

Range Inventory Manual



Range Inventory Manual for Forest Reserve Allotments and
Grazing Leases within Rocky Mountain, Foothills,
Parkland and Grassland Natural Regions

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1.0 Introduction

Government grazing leases have been administered in Alberta since 1881, even prior to the provincial government being formed. These areas are still being managed for grazing with the current focus on either restoring or maintaining rangeland ecological processes. Grazing leaseholders are expected to employ practices which manage variables such as stocking rate and density, timing, frequency, and duration of grazing that preserve the functions of healthy rangelands and integrate other values. Successful planning depends on accurate, up-to-date rangeland resource inventories and rangeland health audits completed according to a standardized measurable and repeatable process.

Grazing leases are administered by Alberta Environment and Parks (AEP) Rangeland Agrologists through contracts with leaseholders. Typically these leases are reviewed for renewal every ten years. Prior to renewal, the current management is assessed, and changes may be administered to better compliment proper rangeland functions. An inventory is a useful tool at this stage to help quantify the land base and identify critical areas.

Within the Rocky Mountains Forest Reserve, grazing is administered differently but the need for consistent ecological data to help manage for improving or preserving rangeland functions is the same. The Forest Reserves Regulation section 15(1)(b) requires forest reserve permit holders to comply with the range management plan for the allotment they are grazing within. Section 1(h) of the regulations sets out the requirements for a management plan. In 2010, AEP introduced new policy that requires allotment permit holders to provide a certified range inventory to support the development of the required allotment range management plan.

The following manual provides instructions and methods to carry out a range inventory and an inventory reassessment. The purpose of an inventory is to quantify the landscape to provide a basis for management decisions that will maintain the natural ecological functions of each management unit (i.e. distribution unit, pasture or field). This is completed by mapping each management unit by vegetation type, determining the ecologically sustainable grazing capacity for the unit, and measuring how current management and disturbance regime is affecting the overall range health. These measurements hinge upon a mapping system that classifies the land base into descriptive and manageable units, and then measures these units according to established processes. The Range Plant Community Guides of Alberta provide the basis for classification. This classification is a hierarchal approach based on Natural Subregions. The Natural Subregions are split into ecological sites or ecological range sites dependent on whether the Grassland or Rocky Mountain, Foothills, and Parkland Natural Region classification system is used. These in turn are subdivided into generalized plant communities. These plant communities are characterized by the constraints within the ecological (range) site and any disturbance the site may subject to.

Once plant communities are defined, characteristics such as forage production, grazing tolerance, and successional pathways can be described. A key measure that each plant community is given is an Ecologically Sustainable Stocking Rate (ESSR). These rates are established to allocate a percentage of the forage production for livestock utilization and the

remaining forage production as carryover for the maintenance of ecological functions (e.g. nutrient cycling, viable plant communities, hydrological function, soil protection, etc.) and plant community services (forage production, habitat maintenance, wildlife forage use, biodiversity, etc.). The ESSR reflects the maximum number of Animal Unit Months (AUMs) per acre or hectare that can be supported by the plant community given inherent biophysical constraints and the ecological goal of sustainable health and proper functioning of the plant community.

When the ESSR is expressed for the area of a plant community polygon, the result is termed that polygon's carrying capacity, and is written in AUMs. Once summed up by management unit, this carrying capacity is the number of AUM's that unit can sustain. Often the carrying capacity must be adjusted for access factors (e.g. areas that are inaccessible due to natural barriers), and management factors (e.g. reduced livestock distribution attributed to livestock management). This adjusted/reduced carrying capacity is termed the grazing capacity. Further information on all of these terms can be found in "Methodology for Calculating Carrying and Grazing Capacity on Public Rangelands" (Range Management Branch 2004) as well as "Grazing Management Adjustments for Health Rangelands" (Range Management Branch 2008).

The Rangeland Health Assessment is the primary tool utilized to measure how the current status of a plant community is maintaining its ability to perform certain key functions. These functions include net primary production, maintenance of soil and site stability, capture and beneficial release of water, nutrient and energy cycling, and functional diversity of plant species. Measuring range health is performed by comparing key ecological attributes of the current plant community to a healthy reference community. For further information, refer to the "Rangeland Health Assessment for Grasslands, Forest, and Tame pasture Field Workbook." (Adams et al. 2016).

1.1 Inventory Requirements

Each range inventory project includes the development of a detailed map of the inventoried area that is delineated by plant community polygons, with each polygon rated for rangeland health. These polygons are then summed up by management unit to calculate the carrying and grazing capacities. A finished range inventory will also have a report containing these management unit summaries, as well as detailed physical and geographical characteristics, current range management practices and challenges, livestock distribution issues, grazing integration issues and recommendations stemming from the inventory.

In cases where a previously accepted inventory exists, an inventory reassessment is conducted. Surveyors use the mapped plant community polygons from the previous inventory as the basis for the reassessment. Updates to a previous inventory are needed to reflect changes due to management, succession, and disturbance. In addition, several improvements to the range inventory process have evolved over time, such as development of plant community guides and classification, imagery improvement, range health assessment protocol (2003), and inventory standardization (2010). Where applicable, polygon line work should be updated based on imagery interpretation and field observations to increase the accuracy of the visible vegetation boundaries and management unit boundaries. In addition, the following are completed during an

inventory reassessment:

- Update plant community calls when there is substantial difference in plant community (e.g., succession, disturbance, etc.) since the previous inventory, or if a new/undescribed/inadequately described plant community is encountered.
- Reassess range health (for trend purposes)
- Adjust carrying and grazing capacities
- Capture boundary and asset updates
- Describe current management and identify range management considerations and recommendations
- Discuss resource integration

Regardless if a new inventory or a reassessment is occurring, the range inventory process is composed of three parts. They are:

1. Pre Field Component
2. Field Component
3. Post Field Component and Map Creation

The processes to complete these three parts are described in this manual. The various survey methods to collect physical and vegetative data to complete the inventory are also outlined. The manual does not cover the methodology of plant community classification or range and riparian health assessments. These methods can be found in the plant community guidebooks for the appropriate Natural Subregions, and the range and riparian health assessment guidebooks. The current website locations of all published guidebooks and reference materials to aid inventories are located in Appendix 1.

2.0 RANGE INVENTORY PROCESS

2.1 Pre Field Component

The pre field component entails gathering information and equipment necessary to perform the rangeland inventory. A literature and file search should be performed to find any relevant information for the land base being inventoried. Past surveys should also be sought out. If the inventory being performed is an inventory reassessment, the previous plot data as well as the detailed map information must be attained. These will provide helpful information and an indication of trend by comparing the past data to present. The relevant plant community guides, riparian assessment guidebooks, and range health assessment guidebook should also be reviewed to ensure familiarity with the plant communities and methodologies in the guide.

The following are examples of maps, data, and forms that AEP recommend or require for the inventory. Maps can be provided by AEP by either digital or hard copy formats, but a data sharing agreement must be attained through the AEP Range Management Specialist for the area the project is in:

- Overview maps of the complete project area being inventoried including enough of the surrounding area to facilitate determining access. These maps will include the following base features: roads, trails, cutlines, hydrography, management unit boundaries, and the most recent high quality imagery. Other specific layers for the project may be provided if available, such as topologically correct polygons from the previous inventory, cutblock information, and available land cover (e.g. AVI - Alberta Vegetation Inventory, GVI - Grassland Vegetation Inventory, DEP – Derived Ecosite Phase).
- Overview maps of each management unit (i.e. field or DU) at 1:20,000 or better with base features as above, any pertinent information (e.g. recent cutblock plans), as well as plant community delineation if available. This may be derived from a previous inventory, a rangeland view of GVI, PLVI (Primary Land Vegetation Inventory), DEP, or AVI.
- Field map sheets (11x17) at scales of at most 1:15,000 showing features provided on the management unit maps. The management unit may be split into multiple sheets if required to maintain the scale. If this occurs a field sheet (11x17) of the complete field will also be provided.
- Paper copies of all relevant forms (e.g. Site Description, Vegetation Inventory, Range Health Assessments, Riparian Health Assessments, Invasive Plant Form, etc.) Example sheets of these are all available in Appendix 2.
- Up-to-date plant community guides for the Natural Subregions relevant to the project area.
- Standardized paper bags (e.g. 14H) for clipping if forage production sampling is part of the project.

- Species list of RRMP preferred scientific and common names (ECOSYS database export)

The field surveyor is required to be equipped with:

- Field, outdoor and safety equipment based on being in remote and isolated locations.
- Means for travel to and within the inventory area (e.g. vehicle, ATV, horse).
- Pertinent and up-to-date manuals to the project (e.g. Range Inventory Manual, Range Health Assessment Field Workbook, Riparian Health Field Workbooks, etc.).
- Navigational equipment (e.g. compass, GPS, clinometer, etc.).
- Survey equipment such as permanent markers, flagging tape, 30 meter tape, forage clippers, and frames relevant to the surveys required.

2.2 Field Component

The field component comprises of utilizing the provided field maps and ground truthing and attributing each polygon that is deemed accessible by livestock. Most polygons should be visited and surveyed utilizing the methods described below. Very remote polygons not deemed accessible by livestock still need to be assessed by can be done visually if no access is apparent. Before deciding to use a visual assessment to describe a remote polygon, efforts should be made to discuss with allotment holders or AEP staff to ensure the areas in question are not being utilized by livestock.

2.2.1 Vegetative Mapping

Surveyors will use the basic plant community polygon line work (previous inventory/GVI/AVI/PLVI/DEP) as a basis for inventory if it is available. It should provide a rough first cut of mapping polygons. More detail is expected to be provided by the surveyor mainly focussed on primary and secondary range types¹. Modifications made can include line deletions, additions, and alterations to increase accuracy of the visible vegetation boundaries. A polygon can contain up to three plant community calls or deciles that must add up to 100 per cent. Deciles can be utilized if the boundaries between communities are hard to discern on the imagery, if a mottling between 2 communities exist, or if the community boundary is below the minimum polygon size. Polygons must be contained within the corrected management unit (field or DU) boundary outline as management is expected to change between grazing units.

¹ Primary Range: range that animals prefer to graze when management is minimal (relative to distribution unit and time of year). Secondary Range: range that is lightly used or unused by livestock under minimal management and will ordinarily not receive much use until primary range has been over-utilized.

2.2.2 Upland Survey

For upland sites, the minimum polygon size is 2 hectares. All polygons given in the basic plant community line work must be visited or viewed and their deciles assessed by either a Detailed, Reconnaissance, or Visual plot level of assessment. These plots are considered relatively hierarchal with the most information required for a Detailed Plot and the least in a Visual Plot. For inventory reassessments, all Detailed and Reconnaissance Plots from the previous inventory must be reassessed, as well as previously surveyed range health assessment points. Detailed and Reconnaissance Plot data from the previous inventory may be used as a surrogate if sampled in the same location and there is no significant difference in species composition (i.e. plant community). In this circumstance, the surveyor would describe the site using the previous plot data and perform a new range health assessment for trend purposes.

- **A Detailed Plot** is used when no other plot within the field or local area being inventoried has the same plant community on the same Ecological (Range) Site. During an inventory reassessment, a Detailed Plot is only used when there is a substantial difference in plant community (e.g. succession, disturbance, etc.) since the previous inventory, or if a new / undescribed / inadequately described plant community is encountered. Please note the following:
 - A Detailed Plot is not necessary if that plot has already been described with a detailed plot in the present reassessment (same field / local area), in this case a reconnaissance plot is acceptable
 - A Detailed Plot should be conducted regardless of whether the new plant community was described in a different location in the previous inventory
 - If no change in species composition is observed, only a range health assessment needs to be conducted at the reassessment location
- **A Reconnaissance Plot** is used when a Detailed Plot with the same plant community occurs within the field and local area being inventoried. Reconnaissance Plots are utilized after a Detailed Plot has been collected of the same plant community during the current inventory and are continued to be used until the surveyor is confident in accurately visually assessing the community using a visual plot. Please consider the following for inventory reassessments:
 - Similar to a new inventory, during inventory reassessments a Reconnaissance Plot can be used to link to a detailed plot that has been completed during the current reassessments.
 - If during the reassessment the plant community has not deemed to have changed from the original assessment, only a range health form is required at the location.

- **A Visual Plot** is used when there is already adequate representation of the plot by a Detailed or Reconnaissance Plots and the areas are similar enough in landscape, vegetation, and health ranking (healthy, healthy with problems, or unhealthy) to be grouped together. For example, this can be used where there is much mottling of plant communities across a landscape. A Visual Plot may also be used to describe:
 - Subdominant deciles within polygons (30% or less) without significant management concern.
 - Polygons that contain no rangeland value (e.g. rocks, roads, etc.).
 - Polygons inaccessible to livestock that can only be viewed due to access reasons.
 - Tertiary Range Types areas such as forested areas that receive limited use by livestock. Forested plant community types (Archibald et al. 1996, Beckingham and Archibald 1996) may be substituted if the community is currently not described within the range plant community guide for that subregion.
 - For inventory reassessments, can be used to describe plant community polygons where detailed or reconnaissance plots were not collected in the previous inventory and the surveyor deems the plant community composition has not substantially changed since the previous inventory.
 - During inventory reassessments to update and/or add subdominant deciling and delineation of tertiary/non-use range.

The forms and measures required differ between Natural Regions. These are itemized in Table 1 below. Specific details of each item are listed after the table.

Table 1. Forms and measures required at each level of assessment.

	Grassland Natural Region	Rocky Mountains, Foothills, Parkland Natural Regions
Detailed Plot		
GPS location	Yes	Yes
Site Description Form		Yes
Vegetation Inventory Form	Full	Full
Plant community call	Yes	Yes
Access Factor	Yes	Yes
Riparian (%) and Health	Yes	Yes
Range Health Assessment	Full	Full
Forage Clip		Yes*
Plot Photographs	Yes	Yes

	Grassland Natural Region	Rocky Mountains, Foothills, Parkland Natural Regions
Reconnaissance Plot		
GPS location	Yes	Yes
Site Description Form		Yes
Vegetation Inventory Form	No Transect	No Transect
Plant community call	Yes	Yes
Access Factor	Yes	Yes
Riparian (%) and Health	Yes	Yes
Range Health Assessment	Full	Full
Forage Clip		Yes*
Plot Photographs	Yes	Yes
Visual Plot		
GPS location		
Site Description Form		
Vegetation Inventory Form	Optional	Optional
Plant community call	Yes	Yes
Access Factor	Yes	Yes
Riparian (%) and Health	Yes	Yes
Range Health Assessment	Rating	Rating
Forage Clip		
Plot Photographs	Optional	Optional

1. GPS locations should be formatted in decimal degrees with 5 decimals. Also ensure the datum is either NAD83 or WGS84. This can be collected on either the Site Description Form or Vegetation Inventory Form (Section 3.1, 3.2).
2. The Site Description Form (PLD 021) describes the physical characteristics of the site (Section 3.1). These forms are required for Detailed and Reconnaissance plots.
3. There are three Vegetation Inventory Forms currently available; MF5-PL, Prairie MF5, and Prairie/Rocky Mountain MF5. The Grassland Natural Region requires the Prairie MF5 or Prairie/Rocky Mountain MF5 to be completed; the other Natural Regions can use any of the three (Section 3.2).
 - For Detailed Plots it is required that this form be filled out entirely, including the detailed transect information. The transect is not required at the Reconnaissance level of assessment as a Reconnaissance Plot should be linked to a Detailed Plot within the nearby area or at the same location in a previous survey.
 - For Visual Plots this form may be used to collect the required information, but the entire form does not have to be filled out.

