _____

Recommended Control Action: _____ Recommended C7E Action: _____

Comment: _____

Land List

Quarter	Section	Township	Range	Meridian	Quarter	Section	Township	Range	Meridian	Quarter	Section	Township	Range	Meridian

Species List

Species	% Cover	Density Distribution	Infestation Hectares	Infestation Acres	Infestation m^2	Comment
1.						
2.						
3.						

Control List

Date (yyyy/mm/dd)	Control Action	Description	Vol. Mixed Product (L)	Species Targeted	Area Treated Hectares	Area Treated Acres	Area Treated m^2
1.							
2.							
3.							

Contractor/Applicator	Comments
1.	
2.	
3.	

Compliance

C&E Action Taken	Occupant Notified	Notification Date (yyyy/mm/dd)	Case Number	Schedules Reinspection Date	Compliance Achieve	Comments

Valid value for % Cover are: 1,2,3,4,5,6,7,8,9,10,15,20,30,40,50,60,70,80,90 and 100 Valid value for Density distribution are:1,2,3,4,5,6,7,8,9,10,11,12 and 13

Valid value for Control Action are: Herbicide, Hand-picked, Mowed, and Other

Contacts For Further Information on Rangeland Health Assessment

Grassland Ecosystem

Range Resource Management Program
Rangeland Management Branch
Public Lands and Forests Division,
Alberta Sustainable Resource Development
Agriculture Centre,
#100, 5401 - 1st Ave. South
Lethbridge, Alberta, T1J 4V6.
(403) 382-4299

Range Resource Management Program
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Public Lands and Forests Division,
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Foothills Montane Ecosystem

Range Resource Management Program
Rangeland Management Branch
Public Lands and Forests Division,
Alberta Sustainable Resource Development
2nd Floor, Provincial Bldg.
782 Main St.
Pincher Creek, Alberta, T0K 1W0
(403) 627-1131

Edmonton

Range Resource Management Program
Rangeland Management Branch
Public Lands and Forests Division,
Alberta Sustainable Resource Development
4th Floor, Great West Life Bldg.
9920 - 108 St.
Edmonton, AB T5K 2M4
(780) 415-9114

Boreal Ecosystem

Range Resource Management Program
Rangeland Management Branch
Public Lands and Forests Division,
Alberta Sustainable Resource Development
6203 - 49 St., Box 4534
Barrhead, Alberta, T7N 1A4
(780) 674-8231

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NOTES