4. Plant community estimation can be a code from the Natural Subregion's range community type guide book. If a community type cannot be found in a guide then a conditional call must be used.
 - If the conditional community closely resembles an established community, but either at an earlier/advanced seral stage, or disturbed, it can be documented as the established community code with a '_D' or '_S' for disturbed or seral related respectively.
 - If the conditional call is not linked to any established community, the name should be a listing of the dominant 2 or 3 species with "/" dividing life-forms, and "-"-dividing species within life-forms. The appropriate Ecosite Phase should be determined in order to set the ESSR.
5. Access factors provide an overview measure of how well livestock are able to access the polygon due to water and landscape constraints. The ratings are from 0 to 10, zero being no access and 10 being full access. This information will be used to fill out the Range Management Form (Section 2.3.2). This data is not formally captured on the Vegetation Inventory Form, although cattle access is rated as good / fair / poor on the back page. This rating can be also included in this area as "AF= 0 - 10".
6. The percent riparian and estimated riparian health ranking (healthy, healthy with problems, unhealthy) for each polygon is a requirement of the Range Management Form and should be collected at each site (Section 2.3.2). There is no formal location for this on the Vegetation Inventory Form, but there is Water Source information collected on the back page. This information may be collected at this location as well.
7. A full Range Health Assessment (forested, grassland, or tame pasture) is required for all Detailed and Reconnaissance Plots. For Visual Plots, just a health ranking (healthy, healthy with problems, unhealthy) is required based on a visual review of the site and professional judgement.
8. Forage clipping is based on a 0.5m² forage clip, separating grass, forbs, shrubs, and litter (Section 3.3). Forage clipping is required for a Detailed or Reconnaissance Plot in the Rocky Mountain, Foothills, and Parkland areas.
 - * Clipping is not required if the project is an inventory renewal, unless a detailed plot is conducted or otherwise stated in the project conditions.
9. Two photographs should be taken for a Detailed Plot. One photograph taken from a standing position capturing a micro plot. And a second photograph taken from the end of the transect from a kneeling position capturing the transect and horizon. Reconnaissance Plots should also have pictures, usually at least one or two of the general area. This is good practice for Visual Plots as well. The allotment/lease name, plot number, and date should be identified in each plot photograph. Plot photographs are submitted with the field plot sheets.

2.2.3 Riparian Survey

Riparian areas, wetlands and meadows can be delineated with a minimum polygon size of 0.5 hectares. The importance of riparian areas in range management has been highlighted recently with an increase in levels of assessment. If possible, the complete riparian zones should be either delineated or deciled. For the purposes of inventory, the riparian zones should be regarded as 2 major areas, the active floodplain and the upper terraces (Figure 1). Upper terraces usually have the highest livestock value, as these are relatively larger, drier areas and often have shorter periods where they are most susceptible to degradation due to livestock grazing. The upper boundaries of these areas should be delineated, and described with a Detailed or Reconnaissance plot similar to grasslands, shrublands, etc. The active floodplain is usually a smaller area directly beside the flowing stream or standing water of a wetland that is directly affected by annual inundations of the water body. The percentage of active floodplain within the polygon should be estimated as well as given an estimated health ranking (healthy, healthy with problems or unhealthy) based on the Riparian Health Assessment system (Fitch et al. 2009, Ambrose et al. 2009). These estimations will be entered for each polygon as part of the Range Management Form explained in Section 2.3.2.

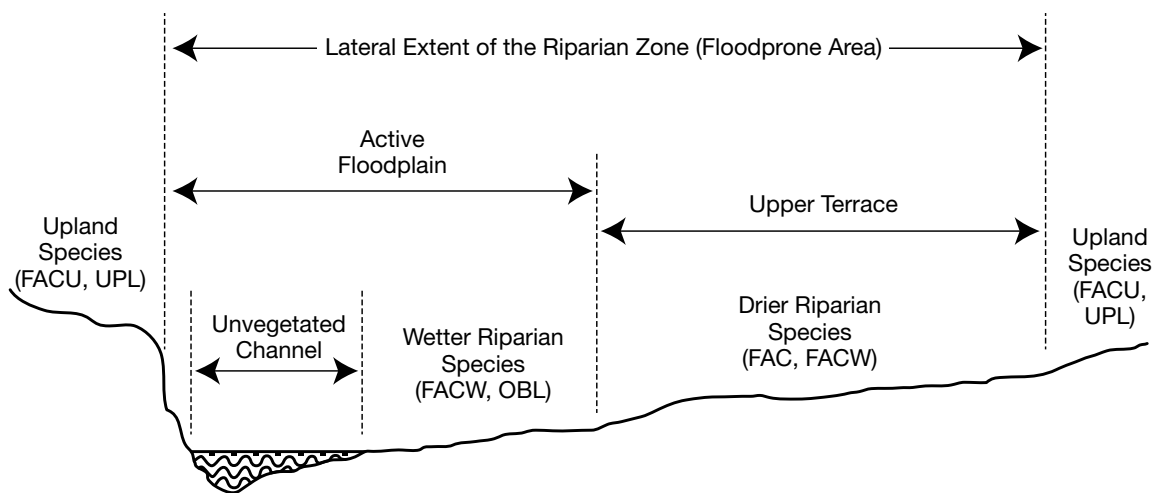


Figure 1. A schematic example of a typical riparian zone cross sections showing near-channel landform features. Note: FAC (facultative), OBL (obligate), UPL (upland), etc. refer to categories of frequency a species is found in wetlands (From Cows and Fish 2005).

For each inventory and reassessment, key critical riparian sites and the active floodplain will be selected to be described in detail using the Cows and Fish Riparian Health Assessment (Fitch et al. 2009, Ambrose et al. 2009) (Section 3.5). Critical sites are reaches that have an existing problem, sensitive areas (plant, fish, or wildlife habitat), or areas that may respond quickly to disturbances or management changes that can be readily monitored. These areas will be utilized as benchmark sites to be monitored to support long term riparian health trend monitoring on individual management units within the inventory area. Inventory projects will often specify

the minimum number of these points required but establishment of these sites will be done based on professional experience and knowledge gained from the area through completing the inventory, and by consultation with the Agrologists and range managers. Depending on water availability, at least one critical riparian health assessment per management unit should be conducted. When selecting the sites, areas upstream and downstream of culverts, roads, fences and other factors that are directly affecting riparian health should be avoided when doing a riparian health assessment although these factors should be commented on as observations.

2.2.4 Management Inventory

Along with the plot information, the following management considerations should also be collected while visiting range inventory polygons to ensure appropriate representation of the Distribution Units. This data will also be used to facilitate completion of the Range Management Form and the inventory report.

- **Livestock Utilization and Distribution:** Successful management should be noted along with any problems.
- **Salt:** Salting locations should be mapped as well as their impacts on livestock distribution and disturbance. Salt locations should be mapped in the Infrastructure dataset.
- **Distribution Unit Boundaries:** Distribution Units can be separated by natural barriers or fences. Note whether the locations of these natural barriers are working and located where the map indicates. Also the condition of the fences should be indicated. It is important to document any irregularities in Distribution Unit boundaries particularly fencelines compared to the base feature map so that they can be corrected.
- **Water Supply and Distribution:** Existing developments should be mapped and their condition recorded in the infrastructure dataset. Potential water developments should also be noted if it is deemed a location to enhance livestock distribution.
- **Invasive Plants:** Invasive plant infestation locations should be mapped and an Invasive Plant Form filled out including an estimation of the infestation area (m², ac, ha). The form is available in Appendix 2.
- **Predators:** Problems with predators or management activities undertaken to deal with predators should be noted.
- **Overall Management Summary:** This should be based on discussions with the allotment permit or disposition holder and on observations made during the inventory. Surveyors should focus on existing conflicts or potential future conflicts that are influencing management or affecting rangeland health.

2.3 Post Field Component

Post field exercises entail creating and submitting a topologically correct GIS spatial dataset of the inventory based on the line work provided, entering collected survey data into provided spreadsheet template forms (range management form, range and riparian health assessments, and invasive plant forms) and developing an inventory report. AEP will provide data entry training after the field component to ensure consistency and minimize errors. Additionally, the AEP Rangeland Inventory GIS Technologist will meet with the inventory GIS specialist after the draft map is completed to ensure mapping consistency and that AEP mapping standards are met.

A local AEP Range Management Specialist will be available throughout the project to assist with technical questions and provide advisory support. If requested, transect data can be analysed through classification techniques by the Range Management Specialist to support inventory community calls. Once completed, this information will be returned to the surveyor to finalize plant community calls. Other measurements such as the Ecological Sustainable Stocking Rate and range health may be updated according to the plant communities provided.

If forage production samples were taken (section 3.3), arrangement should be made with the local AEP Range Management Specialist to have them dried and weighed. This data will be sent back to the surveyor to be used in the report. It is also incorporated to help understand forage production variation of the plant communities they represent.

For efficiency, the post field component should be completed in this order:

1. Draft GIS spatial datasets including: inventory polygons; boundary line work; detailed and reconnaissance plot locations, and infrastructure locations (section 2.3.1)
2. Data Form Entry (section 2.3.2)
3. Contract Summary Meeting (section 2.3.3)
4. GIS Spatial Dataset and Form Finalization (section 2.3.4)
5. Inventory Report (section 2.3.5)

2.3.1 Draft GIS Spatial Dataset Creation

Working with a GIS specialist, the surveyor will develop attributed range inventory polygons within the supplied feature class. The draft spatial data will be submitted to RMFRA for AEP specification analysis and comment. The spatial data includes:

- Topologically correct polygons representing the range inventory. The dataset encompasses the entire allotment with each polygon with a unique id. Polygon attributes are formatted in a provided spreadsheet and are linked by the polygon unique ids. This is expected to be delivered in an ESRI File Geodatabase.
- Detailed and reconnaissance plot locations
- Infrastructure points accompanied by feature descriptions.

Mapping should be based on the initial range inventory polygons given. As mentioned previously, these polygons are based on previous inventories, Alberta Vegetation Inventory (AVI), Grassland Vegetation Inventory (GVI), or the Primary Land Vegetation Inventory (PLVI). The standards and guidelines for these inventories should be reviewed in order to understand the limitations and rules placed upon them. These polygons are the basis of the inventory, but the guidelines established with them are not the same as those for the range survey. Polygons created should be governed by the specifications provided in the attached Alberta Vegetation Delineation for Range Inventories in Forest Reserve Allotments using GIS (Addendum A). Starting this process early in the post field process will ensure time to communicate if there are any discrepancies with the created polygons.

Minimum mapping unit (MMU) for upland sites is 2 hectares. For wetlands and meadows the MMU is 0.5 hectares. Anything above these values should be detailed as clearly as possible. Deciles should only be used if plant community boundaries are not discernible on the imagery, or mottling of plant communities within a polygon make it impossible to delineate. Up to three deciles can be used per polygon. Polygons must be contained within the corrected management unit (field or DU) boundary outline (even if vegetation type is the same it is assumed management is different between fields).

2.3.1.1 Point Features

Plot locations are to be captured spatially in the supplied Plot shapefile. Attributes required are the unique plot identifier and plot type (detailed or reconnaissance). Infrastructure features should be captured in the GIS spatial database. Infrastructure that is required for capture is: salting locations, water developments, and any fence point that may document an irregularity in the distribution unit boundary. Information on capturing Infrastructure features can be found in Appendix 4. A shapefile will be provided from AEP to capture Infrastructure Features. This shapefile is available to be uploaded on to some models of GPS units.

2.3.2 Data Form Entry

All survey forms will be submitted by the surveyor. Surveyors are no longer required to enter plot data into ECOSYS. Vegetation Inventory and Site Information Form data will be entered by AEP directly into ECOSYS. Therefore, form completeness and legibility is important. The surveyor will enter select data collected on field forms into spreadsheet templates provided by AEP. A spreadsheet template will be provided for the RMF, range and riparian health assessments, and invasive plant forms. Range and riparian health assessment and invasive plant spreadsheet data will correspond directly with the assessment score sheet fields. The RMF spreadsheet will be used to attribute the polygons. The RMF attribute fields are as follows:

Field Name – The management unit being inventoried (Field or DU).

Polygon – Unique numeric. This number is automatically assigned and links the polygon to the attribution. This number must be unique for the entire Activity Number. There is a command to assign the polygon number at the bottom of the RMF Attributes under Tools.

Area – The value calculated for the specific polygon being entered from the finalized map. Both acres and hectares can be used.

Range Health Estimate - Use this to indicate range health for the polygon. These are broad rankings (unhealthy, healthy with problems, and healthy) that can be determined by averaging range health assessments or range health calls completed for the polygon during the inventory. This estimation is based on the entire polygon; all deciles must be accounted for. Weighting by decile value may be necessary.

Natural Subregion – The Natural Subregion the polygon decile is in. This is mandatory for all types, whether it be Plant Community, Landform or Associated lands.

Decile (1,2,3) - Number from 1-10 to represent % of polygon that the decile occupies i.e. 3 = 30 per cent of polygon. Maximum of 3 deciles per Polygon, deciles must add up to 10 for a complete polygon description.

Plant Community Code (1,2,3) – Codes listed from the plant community guides. If an established community type code is selected (e.g. UFA7).

Plant Community (1,2,3) – Plant community or conditional plant community name. If an acceptable community does not exist in the plant community guide within the Natural Subregion the polygon decile is in, a conditional plant community name must be entered. If the conditional community is related to an established community, but either an earlier seral stage or more disturbed, it can be documented as the established community code with a ‘_D’ or ‘_S’ for disturbed or seral related respectively. If the conditional community is unrelated to an established community, then provide a listing of the top 2 or 3 species with “/” dividing life-forms, and “-“dividing species (e.g. PI / rough fescue – Idaho fescue), and indicate the appropriate Ecosite Phase or Ecological Range Site. If a Conditional Plant Community is selected, the stocking rate has to be set manually in the adjusted rate field.

Plant Community Comments (1,2,3) – This field can be used to describe the conditional plant community beyond just the leading species, or code detailed above.

Range Use Category – Categorizes the polygon into the degree of use expected in relation to the rest of the DU. This is a drop-down list that contains; Primary (the area that animals prefer to graze when management is minimal), Secondary (range that is lightly used or unused by livestock under minimal management and will ordinarily not receive much use until primary range has been over-utilized), Tertiary (range that goes virtually unused by livestock, even when primary and secondary range are over-utilized), Special Use (Rangeland that has been developed or modified for a specialized purpose, and Non-Use. The Special Category field is then used to describe that purpose). Non-Use List provides alternatives if the polygon decile is not under perennial vegetation. Landforms include: Annual Crop, Alkaline Pond, Beach, Cliff, Exposed Sand, Gravel Bar, Gravel Pit, Oil/Gas/Industrial, Lake, Shallow Open Water, Pond, Reservoir, River, Railway Surface, Rock Outcrop, Rural, Road Surface and Talus.

Special Use Category – If Special Use is selected in the previous field, this field further describes the special use. The drop-down list contains: Associated Lands, Cropping, Cut-Block, Development, Haying, Road Allowance, Wildlife Use, Other.

Access Factor (1,2,3) - This identifies accessibility to a plant community under practical range management. Based on a scale of 0 (no access) to 10 (full access) and must be measured for every decile in a polygon.

Adjusted Stocking Rate (1,2,3) - The surveyor can adjust the stocking rate based on professional judgment or forage production clippings. Stocking rates must be entered here for conditional plant communities as well.

Adjustment Reason (1,2,3) - When the stocking rate is changed for a community, an adjustment reason will be required.

Health Trend Polygon (1,2,3) - Indicate the current trend of the plant community health in the polygon. To establish trend, previous knowledge of health must be attained. If trend is unknown then select 'Unknown'.

Grazing Intensity (1,2,3) - Measured at each polygon decile, this categorizes the grazing intensity of the plant communities that was derived during the field work.

Current Utilization (1,2,3) - Measured at each polygon decile to estimate the current utilization at the time of the survey. Record a value between 0 and 100%.

Riparian Percent – Record the percentage of active flood plain (Figure 1) within the polygon. If the polygon does not have any active flood plain within it, the value for this field should be 0. If the entire polygon is riparian, then the value should be 100.

Riparian Health Estimate – Either an estimated or calculated through a riparian health assessment ranking of the current health of the active flood plain referred to in the previous field. If the value of polygon riparian health is 0 then this field should be left blank.

2.3.3 Contract Summary Meeting

The surveyor must arrange a contract summary meeting with the lease or allotment permit holders and the representing Rangeland Agrologist. The meeting will provide an opportunity to go over the assembled GIS spatial dataset and inventory findings. The GIS spatial datasets, forms, and inventory report should be updated accordingly.

2.3.4 GIS Spatial Dataset and Form Finalization

The finalized map will contain a topologically correct feature class in the GIS spatial database of the project area with each polygon uniquely identified and its area calculated. It is up to the surveyor to ensure the map is free of errors and representative of the field work completed. All inventory forms and spreadsheets should be finalized.

2.3.5 Inventory Report

Once the map is completed the management unit summaries can be developed. These summaries as well as all other findings in the inventory should be detailed in a report. This summary report should include the following:

1. Abstract:

- Present the most important information of the report in a succinct form. Summarize the background, objectives, results and conclusions of the report.

2. Introduction:

- Provide the background and general information necessary to establish the report context. For technical reports this will include the objectives, technical background and the problem or question being answered.

3. Methods:

- Assumptions and procedures used in the work should be described accurately and clearly. This manual is the primary source for methods and will be followed unless modifications have been discussed with and agreed to by Rangeland Specialist.

4. Results and discussion:

- This section should describe the plant community findings of each management unit and include:
 - I. An overview of the Natural Subregions represented on the inventoried area using the Natural Regions Committee (2006) report as the primary reference. Refer to Appendix 1 for access to this resource.
 - II. Community type descriptions organized into categories of coniferous, deciduous, shrubland, and grassland. Community type descriptions will include: community name, number of plots, general soils information, moisture regime, elevation (m), aspect (o), slope (%), drainage, and parent material. Average forage production of trees, shrubs, forbs, grasses, and the total production from the inventory survey clips should be presented along with production values from plant community guides if available. The scientific name, common name (as per Ecosys Plant Species List) and cover (%) of the dominant graminoids, forbs, shrubs and trees should also be listed. An example of this format is in Appendix 3.
 - III. The discussion should include an ecological description, description of grazing and disturbance impact, the reasoning behind assigning a particular community name, unique and identifying features of the community, and a description of where it was found in the allotment.

- Range management considerations: This section should include the following (generally, on a management unit basis):
 - I. Landscape features that limit areas suitable for grazing (i.e. topography where cattle are limited to valleys or drainage)
 - II. Current range and riparian health. Focus should be on any trend information or any issues that were discovered.
 - III. Successional information - outline the successional situation of individual units. This should include a discussion on disturbance impacts as well as the effect that exclusion of natural disturbance factors (e.g. fire) is having.
 - IV. Management Unit boundary issues,
 - V. Lightly or heavily used areas - discuss this in terms of patterns of cattle use rather than a reiteration of which range types are over or under used (this is obtainable from the inventory forms),
 - VI. Any ungrazed sites which are too small to be recognized as separate map units but which are surveyed because of their role as comparative sites for determining range health,
 - VII. Poisonous plants, weed infestations,
 - VIII. Eroded water courses or trails,
 - IX. Impacts of other resource uses on livestock management,
 - X. Current management practices
 - salting
 - livestock distribution - pattern of use
 - fencing - general state of repair and type of fencing,
 - access problems,
 - wildlife use,
 - inclusions - any areas of significant cattle grazing but too small to be included on the map
 - discussion about any associated lands outside the allotment but grazed with the allotment

- Overall management summary: This section should be focussed on existing conflicts or potential future conflicts that are influencing management or affecting rangeland health. This section should also include any discussion about resource integration issues or other resource or land use impacts. Consideration should be given to resolution or follow-up on the issues where this is possible.

5. Recommendations:

- I. Suggest a course of action based on the results of the work
- II. Where and how use could be improved – i.e. additional salt locations (in specific treed areas or drainages away from primary ranges), better livestock distribution, drift fences or improved fencing, water development, trail upgrading, changes to cattle management
- III. Seasonal grazing and grazing management system recommendations
- IV. Resource integration recommendations that focus on promoting successful resource integration
- V. Recommendations on controlling weeds, reducing resource conflicts, etc.

6. Literature cited

7. Appendices

- Characteristics of map polygons and hectares (suggest that this appendix be done as an excel table)
- Species list

3.0 Range Survey Methodologies

3.1 Describing the Site through the Site Description Form (RDB 2002-1)

Describing the environmental and broad vegetation characteristics of a site is necessary for all plots done at the Detailed and Reconnaissance levels of inventory. This is performed by completing the Site Description form. If a Detailed plot is being sampled, the details of the site description form should be directly linked to the vegetation transect being sampled to help complement the vegetative attributes. If a Reconnaissance plot is being assessed, the plot size can be less specific but should be centered in a representative area in the polygon or polygon decile being sampled.

The Site Description form's origin is from a previous public lands department tasked with the collection of ecological data. The site form is one of four forms created for plot data collection. It was designed to be employed in three ways (Resource Data Branch 2003):

1. to record, completely and accurately, location, date and plot identification data which makes each sample plot a distinct plot and spatial entity in an electronic database,
2. to record landscape features associated with the sample plot, and
3. to summarize general vegetation and soil features

This form has been adopted by Rangeland Resource Stewardship Section along with a database (ECOSYS) to help collect and organize data for analysis of communities within Range Plant Community guides. It is still the original form but some of the data fields have either been adapted or are not required for range management purposes. As the ECOSYS database was developed along with this form, the data fields are directly transferable. ECOSYS has been further developed to encompass other projects since its inception, so there may be some new fields in the database that do not relate to the Site Description form.

The following lists the information items on the Site Description form as well as hints for filling them out. These definitions are taken directly from the "Ecological Land Survey Site Manual (Resource Data Branch 2003) except where rangeland inventory procedures deviate from the original definitions. It is recommended to refer to the cited manual for complete definitions.

Project Identification – Used historically to name the study area, can be used to indicate the allotment or grazing lease or inventory area being sampled. Write the appropriate GRL/PNT number, allotment/lease name or name of project.

Surveyor(s) – This field is used to identify the organization or company collecting the field data.

Agency – Enter the name of the agency (department, branch, etc.) for whom the data is being collected in this field.

Level of Assessment – The appropriate level of assessment should be indicated in this field.

Three levels of assessment, with increasingly higher levels of information or data collection, are recognized for conducting range inventories: visual, reconnaissance and detailed (refer to Section 2.2.2).

Visual Assessment

Limited information is collected and recorded on the Site Description Form during this assessment. Data is recorded at the discretion of the surveyor. The collected information is used for mapping and RMF purposes. Collected data is not entered into ECOSYS.

Reconnaissance Assessment

This level of assessment includes the completion of a Site Description Form and Vegetation Inventory Form (MF5-PL, Prairie MF5, or Prairie/Rocky Mountain MF5).

Detailed Assessment

A detailed assessment involves the completion of a Site Description Form and Vegetation Inventory Form. Each form must be filled out in its entirety, with any exceptions detailed in this manual.

Forms – This field identifies the forms filled out for a specific sample plot within the identified study area. A check mark should be placed in the box adjacent to those forms that have been filled or partially filled out. If other forms have been used, they should be identified.

Date – Record the day of month first, then the month, both with leading zeros if necessary, followed by the complete 4 digit number of the year (e.g., 05/12/2001). Months are numbered sequentially from 01 (January) to 12 (December).

Project Code – A code unique to the project is entered in this field. This code should be obtained from a local Range Management Specialist prior to the initiation of data entry. It consists of a 2 digit number followed by a 3 letter acronym, which identifies the geographic location of the study area.

Plot # – The site or plot number being sampled, it should relate to a specific point. This alphanumeric is commonly a letter denoting the allotment/lease name and a sequential number uniquely identifying the plot in the grazing lease, allotment, or project being sampled. Do not duplicate this number within the project, regardless of the type of plot (detailed, reconnaissance, or descriptive). If a vegetation inventory or other form is being completed, this plot number should be recorded on them as well to link the forms together.

Plot Area – For range inventories, the plot area is not recorded on the Site Description Form. The polygon area is determined during the mapping phase.

Plot Shape – For range inventories, the plot shape is not needed.

Legal Land Description (LSD / SEC / TWP/ RGE / MER) – Describes the legal location of the plot. These fields are not required but can be recorded if known to supplement the obtained GPS location.

Global Positioning System (GPS) – This field is not used for range inventories. All locations must be acquired using an accurate GPS.

Latitude / Longitude – Enter the GPS location here. Latitude and Longitude location information must be recorded for each detailed and reconnaissance plot. GPS locations should be formatted in decimal degrees with 5 decimals. Also ensure the datum is either NAD83 or WGS84. Projections such as UTM or TTM are not acceptable on this form.

The following is an example of an acceptable format:

Decimal Degrees (DD) – Ensure degrees are recorded to 5 decimal places (i.e. 49.69500, 112.77778)

Site Photos – Digital plot photographs should be documented by recording the photo number(s) in this field. Digital image files should be named with project name and plot number and placed in a project specific directory.

Aerial Photography – Historically used to capture x-y coordinates of a plot from a specific aerial photograph. If aerial photography was used to identify the plot, record the aerial survey roll number (the letters followed by the four or five digits number, (e.g. AS1514) and the photo number (e.g. 170) of the air photo on which the sampled plot is located. Refer to the original manual for further details.

Map Sheet – 1:50,000 National Topographic System (NTS) or 1:20,000 Base Map – Not needed for range inventory data collection

Natural Region/Subregion – Natural Regions are recognized on the basis of broad variations in landscape features. There are 6 natural regions within Alberta. Each region is further divided into two or more subregions based on distinctive subregional landscape patterns. The appropriate numeric code for the subregion is recorded (Table 2). Further information on natural regions and subregions may be found in Natural Regions and Subregions of Alberta (Natural Regions Committee 2006).

Table 2. Natural Subregion Codes (from Resource Data Branch 2003).

Boreal Forest Natural Region	
1	Central Mixwood
2	Dry Mixwood
3	Wetland Mixwood
4	Sub-Arctic
5	Peace River Lowlands
6	Boreal Highlands
Rocky Mountain Natural Region	
7	Alpine
8	Subalpine
9	Montane
Foothills Natural Region	
10	Upper Foothills
11	Lower Foothills
Canadian Shield Natural Region	
12	Athabasca Plain
13	Kazan Upland
Parkland Natural Region	
14	Foothills Parkland
15	Peace River Parkland
16	Central Parkland
Grasslands Natural Region	
17	Dry Mixedgrass
18	Foothills Fescue
19	Northern Fescue
20	Mixedgrass

Ecodistrict – Record if known. A three-letter code defines each ecodistrict. For the three letter allowable codes, a map of the ecodistricts and further descriptive information see Ecodistricts of Alberta (Strong and Thompson 1995).

Elevation – Record in meters using height above ellipsoid calculations on GPS if available. Indicate on form if attaining from a source other than GPS such as an altimeter or topographic map (indicate scale).

Aspect – Record in degrees. Aspect is a measure of the orientation of the slope, using a compass reading. It is used to indicate the direction of exposure of a slope. This information is valuable, when combined with a measure of slope, for predicting the amount of incident solar radiation.

Level ground has no aspect. For slopes of less than one percent, enter a zero in the aspect field. On sites with a slope of one percent or more, enter a numeric value for aspect. (A value of 360° is due north, 90° is due east, 180° is due south, and 270° is due west). Enter the compass bearing of the estimated aspect of the slope to the nearest degree. Ensure the compass is set to the current proper declination. Current declination information may be obtained from recent NTS or Access maps, or from web sites, which provide the calculations to determine the current declination of a specific location (e.g. Natural Resources Canada, Centre for Topographic Information). The current declination reflects any annual changes in declination and local magnetic variations.

Slope – Record in percent slope. This can be attained through the use of a clinometer. A slope of 0 must be recorded for those sites which have no slope (a level site). If degree slope is attained, convert to percent using a conversion table. Refer to the original manual for further details.

Regen 1,2,3 – Average height and % cover of deciduous and coniferous regenerating tree species should be recorded here. Use Alberta Vegetation Inventory mapping species codes (See Table 3).

Table 3. Tree species names and codes for describing regeneration.

Code	Common name	Scientific name
Sw	White Spruce	<i>Picea glauca</i>
Se	Engelmann spruce	<i>Picea engelmannii</i>
Sb	Black spruce	<i>Picea mariana</i>
Pl	Lodgepole Pine	<i>Pinus contorta</i>
Pj	Jack pine	<i>Pinus banksiana</i>
Pa	Whitebark pine	<i>Pinus albicaulus</i>
Pf	Limber pine	<i>Pinus flexilis</i>
Fb	Balsam fir	<i>Abies balsamea</i>
Fa	Alpine (subalpine) fir	<i>Abies lasiocarpa</i>
Fd	Douglas fir	<i>Pseudotsuga menziesii</i>
La	Alpine larch	<i>Larix lyallii</i>
Lt	Tamarack	<i>Larix laricina</i>
Lw	Western larch	<i>Larix occidentalis</i>
Aw	Trembling aspen	<i>Populus tremuloides</i>
Pb	Balsam poplar	<i>Populus balsamifera</i>
Bw	Paper (white) birch	<i>Betula papyrifera</i>

Data Categories (Exposure – Factor 2) – Valid codes for the following data categories are numeric. Most are shown along with a brief description of each numeric code, on the bottom half of the Site Description Form. **Record the number in the field that best corresponds with the sites description.**

Exposure - If the site is influenced by the following atmospheric or climatic related exposure factors that deviate from the typical (zonal) climate, enter that value, otherwise choose 1 (Not Applicable).

1. Not Applicable
2. Wind – This category is used if the site is directly influenced by strong winds. This commonly occurs on ridges, mountain tops, or in areas where wind funnelling occurs due to the convergence of valleys in the direction of wind flow. Common vegetation indicators are plant of reduced height or gnarled growth form, tree tops and branches oriented downward, and vegetation reflecting a drier environment.
3. Insolation – Sites that are influenced by solar radiation far greater than level ground. Generally applies to south facing slopes between 20 and 100%. Common vegetation indicators are vegetation from drier more heat tolerant environments (often grass dominated) and reduced tree growth.
4. Frost – Refers to areas of cold air accumulation in valley bottoms and depressions in the landscape. Vegetation indicators include tree, shrub and forb species more indigenous to cooler areas. Frost cracks on the trunks of trees may also be present.
5. Cold air drainage – This applies to areas where cold air passes, such as mountain gullies. This is separate from the frost category and cold air does not accumulate. Commonly, the vegetation in these areas is usually from somewhat moister than the zonal climates.
6. Atmospheric toxicity – Applies to areas influenced by acidic or basic rainfall. Also areas that are exposed to toxic fumes from industrial plants. This toxicity affects the type and growth form of the vegetation, as well as causes defoliation, disease and dead standing species.

Flood Hazard - Describe the frequency in which the site is prone to flooding. This refers to overland flooding associated with rivers, creeks and streams. The following table itemizes the indicators of the various levels of flood hazard.

Table 4. Flood hazard characteristics (adapted from Resource Data Branch 2003).

1. No Hazard	
Litter cover	Thick litter cover, lower layer completely decomposed. Soil profile development is evident
Overbank deposits	No evidence of recent overbank deposits
Fluvially transported debris	Not present
Vegetation	Mature stands of upland vegetation
Terrain height	Areas of higher elevation
Terrain unit	Areas of higher terraces, fluvial fans, colluvial deposits, etc... Unusually adjacent to valley walls.
Estimated flood frequency	This unit is unlikely to be flooded under the present hydrological conditions.
Soil classification	Usually no Regosolic; will depend on area surveyed
2. Rare	
Litter cover	Thick litter cover, lower layer completely decomposed
Overbank deposits	No evidence of recent overbank deposits
Fluvially transported debris	Not present
Vegetation	Mature stands of upland vegetation
Terrain height	Areas of higher elevation
Terrain unit	Areas of lower terraces, fluvial fans or colluvial deposits
Estimated flood frequency	In the range of 50 to greater than 200 years return interval
Soil classification	CumulicRegosols; Brunisolics
3. May be expected	
Litter cover	Thin litter cover present ranging from recent to partly or completely decomposed material
Overbank deposits	Silt and/or fine sand deposits inter-bedded with organic litter
Fluvially transported debris	Fluvially deposited logs and organic debris may be present on the ground and in lower branches of trees.
Vegetation	Mostly mature vegetation stands, but with some species typical of primary colonization
Terrain height	Areas of moderate elevation
Terrain unit	Areas of valley floor dissected by drainage channels
Estimated flood frequency	Less than 50 year return interval
Soil classification	CumulicRegosols

4. Frequent	
Litter cover	No litter to a thin layer of non-decomposed material
Overbank deposits	Presence of recent silt or sand depositions. Occasional scour holes
Fluvially transported debris	Fluvially deposited logs and organic debris on channel banks Occasional debris in lower branches of trees.
Vegetation	None, or species typical of primary colonization; or species typical of wetlands
Terrain height	Low lying areas
Terrain unit	Active floodplain or fans. Includes active channels, side channels, drainage channels and areas of march or swamps adjacent to valley walls
Estimated flood frequency	1-3 year return interval
Soil classification	Orthic and Cumulic Regosols

Soil Drainage - The official soil drainage classes of the Canada Soil Survey Committee are used for this category. These have been defined by the Land Resource Research Institute (Day 1982). These classes are defined in terms of actual moisture content in excess of field capacity, and the extent of the period during which such excess water is present in the plant – root zone. This measure incorporates other soil characteristics such as permeability, level of groundwater, and seepage. The soil drainage classes are as follows:

1. Very rapidly drained – The soil moisture contents seldom exceeds field capacity in any horizon except immediately after water additions. Water is removed from the soil very rapidly in relation to supply. Excess water flows downward very rapidly if underlying material is pervious. There may be very rapid subsurface flow during heavy rainfall provided there is a steep gradient. Soils have very limited water storage capacity (Usually less than 2.5 cm) within the control section and are usually coarse textured, or shallow, or both. Water source is precipitation.
2. Rapidly drained – The soil moisture contents seldom exceeds field capacity in any horizon except immediately after water additions. Soils are free from any evidence of gleying or mottling throughout the profile. Rapidly drained soils often occur on steep slopes.
3. Well drained – The soil moisture content does not normally exceed field capacity in any horizon (except possibly the C) for a significant part of the year. Soils are usually free from mottling in the upper 1m, but may be mottled below this depth.
4. Moderately well drained – The soils moisture in excess of field capacity remains for a small but significant period of the year. Soils are often faintly mottled in the fine-textures soils and in medium texture soils that have a slowly permeable layer below the A and B horizons. In grassland soils the B and C horizons may be only faintly mottled and the A horizon may be relatively thick and dark.

5. Imperfectly drained – The soil moisture in excess of field capacity remains in the subsurface horizons for moderately long periods during the year. Soils are often distinctly mottled in the B and C horizons; the Ae horizon, if present may be mottled. The matrix generally has a lower chroma than in the well-drained soils on similar parent materials. Soils are generally gleyed subgroups of mineral soils orders.
6. Poorly drained – The soil moisture in excess of field capacity remains in all horizons for a large part of the year. The soils are usually strongly gleyed. Except in high chroma parent materials, the B if present and upper C horizons usually have matrix chromas of three or fewer. Prominent mottling may occur throughout. Soils are generally in the Gleysolic and Organic order.
7. Very poorly drained – Free water remains at or within 30 cm of the surface most of the year. The soils are usually strongly gleyed. Subsurface horizons usually are of low chroma and yellowish to bluish hues. Mottling may be present within 30cm or at depth in the profile. Soils are generally in the Gleysolic or Organic order, mineral soils are usually a peaty phase.

Perviousness - The ability of the soil to allow free movement of water through its substrate. These classes refer soil characteristics such as structure, texture, porosity, cracks, organic matter content and shrink-swell properties. These are closely related to measures of permeability, percolation rate, and infiltration rate, but the use of these terms are reserved for the actual measurements of these. Perviousness categories apply to the entire soil profile, thus the least permeable layer will be the layer the limiting factor that defines it. The categories are:

1. Rapidly pervious – the capacity to transmit water vertically is so great that the soil will remain wet for no more than a few hours after thorough wetting. The horizons and soils have large and continuous or connected pores and cracks that do not close with wetting.
2. Moderately pervious – the capacity to transmit water vertically is great enough that the soil will remain saturated for no more than a few days after thorough saturation. Most moderately pervious soils hold relatively large amounts of water against the force of gravity, and are considered good, physically, for rooting and supplying water to plants. Soil horizons may be granular, blocky, weakly platy or massive (but porous) if continuous conducting pores or cracks are present which do not close with wetting.
3. Slowly pervious – the potential to transmit water vertically is so slow that the horizon or the soil will remain saturated for periods of a week or more after thorough wetting. The soil may be massive, blocky or platy, but connecting pores that conduct water when the soil is wet are few, and cracks or spaces among peds that may be present when the soil is dry, close with wetting. Roots are usually few or absent, even in positions accessible to plant roots. Roots are localized along cracks when they are present.

Regional Landform – This attribute provides a general description of the landscape in the region of the sample plot. This level of terrain assessment is based on the ecodistrict scale. The terms used to describe regional landform are defined in Table 5. These definitions have been extracted with minor revisions from Shields et al. (1991) unless indicated otherwise.

Table 5. Regional landform codes and descriptions (from Resource Data Branch 2003).

Code	Landform	Description
1	Tableland (or plateau) dominated	Comparatively flat areas of great extent commonly bounded on at least one side by an abrupt escarpment, or may be terminated by mountains; may be dissected by deep valleys and deeply incised rivers; may be tectonic, erosional or volcanic in origin; slopes generally < 10%, in some places 10 to 15%; relief generally < 50m.
2	Hilland dominated	Natural elevations rising prominently above the surrounding plain and having a recognizably denser pattern of generally higher knolls or crest lines with irregular or chaotic surface form composed of upper surface convexity and lower concavity; includes hummocky morainal material, volcanic cones, and conical hills of lava; slopes generally 10 to 30%; relief generally 30 to 300m.
3	Mountain dominated	Tectonic (erosional and volcanic) landscapes with relief (vertical distance between higher and lower parts) > 300m with most of the area comprising valley to summit terrain; slopes generally > 30%. In general the terrain has a restricted summit area and steep sides, irregular shape and considerable bare rock surface or very thin soil cover.
4	Organic wetland dominated	Areas dominated by organic material > 40cm thick; contains > 30% organic matter by weight; occurs in a variety of wetland surface forms.
5	Plain dominated	Flat to very gently undulating areas having few or no prominent irregularities; formed by erosional or depositional (constructional) processes; include broad, continuous, gently sloping morainal, lacustrine, alluvial and piedmont plains; slopes generally 0 to 15%; relief generally 3 to 30m; extent generally > 5km in one direction.
6	Scarp dominated	Escarpments, cliffs or steep slopes of some extent along the margin of terrace, bench, plateau, hill, or mesa; a scarp may be of any height.
7	Valley dominated	Terrain dominated by major spillways, drainage ways or mountain trenches separated from surrounding landforms by a significant and abrupt break in slope; the valley profile may be V- or U-shaped with an extensive valley floor and flood plain up to 5km wide; valley profile may also include eroded terraces and their irregular slope segments.

Code	Landform	Description
8	Dune dominated	Mounds, hills or ridges of windblown sand, either bare or variously covered by vegetation and capable of further movement, but retaining their characteristic shape for extended periods of time (adapted from David 1977).
9	Delta (deltaic plain)	A relatively extensive (several square km), level to sloping plain composed of sediments ranging from gravel (top set) to sand (middle set) to clay (bottom set) occurring between diverging branches at the mouth of a river, e.g. Peace-Athabasca delta (adapted from Bates and Jackson 1984).

Site Position – Meso – This is the position at the local scale, usually within one of the major positions under Site Position - Macro. In some areas of low topography this measure may be identical to the Macro position. The vertical distance between high and low in this scale is usually between 3 to 300m. The positions are defined below and illustrated in Figure 2.

1. **Crest** – the generally convex uppermost portion of a hill, it is usually convex in all directions with no distinct aspect.
2. **Upper slope** – the generally convex upper portion of the slope of a hill immediately below the crest. It has a convex surface profile with a specific aspect.
3. **Middle slope** – the area of the slope of a hill between the upper slope and the lower slope where the slope profile is neither concave nor convex. These slopes have a specific aspect.
4. **Lower slope** – the area toward the base of the slope of the hill. It generally has a concave surface profile with a specific aspect.
5. **Toe** – defined by a clear demarcation by an abrupt decrease in the slope below and adjacent to the lower slope. These profiles have low slope.
6. **Depression** – any area that is concave in all directions; generally at the foot of a meso scale hill or a generally level area.
7. **Level** – any level meso scale areas not immediately adjacent to a hill. The surface profile is generally horizontal with no significant aspect.

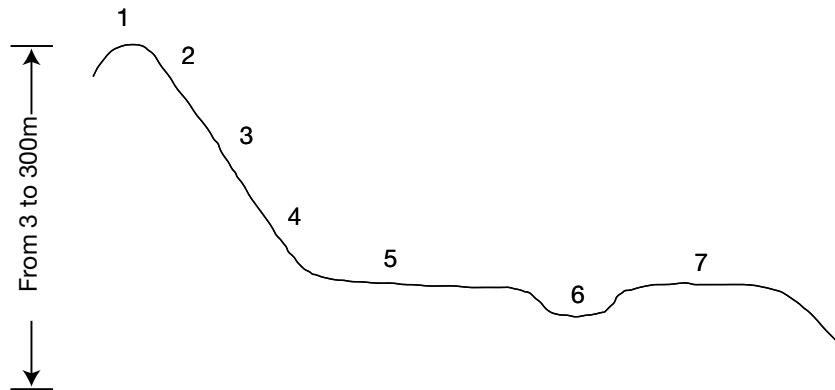


Figure 2. Illustration of terms used in Site Position – Meso.

Site Surface Shape – Record whether the surface shape is concave (predominately hollow), convex (steepening), or straight (Figure 3).



Figure 3. Illustration of terms used in Site Surface Shape.

Site Microtopography – This field is typically not completed for range inventories. Microtopography refers to the characteristics of the ground surface in the immediate vicinity of the plot. The elevation and spacing of mounds is utilized to determine the pattern which best describes the landscape at this very large scale. The microtopography classes and definitions provided in Table 6 have been taken from Resource Data Branch 2003.

Table 6. Site microtopography codes and definitions (from Resource Data Branch 2003).

Code	Micro Relief Class	Mound height (m)	Spacing between (m)
1	level	Few	None
2	micro mounded	< .3	-
3	slightly mounded	.3 - 1	> 7
4	moderately mounded	.3 - 1	3 - 7
5	strongly mounded	.3 - 1	1 - 3
6	severely mounded	.3 - 1	.3 - 1
7	extremely mounded	> 1	> 3
8	ultra mounded	> 1	< 3

Ecological Moisture Regime - Ecological moisture regime (hygrotope), relative to certain macroclimatic conditions represented by Natural Region, Ecoregion or any other bioclimatic unit, signifies on a relative scale the available moisture supply to plant growth. At present, there has been little quantitative investigation of the classes described here. Assuming that within a given Natural Region, climatic variables such as temperature and precipitation are essentially constant (or vary within narrow ranges), the within-region variation of available moisture results from the redistribution of precipitation by edaphic factors. Sites which have an amount of available moisture that reflect the given climate, and have average conditions of slope, moisture translocations, and texture have a mesic moisture regime, while those with less than normal available moisture grade to xeric, and those with more than normal available moisture grade to hydric (see Table 7). The ecological moisture regime is a relative ranking of sites based on their available moisture supplies (available moisture is that which is held between 1/3 bar and 15 bars matric potential). The moisture regime is assessed regardless of osmotic potential (i.e. salt content is not considered). Because available moisture is a dynamic property which varies throughout the year, the intent of the assessment is to evaluate available moisture on the basis of the growing season as a whole, not at any particular time.

The ecological moisture regime integrates many interrelated environmental and biotic parameters which in combination determine the actual amount of available moisture. The field assessment is ideally completed by evaluating the combination of environmental factors, soil properties, and indicator plants. However, the assessment can be made on the basis of plant indicators or environmental factors and soil properties alone. A schematic illustration of the influence of these factors is given in Figure 4.

Ecological moisture regime is correlated with the following factors: micro-variations in the topo-climatic slope positions (macro and meso relief), slope gradient, soil drainage, depth of surface humus layers, soil texture (including the content of coarse fragments), soil depth, and the presence of an impermeable layer. Factors related to internal soil properties can be evaluated in a soil pit, on road cuts, or in disturbed spots. In general, the most influential factor is the position on the slope. On ridges, and upper slopes, precipitation is the main source of water since moisture passes quickly downslope and little if any moisture is retained. Middle slopes receive, in addition to precipitation, some seepage from up-slope, but this seepage flow moves further down slope and is usually discontinued during the summer. The lower slopes, flats, and depressions are usually enriched by a temporary or permanent seepage water flow. The other factors can be considered as compensating this general pattern, (i.e. affecting the variable degree the ultimate ecological moisture regime). The amount of available moisture often increases with decreasing slope gradient, decreasing soil particle size (i.e. from coarse to fine textured soils), decreasing content of coarse fragments, increasing soil depth, and increasing thickness of humus layers (in particular with the thickness of colloidal and humified H-layer). The presence of an impermeable layer (i.e. bedrock, compacted till, cemented layer) may inhibit soil water storage or create conditions for temporary or permanent seepage if subsurface water flow seepage is present. This can also result in the increase of available moisture. The ecological moisture regime classes and potentially identifying characteristics are given in Tables 7 and 8.

The use of plant indicators for assessing ecological moisture regime requires an existing classification scheme for the natural region under consideration or the reconnaissance of

the area sufficient to establish relationships between vegetation indicators and the range of edaphic conditions. When assessing sites near Natural Region boundaries, care must be taken to differentiate between seepage inputs, and increases in precipitation or decreases in evapotranspiration demands. For example, plants which are normally found on mesic sites in one natural region can occur on subhygric sites in an adjacent Natural Region with lower precipitation or higher temperatures. Care must also be taken to assess the plant community as a whole. Some species may have a limited rooting depth and do not reflect the presence of deeper seepage waters, while other species may reflect changes in nutrient availability rather than available moisture. Even when extensive vegetation information is available, it is always best to consider the environmental factors as well. If the intent is to develop a classification scheme that defines plant indicators, then only environmental factors should be considered to avoid circular reasoning.

Table 7. Soil moisture regime classes and descriptions (adapted from Resource Data Branch 2003).

Moisture Regime	Primary Water Source	Description
Very Xeric (0)	Precipitation	Water removed extremely rapidly in relation to supply; soil is moist for a negligible time after precipitation
Xeric (1)	Precipitation	Water removed very rapidly in relation to supply; soil is moist for brief periods following precipitation
Subxeric (2)	Precipitation	Water removed rapidly in relation to supply; soil is moist for short periods following precipitation
Submesic (3)	Precipitation	Water removed rapidly in relation to supply; water available for moderately short periods following precipitation
Mesic (4)	Precipitation in moderately to fine - textured soils and limited seepage in coarse texture soils	Water removed somewhat slowly in relation to supply; soil may remain moist for a significant, but sometimes short period of the year. Available soil moisture reflects climatic inputs
Subhygric (5)	Precipitation and seepage	Water removed slowly enough to keep the soil wet for a significant part of the growing season; some temporary seepage and possibly mottling below 20 cm
Hygric (6)	Seepage	Water removed slowly enough to keep the soil wet for most of the growing season; permanent seepage and mottling present; possible weak gleying
Subhydric (7)	Seepage or permanent water table	Water removed slowly enough to keep the water table at or near the surface for most of the year; gleyed mineral or organic soils; permanent seepage less than 30 cm below the surface
Hydric (8)	Permanent water table	Water removed so slowly that the water table is at or above the soil surface all year; gleyed mineral or organic soils

Table 8. Soil moisture regime classes and descriptions (adapted from Resource Data Branch 2003).

Moisture Regime	Slope		Soil Properties				
	Position	Gradient	Texture	Drainage	Depth to Impermeable Layer	Humus Form Depth	Available Water Storage Capacity
Very Xeric (0)	ridge crests, shedding	very steep	very coarse (gravelly S), abundant coarse fragments	very rapid	very shallow (<0.5m)	very shallow	extremely low
Xeric (1)		steep		rapid			
Subxeric (2)	upper slopes, shedding	steep	coarse to moderate coarse (LS-SL), moderate coarse fragments	rapid to well	shallow(<1m)	shallow	very low
Submesic (3)							low
Mesic (4)	mid slope, normal, rolling to level	moderate	moderate to fine (L-Sil), few coarse fragments	well to moderately well	moderately deep (1-2m)	moderately deep	moderate
Subhygric (5)	lower slopes, receiving	slight	variable depending on seepage	moderately well to imperfect	deep (>2m)	deep	high
Hygric (6)				imperfect to poor			
Subhydric (7)	depressions, receiving	flat	variable depending on seepage	poor to very poor	variable, depending on seepage	very deep	variable, depending on seepage
Hydric (8)				very poor			

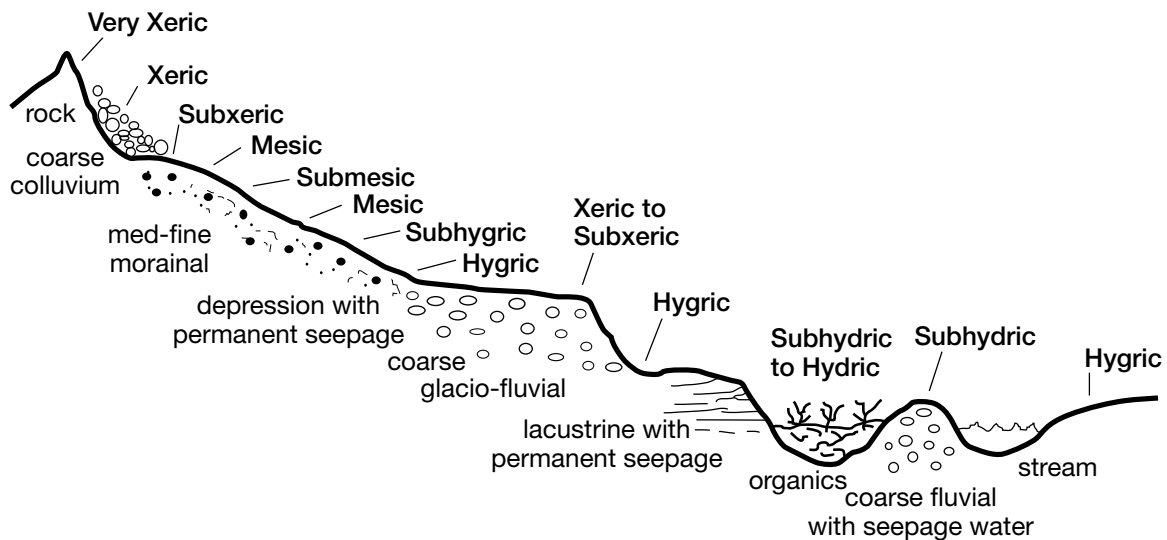


Figure 4. Ecological moisture regime in relation to landscape position and geological material (adapted from Resource Data Branch 2003).

Nutrient Regime - Soil nutrient regime (trophotope), relative to climatic conditions represented by an Ecoregion or any other bioclimatic unit, signifies on a relative scale the available nutrient supply to plant growth (with emphasis on soil pH and exchangeable cations; Ca, Mg, Na, and K). The soil's nutrient regime integrates many environmental and biotic parameters which in combination determine the actual amounts of available nutrients. It is a dynamic property, characterized by inputs and losses, with seasonal variations. The aim of the assessment is to derive an estimate of the available nutrient supply for a site which will characterize it relative to all other sites occurring within the respective Natural Region, Ecoregion or other bioclimatic unit.

At present, the assessment of soil nutrient regimes is strictly qualitative for a number of reasons, including a lack of understanding of the role played by soil weathering and forest humus layers in the supply of nutrients, and a lack of information on the required nutrient levels for optimum growth of various species (particularly trees.) At present, the application of soil nutrient regimes does not directly take into account the availability of nutrients other than cations, which may be limiting on any particular site. In general however, biomass production is expected to increase from oligotrophic to eutrophic nutrient regimes for a given hygrotone under particular climatic conditions (i.e. Ecoregion). Exceptions may occur with limiting nutrients such as phosphorus, which is often unavailable (and limiting) at a high pH where it is fixed by calcium compounds; nitrogen, which occurs in various forms and can be limiting to the production of some species; or sulphur, which may be absent in some parent materials. Eutrophic and hypereutrophic nutrient regimes may contain excess salts which limit the availability of water to most plant species. Ecotypic variations within species (i.e. elevation) might also produce unusual trends.

Major factors influencing nutrient regimes are described in the following paragraphs, and Table 9 provides information on the use of soil parent materials, humus layers, seepage water and analytical data to aid in assessing soil nutrient regime.

- a. Soil parent materials (bedrock and landforms) – the kind of bedrock from which the soil parent materials were derived can be a useful guide to assessing the nutrient regime. Identification of coarse fragments from the soil is preferable, although local outcrops or information from a geologic map may be used. During the last major glaciation in Alberta, glacial materials were derived both from local bedrock sources (the Rockies) and from the Canadian Shield, producing soil parent materials which often reflect the bedrock types they were derived from. This is particularly true in small valley systems where the bedrock is uniform and materials have moved only short distances. The larger valleys and the foothills and plain areas of Alberta are more likely to have mixed parent materials of intermediate nutrient regimes. Wherever bedrock is used as a primary differentiating criterion, the rock types which occur as coarse fragments should be compared to those indicated on geologic maps or in adjacent outcrops.

Soils derived from basic igneous rocks (i.e. basalt, gabbro) basic metamorphic rocks (i.e. argillite, biotite, schist, gabbro, gneiss), and rich sedimentary rocks (i.e. limestone, dolomite) may be expected to be mesotrophic to eutrophic because of the abundance of basic elements found in the minerals of these rocks. These rock types also generally result in finer textured materials than the more resistant, acid metamorphic rocks (i.e. granite, gneiss, quartzite), and some sedimentary rocks (i.e. conglomerate, and marine shales) may be expected to be oligotrophic to mesotrophic. Some soils may be hypereutrophic as a consequence of groundwater flow through saline bedrock (i.e. marine shales and evaporates).

Soil texture, as it affects cation exchange capacity, may also be used to assist in the assessment of soil nutrient regime. Landform and terrain characteristics may be used in a general way, since they often determine soil texture. Coarse – textured materials (usually glaciofluvial, fluvial, colluvial, and some morainal materials) generally have a low cation exchange capacity, and therefore tend to fall into the oligotrophic to mesotrophic nutrient regimes. Finer-textures materials (lacustrine and some morainal, fluvial and colluvial materials) have higher cation exchange capacities and generally fall into the mesotrophic to eutrophic nutrient regimes. The texture relationships, however, must always be considered in relation to the mineralogy (or bedrock source) of the parent materials, and the presence or absence of seepage water and incorporated organic matter.

- b. Soil Organic Layers – soil organic layers may be classified into three major humus forms: mor, moder and mull. The humus form, reflecting the mode of decomposition, is related to many environmental factors (i.e. Microclimate) and biotic factors (i.e. Activity of flora and fauna). It is identified by the relative proportions of the three layers (L – fresh litter, F – felty, partially decomposed litter with observable structure, and H – humified amorphous and colloidal material), the total thickness of all layers, an estimate of soil, animal or fungi activity, and by analytical parameters such as pH and C/N ratio. In general, the humus form reflects

the kind and degree of decomposition of organic matter, and hence is a good indicator of the intensity of biogeochemical cycling.

- c. Free Water – temporary or permanent subsurface water flow within the rooting zone usually enriches a site with nutrients. Seepage water emanating from acid bogs is an obvious exception. Alluvial fans with moving underground water and floodplains are usually enriched.
- d. Soil Analytical Data – the most readily available chemical soil characteristic is pH. Within the range of soil pH values (with emphasis on soil B horizons) found in an Ecoregion, the sites with lower pH values will tend to be oligotrophic and those with higher pH values will tend towards being eutrophic. In addition to pH, measured values of base saturation, and cation exchange capacity are also useful criteria. With increasing base saturation and cation exchange capacity, the nutrient regime grades from oligotrophic to eutrophic. The calculation of available nutrients in Kg/ha is probably the most useful criterion, although influences from seepage water must also be considered.

Successional Status – These fields were originally used to categorize the current state of succession at a site. Currently, succession is modelled and interpreted within the plant community and range health guidebooks so these categories are not utilized.

Factors Influencing Stand Establishment

Historical events relevant to the appearance of present vegetative cover and soil characteristics, insofar as these differ from the characteristic soil and climax vegetation of the site, are recorded. It is impossible to compile a complete list of potential influences affecting the soils and vegetation, and additional categories may need to be described in the “Comments” portion of the Site Description Form. However, wherever possible the investigator should use one or several of the indicated categories located on the backside of the Site Description Form (See Table 10). For easier consultation of the list, the various factors are grouped into general categories or broad factors. Specific factors within each broad factor are then identified. The factor code includes the combination of a broad and specific factor and consists of 2 numbers: the first number representing the broad factor and the second number providing more specific detail (e.g. 1.2 – atmosphere - climatic extremes). A single number code is not acceptable. If the specific factor is not listed enter a “0” for the second number and provide additional information in the “Comments” section. If further elaboration of any parameter is required, additional notes can be made in the “Comments” portion of the Site Description Form. If more than one factor applies, an additional factor (factor with a lesser impact) can be inserted by filling in a code for the field under Factor 2.

Table 9. Nutrient regime characteristics (McNeil 2010). Adapted from Resource Data Branch (2003).

Class	1. Oligotrophic	2. Sub-mesotrophic	3. Mesotrophic	4. Permesotrophic	5. Eutrophic	6. Hypereutrophic
Nutrient Status	Very poor; very small supply of available nutrients	Poor; low supply of available nutrients	Medium; medium supply of available nutrients	Rich; plentiful supply of available nutrients	Very rich; abundant supply of available nutrients	Saline; excess salt creates high moisture tension in soil
Bedrock Source	Granite, Rhyolite, Quartzite, Quartz sandstone	Granodiorite, Dacite, Quartz Gneiss, Conglomerate	Diorite, Andesite, Garnet schist, Graywacke	Gabbro, Basalt, Biotite schist, Argillite Shale	Peridotite, Dunite, Basalt, Slate, Dolomite, Phyllite, Limestone	Dunite, Serpentine, Marble, Phyllite, Limestone, Gypsum Halite, other evaporites
Texture	Very coarse	Coarse	Medium	Fine	Very fine	Variable
Organic Matter Content	Low	Moderate	Moderate	High	High	Variable
Humus form	Acid mors	Mors and Moders	Mors and Moders	Moders and mulls		
Soil reaction	Extremely acid to medium acid	Medium acidic to neutral	Medium acidic to neutral	Slightly acid to mildly alkaline	Neutral to moderately alkaline	Moderately to strongly alkaline
Cation Exchange Capacity	Low	Moderate	Moderate	High	High	Variable
Base saturation	Low	Moderate	Moderate	High	High	Variable
Carbon: Nitrogen ratio	High	Moderate	Moderate	Low	Low	Variable

Table 10. Broad and specific factors that influence stand establishment.

Broad Factor Categories	Specific Factors
1. Atmosphere-related effects	<ol style="list-style-type: none"> 1. Atmospheric pollution (specify type) 2. Climate extremes (specify type) 3. Windthrow
2. Cutting and soil disturbances	<ol style="list-style-type: none"> 1. Abandoned construction sites (road-bed, railway, etc.) 2. Clearcut logging (no slash burn unless indicated) 3. Cultivation (continued disturbance of the vegetation and/or the soil, excluding harvesting of native crop) 4. Excavation 5. Harvesting of native crop (haying, berry picking, etc.) 6. Land clearing (includes grubbing and/or other forms of disturbance of the natural soil as for pipeline construction etc.) 7. Scarification 8. Selective logging (including shelter cut) 9. Soil compaction (including effects from foot traffic and animal traffic)
3. Dumping, disposal and spills	<ol style="list-style-type: none"> 1. Chemical spill or disposal (specify type) 2. Effluent disposal 3. Mine spoils 4. Oil spill or disposal 5. Radioactive waste disposal or exposure
4. Fires	<ol style="list-style-type: none"> 1. Intensive fires (consuming trees and larger shrubs) 2. Light fire (primarily ground fire) 3. Repeated intensive fire 4. Repeated light fire 5. Slash burn (following logging)
5. Plant and animal-related effects	<ol style="list-style-type: none"> 1. Beaver tree cutting 2. Disease (excluding insects: specify type) 3. Domestic grazing/browsing (specify animal) 4. Excrement accumulation (other than that normally associated with grazing or browsing) 5. Insect kill (specify insect) 6. Succession (gene ration of vegetation including climax stands) 7. Wildlife grazing/browsing (specify animals)

Broad Factor Categories	Specific Factors
6. Terrain-related effects	<ol style="list-style-type: none"> 1. Avalanching 2. Eolian 3. Recent deglaciation 4. Rock quarrying (including open mine pits) 5. Terrain failures (active or recent slumps, slides, solifluction etc.) 6. Volcanic activity
7. Vegetation and site improvement-related effects	<ol style="list-style-type: none"> 1. Fertilization (specify fertilizer) 2. Irrigation 3. Planted trees or shrubs 4. Seeded or planted to grass or herbs 5. Seeded to trees or shrubs
8. Water-related effects	<ol style="list-style-type: none"> 1. Inundation (including temporary inundation resulting from beaver activity) 2. Temporary seepage (usually man-induced seepage; this excludes intermittent seepage resulting from climate patterns). 3. Water table control (diking, damming) 4. Water table depression (associated with extensive water extraction from wells).
9. Not evident	0. Not evident

Surface Substrate – Quantify the ground surface into broad categories. The value is recorded as the percentage of the ground covered by each category type. **Values should sum up to 100%.**

- **Decaying Wood:** standing or fallen wood actively decaying. Does not include freshly fallen materials not yet decomposing. The decaying wood must exceed 10 cm in thickness, or the wood is classed as part of the organic matter type.
- **Bedrock:** exposed consolidated mineral material, not covered by mineral soil or organic matter
- **Cobbles and Stones:** exposed unconsolidated rock fragments greater than 7.5 cm in diameter. These are still included in this category if covered by organic layer is less than 2 cm
- **Mineral Soil:** any exposed unconsolidated mineral material of variable texture.
- **Organic matter:** sum of all organic layers which have accumulated on the soil surfaces, ranging from easily recognized undecomposed vegetation to humified organic material. Areas covered by grasses are classed within this group due to their underlying L horizons. Ah, Ap, and areas with living grass or forbs, where mineral soil is visibly between stems are classed as mineral soil.
- **Water:** All areas with standing or moving water

Additional Landform Classification – A number of classification systems are in use for the identification of landforms. There are indications that more will be coming into use in the near future. Often this type of classification combines various landscape attributes to provide a more specific image of the site.

Classification System – Enter the name of the specific classification system being utilized in this field.

Classification Code – Enter the correct code that describes the site. Ensure all parts of the code are recorded. In many cases classification codes consist of a combination of several codes. Many of these sub codes are meaningless unless presented in combination with other sub codes to identify unique classes.

Additional Vegetation Classification – This field is provided for the surveyor to record information pertaining to the vegetation classification of the site. The use of this type of classification enables the surveyor to identify the vegetation community based on the existing vegetation. For example:

- Range Plant Communities and Carrying Capacity for the Montane Subregion of Alberta – Seventh Approximation (Willoughby et al. 2008)
- Field Guide to Ecosites of Southwestern Alberta (Archibald et al 1996)

Classification Code – Enter the complete code required to identify the vegetation community, based on the range plant community guide, field guide or classification system being used. Ensure you provide all pertinent codes or any specific information that is required to identify the code as unique.

Back Page of Site Description Form

Landscape Profile Diagram – This space is used to draw a freehand sketch of the landscape that the site being described is located on. The intent is to draw a cross-sectional diagram which can aid in explaining items such as:

1. Location of the site sits with respect to other sites and to the topography.
2. Physical features of the surrounding landscape such as landforms, forest zones, etc.
3. Communicating why this particular site was chosen.
4. Identifiable landmarks, which will assist with plot relocation at a future date.

The landscape profile diagram should have the plot location clearly marked as well as an indication for direction. This is usually accomplished by indicating north. The distance and bearing to any distinct land marks could also be noted.

Site Location – This space was used previously to provide a free hand sketch of a map showing the particular plot location. This space does not need to be filled out for a range inventory if accurate geographic coordinates are documented. It can be used if sketching landmarks will make future plot relocation easier.

Location – As with site location, this space is available for documenting the site location. This item is unnecessary if accurate geographic coordinates are documented.

General Comments on Site Characteristics – Several lines are provided here for elaboration of any information reported on the form or for additional site features of interest to the recorder.

3.2 Collecting Vegetation Data with the Vegetation Inventory Form (MF5)

Detailed vegetation data is required for all sites where Detailed and Reconnaissance plots are completed. To accomplish this, a version of the Vegetation Inventory form (MF5) needs to be completed. These forms are based on a plot within a uniform area with similar slope and aspect and entirely in one singular plant community. For Detailed Plots, a 30 meter transect needs to be established within this community and micro-plots surveyed. In hilly terrain it is preferred if the transect is orientated across slope along a consistent elevation, without any draws included unless of course, the draw is the area being sampled.

The Range Inventory form (Prairie/Rocky Mountain MF5) in Appendix 2 has been constructed to collect vegetation information for ecological and range management descriptions. This form facilitates the collection of plant species data using multiple nested plots along a transect, rather than estimates of a single larger plot. The Range Inventory form is a revised version of the previous Vegetation Inventory forms. There are two versions of the Vegetation Inventory form, the MF5-PL and Prairie MF5, which still exist and provide the same function as the Range Inventory form. The Prairie MF5 was based on the MF5-PL but adapted to collect vegetation data in the Grassland Natural Region where GVI, AGRASID soil descriptions, and range site relationships are referenced for the basis of ecological classification. The ECOSYS database has been developed along with these forms so that all data collected has entry locations into the database.

Some methodologies entail completion of the Site Description form as well as the Vegetation Inventory form. There is duplicate information on the two forms. It is best to fully complete all forms, but at the least ensure the Site Description form is filled out entirely and duplicate information left off of the Vegetation Inventory form. Listed below are the items collected on the Range Inventory form and the description or methodology associated with each:

Disposition/ Allotment – Grazing dispositions and allotments usually have a common name but also a six or seven digit number with a three letter prefix abbreviating whether the land is an Allotment (PNT), Grazing Lease (GRL) or other type. Either the common name or code can be

entered here, although the code is preferred as all information collected for the inventoried area is ultimately linked to it (e.g. Grazing lease identified as GRL 000000).

Field/ Distribution Unit (DU) –Write in an appropriate common name, abbreviation, or number specific to the field, distribution unit, or management unit.

Plot –The name of the site or plot being sampled, it should relate to a specific point. The plot name is commonly a sequential alphanumeric uniquely identifying the plot in the grazing lease, allotment, or project being sampled (e.g. AH01, AH02, AH...). Do not duplicate this identifier within the inventoried area regardless of the type of plot (Detailed, Reconnaissance, or Visual). If other forms are being completed, this plot name should be used on them as well to link the forms together.

Polygon No. – This number is not required until the mapping has been finished. This will reference the survey form to the final map product.

Date – Enter as year, month, day (e.g. 98 08 03) when the plot was surveyed.

Surveyor – Last name of the individual(s) doing the vegetation survey.

Vegetation Type – record appropriate type (e.g. Forested, Shrubland, Grassland, Riparian (Lentic or Lotic)).

Legal Description (LS, SEC, TWP, RGE, M) – Describe the legal location of the plot. Use these fields only if an accurate GPS location cannot be obtained. If no GPS available, describe to the Quarter Section or LSD level to increase the accuracy of the plot. This information can be left blank if the same information has already been entered on a Site Description form.

Slope (%) – Record in percent slope. This can be attained through the use of a clinometer. If degree slope is attained, convert to percent using a table of conversions. This item can be left blank if slope information has already been entered on the Site Description form.

Aspect – Aspect is a measure of the orientation of the slope using a compass reading. Record in degrees, and ensure angle of declination is incorporated. Slopes less than 1° have no aspect; do not enter any value for these. This item can be left blank if aspect information has already been entered on the Site Description form.

Elevation (m) – Record in meters using height above ellipsoid (HAE) calculations on GPS if available. Indicate on form if attaining from a source other than GPS such as an altimeter or topographic map (indicate scale). This item can be left blank if elevation information has already been recorded on the Site Description form.

Soils Description – this section is used to accommodate the collection of information regarding AGRASID, range site, and landform features common on the prairies. Along with the prairies, these forms can be used in areas where transition between forested areas and prairies occur.

SCA: Soil Correlation Area the plot is in.

AGRASID SLM Code: this column provides details from the AGRASID polygon. Refer to AGRASID User's Manual (Brierly et. al. 2001).

Soil Series 1: Dominant or Co-dominant soil series derived from the AGRASID polygon.

Soil Series 2: Co-dominant or Sub-dominant soil series derived from the AGRASID polygon.

Other Sign SS: Other significant soil series derived from the AGRASID polygon.

Surface Form: Derived from the AGRASID polygon.

Slope Class: Derived from the AGRASID polygon.

Surface Modifier: Derived from the AGRASID polygon.

Field verified: this column is used to select AGRASID attributes that are specific to the field site.

Terrain Profile and Notes – Used previously to draw a diagram of the general area (e.g. valley) where the sampling occurred. Currently this item can be used to enter plant community information such as estimated plant community, subdominant decile information, and any other remarks that may be pertinent to the ecological classification of the plot. Photo numbers are also commonly entered here. Two photographs per site should be taken. One close up of a micro-plot directly toward the ground and another from the end of the transect looking back on the transect line capturing a little bit of the horizon to help assess structure. Record photo numbers and ensure plot or site names are identified in the photos.

Site Description – Circle the appropriate description from each list. Refer to Section 3.1 Site Description Form in this manual regarding this section. This information can be left blank if the same information has already been entered on the Site Description form.

PC-ORD – Enter the ordinated plant community.

Ecodistricts – If applicable, enter the appropriate Ecodistrict for the Natural Subregion.

GPS Unit # – Identification number on GPS unit.

Waypoint # – The number of the waypoint as recorded on the map and within the GPS Unit.

Start – GPS location of the beginning point of the transect (decimal degrees).

End – GPS location of the end point of the transect (decimal degrees).

Est. Production – Estimation in lbs/ac or kg/ha. With a Detailed or Reconnaissance plot, production is assessed through a 0.5 m² clipped plot. Refer to section 3.3 for forage production clipping methodology for inventories. This field can be used if the surveyor has experience estimating production, otherwise it can be left blank.

Est. Litter – Estimation in lbs/ac or kg/ha of litter as hand raked from a ¼ m² plot. This field can be used if the surveyor has experience estimating production, otherwise it can be left blank.

Collecting Micro Plot Data (Species, Plot Number)

A transect will be placed within the most representative part of the area declared as a site. This must be a uniform area with similar slope and aspect and entirely in one singular plant community. Each transect will be 30 m long with 15 micro-plots placed uniformly along its length. If the transect is located on a slope, it will run parallel with the contour of that slope avoiding any swales.

Grasslands, shrublands, and forests have slightly different nested micro plot sizes for data collection. These are used to accommodate the various strata the vegetation is in (Stratum definitions are listed in Table 11).

In grasslands (including tame pasture) and shrublands whose dominant layer is less than (<) 2 m (Figure 5a):

- A 1 m² (1x1 m) micro-plot will be used to estimate the cover of shrubs (S1 and S2) and all trees less than (<) 5 m.
- A 0.1 m² (20x50 cm) nested plot within the 1 m² plot will be used to estimate the cover of forbs, grasses, and S3 shrubs.
- Ground cover estimates (Litter/Total Vegetation, Exposed Soil, Moss & Lichen, rock, etc.) will also be measured in the 0.1 m² nested plot.

In forests and shrublands whose dominant layer is greater than (>) 2 m (Figure 5b):

- A 4 m² (2x2m) micro-plot will be used to estimate the cover of S2 shrubs and trees less than (<) 2 m
- A 0.25 m² (50x50 cm) nested plot within the 4 m² plot will be used to estimate cover of S3 shrubs, forbs, and grasses.
- Ground cover estimates (Litter/Total Vegetation, Exposed Soil, Moss & Lichen, rock, etc.) will also be measured in the 0.25 m² nested plot.
- One 100 m² macro-plot (10x10 m), located in the middle of the transect, will be used to estimate the cover of trees and tall shrubs (> 2 m in height) within the macro-plot area. These should be measured in their appropriate S1, T1, and T2 strata. These data are directly associated with the transect and separate from the woody species information on the back of the form which is collected at the polygon level.

Species: Foliar cover estimates will be recorded at each micro-plot on the MF5 form. All of the plant species (trees, shrubs, graminoids, and forbs) will be recorded using a seven letter code for identification. The code is the first 4 letters of the Genus name followed by the first 3 letters of the species names. The species will be named according to the currently accepted names used by AEP (ECOSYS species list). Foliar cover estimates for all species will be recorded in the appropriate micro-plot number to the nearest 5% except below 10% and above 90% which will be estimated to the nearest 1%.

The following are generalized plot characteristics that must be filled out for each micro-plot. Do not include these items with the cover estimates in the species portion of the form.

Litter/Total Vegetation: Check off the appropriate box whether total vegetation or litter is being assessed and give the cover estimate for each micro-plot. The recommended choice for these inventory procedures is to provide a litter estimate.

Exposed Soil: Estimate the cover rating for exposed mineral soil in each plot. This is NOT a measurement of rocks or decayed organic material. The cover of debris (sticks, etc.) and rocks should be recorded separately. If no exposed soil is encountered a tick should be marked in that box for that plot.

Moss & Lichen: Estimate the cover of moss and lichen in each plot. If no moss or lichen is encountered, a tick should be marked in the box for that plot. Where there are a variety of species of moss and/or lichen (e.g. within a Sw/ Moss community) the species should be summed up.

Vegetation Notes – Provide any information that pertains to plot vegetation in this section.

Table 11. Stratum codes and definitions for vegetation sampling.

Code	Name	Description
T1	Overstory Tree	Any woody species growing to a height of greater than 5m occupying the tallest canopy; it's crown is open to full sunlight
T2	Understory Tree	Any woody species growing to a height of greater than 5m and occupying the secondary canopy below T1; it's crown is mostly subjected to filtered sunlight
S1	Tall Shrubs	All woody species at least 2.0m but less than 5.0 m tall.
S2	Medium Shrubs	All woody species at least 0.5m but less than 2.0 m tall.
S3	Low Shrubs	All woody species less than 0.5 m tall.
E	Epiphyte	Mosses or lichens growing on other plants (usually trees / shrubs)
F1	Tall Forbs	All forb species 30 cm tall or greater
F2	Low Forbs	All forb species less than 30 cm tall
G1	Graminoid	All graminoid species

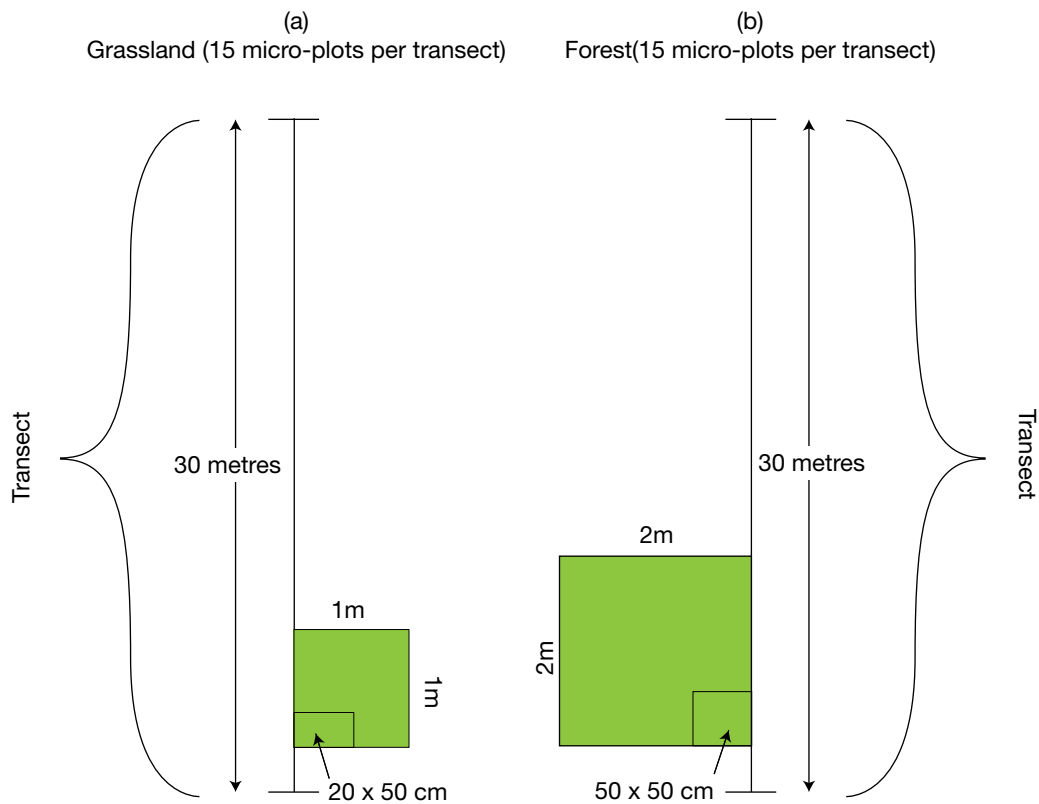


Figure 5. Schematic and dimensions of a transect, Micro-plot and nested plot within the micro-plot.

Range Health Estimate – Check the appropriate range health category for the entire polygon as depicted by the transect. Refer to Section 3.4 for Range Health Methodology.

Macroplot (List species, stratum, and cover) – Record species, stratum, and cover for species (>) 2 m in height in the 100 m² macro-plot (e.g. Aw, 20%, T1 & Aw, 5%, S1).

Back of Range Inventory Form

Range Use Category – Indicate whether the plot is considered primary, secondary, or non-use range within the grazing unit. Primary ranges are areas that livestock prefer to use when management is limited. Secondary ranges are lightly used or unused by livestock under minimal management and will not ordinarily be fully used until the primary range has been overused. Non-use (tertiary) areas are not used by the livestock for grazing due to a lack of forage (e.g. thick coniferous forest) or inaccessibility (e.g. bogs). These categories are relative to one another and are conditional to the makeup of the grazing unit. For example, a deciduous forest may be considered secondary range if plenty of accessible grasslands exist. However, if the deciduous forest in the grazing unit is the most accessible and highest producing rangeland it should be considered as primary range.

Grazing Intensity – Check off the appropriate box: unused (U), unused-low (U-L), low (L), low-moderate (L-M), moderate (M), moderate-high (M-H), or high (H) as an estimate of the level of past utilization. Indicators to aid with assessing past utilization can be the amount of litter, quantity of cattle droppings and seed heads remaining from the previous year.

Current Utilization – Give an estimate of the proportion of the current year's growth grazed by livestock. This is determined by measuring the proportion of new growth that has been utilized. The number of livestock in the area and amount of cattle droppings can be good indicators as well.

Vigour – This does not have to be filled out for inventories.

Woody Species – The measurements in this section are performed at the polygon decile level. Woody species along the transect should be evaluated in the micro and macro-plots sections on the front page of the form. This measure is intended to describe the woody species coverage and distribution of the entire polygon decile, and by the height stratum. Fill this out as completely as possible.

Woody Species: All woody species except for S3 shrubs should be measured. Regrowth and mature stands of the same species should be individually measured within stratum locations (e.g. if aspen (*Populus tremuloides*) regrowth is in the S2 stratum and the T1 overstory trees are also aspen, there should be an Aspen S2 stratum measure separate from the T1 measure).

Density Distribution Class: Refers to how the species being observed are patterned spatially throughout the polygon. The classes range from rare individuals to continuous dense occurrences. These ratings as well as diagrams are found directly on the field sheet. The density distribution table on the original MF5-PL form is antiquated so please disregard and use the Range Health Assessment density distribution table. The Range Inventory and Prairie MF5 density distribution tables have been updated and therefore can be used.

Median Height: The median height is the middle height of all the occurrences of the observed species in the polygon. This is measured in meters and can be rounded to the nearest one-tenth.

Height Range: Measured in meters, list the lowest and the highest height observed for that species.

Percent Area Cover: Estimate the percent canopy cover within the polygon decile for the observed species. Total coverage of species can be greater than 100% because of the different strata of vegetation.

Basal Diameter (mm): Estimate the average basal diameter of each species (choose one stem / species which appear representative).

Total Shrub Cover – Record the height class and density distribution class of the dominant and subdominant strata (all shrub species). The height classes are coded on the form.

Forest Cover – Use available cover specifications (Phase III Forest Cover Type or Alberta Vegetation Inventory Type maps) or assess forest cover according to the Alberta Vegetation Inventory specifications (Forestry, Lands and Wildlife 1989). Dominant/ subdominant applies only where there is an overstory / understory designation.

Comments – Comments here should refer to the shrub, tree or other vegetative properties within the polygon.

Poisonous Plants / Weeds – In this section provide a brief description on some commonly encountered poisonous plants and noxious weeds.

- **Species:** List the plant codes of the three most common species.
- **GPS Location:** For significant infestations, enter GPS coordinates (decimal degrees) and notify AEP personnel.
- **% Area Cover:** Estimate percent area covered by the observed weed or poisonous plant within the polygon decile.
- **Density Distribution Class:** Record appropriate class utilizing the density distribution classes that are located on the form

Water source – In this section fill out the appropriate blanks to aid in establishing water locations in the grazing units.

- **Water Source:** Check source of nearest water, if other is selected then specify the source.
- **GPS Location:** Enter GPS coordinates (decimal degrees) of the water source.
- **Required / Not Required:** This selection is not required for these inventories.
- **Distance (km):** Estimate the distance the polygon is from water to the nearest kilometre. If less than 500 m then enter 0.
- **Water Quality / Access (specify):** Comment on the quality of the water and the access. For example, comments may indicate that the water is stagnant and that access to water is down a steep, eroding bank. This field can also be used to document the percent riparian area and estimated riparian health of the polygon.

Salt Source – Check the appropriate box and enter GPS coordinates (decimal degrees) of the salt source.

Access (Cattle) – Designate the quality of the access to the site being surveyed (good, fair, poor) and the type of access (truck trail, road, etc.). If other is selected then specify the source. This field can also be used to note the Access Factor (0-10) for the polygon deciles. Access factors provide an overview measure of how well livestock are able to access the polygon due to water and landscape constraints. The ratings are from 0 to 10, zero being no access to 10 being full access. This information will be used to fill out the Range Management Form (Section 2.3.2).

Comments – Discuss conflicts that may arise with other users and resources of the area and their impact on the range, and make recommendations on integrating them with livestock grazing. Other users and resources would include equestrian, off-highway vehicles, recreationalists, wildlife, fisheries, riparian areas, timber harvesting, reforestation, and oil and gas activities. Any other comments specific to the livestock distribution and management of the area are to be included here. These comments are for reference when completing the Range Management Form and inventory report.

3.3 Forage Production Clipping

Forage production clipping is an analytical method to assess the amount of dry matter available to grazing animals of a given area. The process involves clipping a measured area and sorting the contents into forage categories. Commonly the current year's growth is separated into grass / grass-like, forb, and shrub categories. These forage categories are then dried of their water content and weighed to the nearest 0.1 of a gram. These weights can then be associated with the measured area to come up with a weight / unit area measure. Commonly, multiple clippings are averaged together from a specific area or community to derive a common production value.

Litter production is another measure taken at grassland clipped sites. Litter is the slightly or un-decomposed plant residue left on a site from previous year's carryover. Litter production is a good indicator of hydrologic function and nutrient cycling on a site (Adams et al. 2016). With proper amounts of litter a site can capture, store, and beneficially release moisture associated from normal precipitation events. Usually before the plot is clipped, the litter in the measured area is removed, dried, and weighed just like the forage. The amount of litter is then used to assess the amounts required to achieve proper hydrologic functioning.

The following methodology is used when clipping is stipulated within the project requirements. Once a site has been surveyed, a single plot clip is performed directly in the plot area. This clip should be in an area best representing the production of the site. If portions of the site are grazed, the clip should be in an area not grazed that current year. If the entire site is grazed, clip in an area where the amount of utilization can be measured with some confidence and this estimated percent utilization recorded on the clipped samples.

Clip a 0.5 m² quadrat to a two-cm stubble height at each plot. A common practice to achieve this is to clip two 0.25 m² frames side by side. If a grassland site, litter should be raked out of the plot before clipping, and then the current year's growth removed. The clip will be separated into trees and shrubs (foliage at below 2 m), forbs, and grasses. Only current annual growth of trees and shrubs will be clipped (this year's twigs and leaves). These separate forage samples will be bagged into standardized paper bags clearly labelled with the plot name, date, and contents. These bags will then be stored in a dry, open area to keep them free of mould and to promote drying. Arrangements can be made to deliver to an AEP Rangeland Specialist throughout the year for proper storage.

At the end of the inventory year an AEP Rangeland Specialist will dry and weigh all forage samples. The values will then be given back to the surveyor for report purposes. The samples will also be used to increase confidence of the average production of the plant communities they were sampled from. These average productions will then provide insight of the forage produced by the plant communities and the amount of grazing pressure they can sustain.

3.4 Collecting the Range Health Assessment

Range Health Assessments are completed for all Detailed and Reconnaissance plots. These assessments are to be completed at the site the Detailed or Reconnaissance plot is associated to, and is usually included in the same geographic location (i.e. GPS point). The range health assessment however is designed to be representative of the polygon decile being assessed. For instance, if within the decile being assessed there are factors that affect the range health score that are not immediately represented on the transect, they must still be incorporated on the assessment. An estimate of the range health ranking is used for visual plots.

Range health methodology is detailed in the “Rangeland Health Assessment for Grassland, Forest, & Tame Pasture” Field Workbook (Adams et al. 2016). Current methodology incorporates the 3rd edition (2009) of the manual, which had significant changes to the scoring from the second. Contact Rangeland Resource Stewardship Section staff if 5th edition (2016) copies are required.

The Range Health Assessment forms have also been updated to incorporate the new scoring. These three forms are available in Appendix 2, but can also be made available through the AEP Rangeland Specialist. Grasslands and shrublands should be assessed using the grassland health form. Forests and disturbed forests (fires, cutblocks, bug kills, etc.) should be assessed using the forest health form. Areas that have been seeded with non-native species, and are actively being managed as a tame pasture should be monitored with a tame pasture assessment form. Historically there were some initiatives to ‘improve the range’ by seeding meadows to domestic species. These however were never managed as a tame pasture and will never be broke and seeded again. These areas should be considered as disturbed or modified grasslands and measured with the grassland health.

3.5 Performing the Riparian Health Assessment

As described in section 2.2.3, riparian zones can be separated into two broad areas (Figure 1). The upper terraces can be assessed using the vegetation mapping portion of the inventory, but the active floodplain is measured with a Riparian Health Assessment (Fitch et al. 2009, Ambrose et al. 2009). The active floodplains are commonly multiple bands of vegetation from obligate species to facultative wetland species. These areas are susceptible to degradation and can directly affect the proper functioning of the stream or river.

The Alberta Riparian Habitat Management Society (Cows and Fish) have created the guidebooks that are used provincially for assessment riparian health. There are two Field Workbooks and three User Manuals that are required for completing the assessments necessary. The majority of

riparian health will generally be for streams and small rivers, so the “Riparian Health Assessment for Streams and Small Rivers” (Fitch et al. 2009) will be used. Occasionally important lakeshores and wetlands will be flagged as requiring an assessment. In these cases the “Riparian Health Assessment for Lakes, Sloughs, and Wetlands (Ambrose et al. 2009) should be used. Lastly, there are occasions where large river systems will be flagged to be assessed. There is no field workbook for these but there is a user manual that along with the above guides can be used to complete the assessment. A good knowledge of both field workbooks is required to complete the riparian assessments on the selected key riparian sites, as well as to estimate the riparian health ranking of the active floodplain that occurs within polygons.

AEP forms for these three types of riparian assessments are available in Appendix 2 of this manual or copies can be provided from the Rangeland Specialist. These forms are for entry into the AEP Rangeland Geomatics data set, and based upon the user manuals from Cows and Fish. However these manuals are created to be standalone documents that can be used for many purposes. Since they are being used to complement an entire vegetation inventory, the AEP forms are adapted for this purpose. Focus should be placed on completing the riparian health assessment score sheet.

In total, a Riparian Health Assessment consists of:

1. GPS location of the upper and lower boundaries of the plot
2. A riparian plant community classification linked to a Range Plant Community Guide or the “Classification and Management of Riparian and Wetland Sites of Alberta’s Grassland Natural Region” (Thompson and Hansen 2002). If a plant community is not found in either guide book, then a conditional plant association can be described, usually the top two or three species.
3. A Cows and Fish Riparian Health Assessment for lotic, lentic or large river systems, depending on the type of riparian, on the AEP riparian form.
4. At least 3 pictures, one from the upper end of the reach looking down stream, one from the bottom end of the reach looking upstream and a landscape picture if possible. Supporting pictures of other important riparian features or issues within the reach are valuable and recommended.

4.0 Literature Cited

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Appendices

The vegetation information form (MF5) and Prairie MF5 were previous versions of the Prairie / Rocky Mountain MF5. Although the forms may differ slightly the key fields required in this document are still contained.

Appendix 1. Links to reports and manuals that can help complete a range inventory

- Range Plant Community Guides: Range plant community guides area available at the link below. These are the published documents and may not have the most current plant communities available. If required, contact the local Range Agrologist or Area Range Management Specialist for the most up to date guide.
<http://aep.alberta.ca/land/programs-and-services/rangeland/grazing-and-range-management/rangeland-classification-and-survey-tools.aspx>
- Range Health Assessment Guide and Score Sheets:
<http://aep.alberta.ca/land/programs-and-services/rangeland/grazing-and-range-management/range-health.aspx>
- Alberta Riparian Habitat Management Society (Cows and Fish) website. Contains guidebooks and forms: <http://www.cowsandfish.org/>
- Natural Regions of and Subregions of Alberta:
https://www.albertaparks.ca/media/2942026/nrsrcomplete_may_06.pdf
- Agricultural Region of Alberta Soil Inventory Database (AGRASID):
[https://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/sag10372](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag10372)
- Grazing Lease Stewardship Code of Practice:
<http://aep.alberta.ca/land/programs-and-services/rangeland/grazing-and-range-management/grazing-lease-stewardship-code-of-practice.aspx>
- Grazing Management Adjustments for Healthy Rangelands
<http://aep.alberta.ca/land/programs-and-services/rangeland/grazing-and-range-management/range-stewardship.aspx>
- Ecological Land Survey Site Description Manual (Resource Data Branch 2003):
<https://open.alberta.ca/dataset/11f86334-fbd5-4540-b7ef-b50ef434ae5d/resource/1cab28a0-e122-46fa-814c-c05946478acd/download/5902534-2003-Ecological-Land-Survey-site-Description-Manual-2nd-edition.doc>

Appendix 2. Range Inventory Forms

SITE DESCRIPTION FORM

Project Identification			Level of Assessment <input type="checkbox"/> Visual <input type="checkbox"/> Recon <input type="checkbox"/> Detailed		Forms <input type="checkbox"/> Soils <input type="checkbox"/> Vegetation <input type="checkbox"/> Supp Soils <input type="checkbox"/> Other _____ _____		
Surveyor(s)							
Agency							
Date (D/M/Y)		Project Code	Plot #	Plot Area	Plot Shape		

LSD	SEC	TWP	RGE	Mer	GPS	Latitude	Longitude

Site Photos (roll, no.)	Air Photos (roll, no.)	Map Sheet	Nat Subregion	Eco District

ELEVATION (m)	ASPECT (°)	SLOPE (%)	Regen 1			Regen 2			Regen 3		
			SP	%	HT(m)	SP	%	HT(m)	SP	%	HT(m)

EXPOSURE 1	EXPOSURE 2	FLOOD	DRAINAGE	PERVIOUSNESS	REGIONAL LANDFORM	SITE - MESO	SITE - SHAPE	SITE - MICRO	E. MOISTURE	NUTRIENTS	SUCC. STATUS 1	SUCC. STATUS 2	Factor 1	Factor 2	SURFACE SUBSTRATE (% Cover)					
															Decaying Wood	Bedrock	Cobbles and Stones	Mineral Soil	Organic Matter	Water
													.	.						

Landform Classification System - Code -	Vegetation Classification System - Code -
--	--

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|--------------------|---------------|---------------------|----------|-----|------|------------------|------|---|---------------------|---------|---|-----------------------|---------|-------|---------------------|---------|-------|---------------------|---------|---------|----------------------|----|----|------------------|----|----|--|--|
| EXPOSURE TYPE
1. Not applicable
2. Wind
3. Insolation
4. Frost
5. Cold air drainage
6. Atmospheric toxicity

FLOOD HAZARD
1. No hazard
2. Rare
3. May be expected
4. Frequent

SOIL DRAINAGE
1. Very rapidly
2. Rapidly
3. Well
4. Moderately well
5. Imperfectly
6. Poorly
7. Very poorly | PERVIOUSNESS
1. Rapidly
2. Moderately
3. Slowly

REGIONAL LANDFORM
1. Tableland (plateau) dominated
2. Hill land dominated
3. Mountain dominated
4. Organic wetland dominated
5. Plain dominated
6. Scarp dominated
7. Valley dominated
8. Dune dominated
9. Delta (deltaic plain)

SITE POSITION - MESO
1. Crest
2. Upper Slope
3. Middle Slope
4. Lower Slope
5. Toe
6. Depression
7. Level | SITE SURFACE SHAPE
1. Straight
2. Concave
3. Convex

SITE MICROTOPOGRAPHY
<table style="font-size: x-small; border: none;"> <tr> <td>Micro Relief Class</td> <td>Mount ht. (m)</td> <td>Spacing Between (m)</td> </tr> <tr> <td>1. Level</td> <td>few</td> <td>none</td> </tr> <tr> <td>2. Micro mounded</td> <td><0.3</td> <td>-</td> </tr> <tr> <td>3. Slightly mounded</td> <td>0.3 - 1</td> <td>></td> </tr> <tr> <td>4. Moderately mounded</td> <td>0.3 - 1</td> <td>3 - 7</td> </tr> <tr> <td>5. Strongly mounded</td> <td>0.3 - 1</td> <td>1 - 3</td> </tr> <tr> <td>6. Severely mounded</td> <td>0.3 - 1</td> <td>0.3 - 1</td> </tr> <tr> <td>7. Extremely mounded</td> <td>>1</td> <td>>3</td> </tr> <tr> <td>8. Ultra mounded</td> <td>>1</td> <td><3</td> </tr> </table> | Micro Relief Class | Mount ht. (m) | Spacing Between (m) | 1. Level | few | none | 2. Micro mounded | <0.3 | - | 3. Slightly mounded | 0.3 - 1 | > | 4. Moderately mounded | 0.3 - 1 | 3 - 7 | 5. Strongly mounded | 0.3 - 1 | 1 - 3 | 6. Severely mounded | 0.3 - 1 | 0.3 - 1 | 7. Extremely mounded | >1 | >3 | 8. Ultra mounded | >1 | <3 | ECOLOGICAL MOISTURE REGIME
1. Very xeric (very dry)
2. Xeric (dry)
3. Subxeric (moderately dry)
4. Submesic (moderately fresh)
5. Mesic (fresh)
6. Subhygric (moderately moist)
7. Hygric (moist)
8. Subhydryc (moderately wet)
9. Hydric (wet)

NUTRIENT REGIME
1. Oligotrophic (very poor)
2. Submesotrophic (poor)
3. Mesotrophic (medium)
4. Permesotrophic (rich)
5. Eutrophic (very rich)
6. Hypereutrophic (e.g. saline) | SUCCESSIONAL STATUS
1. Pioneer seral
2. Young seral
3. Mature seral
4. Old seral
5. Young edaphic climax
6. Mature edaphic climax
7. Young climatic climax
8. Mature climatic climax
9. Disclimax
10. Non vegetated

DISTURBANCE FACTORS
See over page for listing. |
| Micro Relief Class | Mount ht. (m) | Spacing Between (m) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Level | few | none | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Micro mounded | <0.3 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Slightly mounded | 0.3 - 1 | > | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Moderately mounded | 0.3 - 1 | 3 - 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Strongly mounded | 0.3 - 1 | 1 - 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Severely mounded | 0.3 - 1 | 0.3 - 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. Extremely mounded | >1 | >3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. Ultra mounded | >1 | <3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

RANGE INVENTORY FORM

DISPOSITION/ALLOTMENT				FIELD/DU		PLOT		POLYGON NO.		YR	MO	DAY	SURVEYOR
Vegetation Type	LS	SEC	TWP	RGE	M	SLOPE (%)		ASPECT		ELEVATION (m)			

SOILS DESCRIPTION			TERRAIN, PROFILE AND NOTES			SITE DESCRIPTION (Circle one in each column)		
SCA _____	Field Verified					REGIONAL LANDFORM	LOCAL LANDFORM	LANDFORM ELEMENT
AGRASID SLM code		Transect Range Site	Mountains	Steep Slopes	Crest			
Soil Series 1			Hills	Hilly	Upper Slope			
Soil Series 2			Plateau	Rolly	Mid-Slope			
Other signif SS			Organic Wetland	Hummocky	Lower Slope			
Surface Form			Plain	Undulating	Toe			
Slope Class			Valleys	Ridged	Level			
Surface Modifier			Scarp	Plain	Depression			
PC-ORD:	GPS Unit #		WPT #					
Ecodistricts:	Start		Dunes					
	End		Est. Production _____ kg/ha lb/ac					
			Est. Litter _____ kg/ha lb/ac					

SPECIES	PLOT NUMBER															AVERAGE COVER	VEGETATION NOTES	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
1																	•	
2																	•	
3																	•	
4																	•	
5																	•	
6																	•	
7																	•	
8																	•	
9																	•	
10																	•	
11																	•	
12																	•	
13																	•	
14																	•	
15																	•	
16																	•	
17																	•	
18																	•	
19																	•	
20																	•	
LITTER <input type="checkbox"/> TOTAL VEGETATION <input type="checkbox"/>																	•	
EXPOSED SOIL																	•	
MOSS & LICHEN																	•	
Range Health Estimate _____ Healthy _____ Healthy w/Problems _____ Unhealthy	Macroplot (List species, stratum, and cover):																	

Suggested Cover Percentages: 1-10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90-100

RANGE USE CATEGORY <input type="checkbox"/> Primary <input type="checkbox"/> Secondary <input type="checkbox"/> Non Use			GRAZING INTENSITY (EST. LONG TERM) <input type="checkbox"/> U <input type="checkbox"/> U-L <input type="checkbox"/> L-M <input type="checkbox"/> M <input type="checkbox"/> M-H <input type="checkbox"/> H			CURRENT UTILIZATION (EST) %		VIGOUR <input type="checkbox"/> E <input type="checkbox"/> G <input type="checkbox"/> F <input type="checkbox"/> P		
WOODY SPECIES	DENSITY DIST. CLASS	MEDIAN HEIGHT (m)	HEIGHT RANGE (m)	% AREA COVER	BASAL DIAMETER (mm)	Density Distribution				
						Class	Description of abundance in polygon	Distribution		
1		•	• - •			0	None			
2		•	• - •			1	Rare	•		
3		•	• - •			2	A few sporadically occurring individual plants	• • •		
4		•	• - •			3	A single patch	•••		
5		•	• - •			4	A single patch plus a few sporadically occurring plants	••• • •		
6		•	• - •			5	Several sporadically occurring plants	• • • • •		
7		•	• - •			6	A single patch plus several sporadically occurring plants	• • • • •		
8		•	• - •			7	A few patches	••• •••		
		•	• - •			8	A few patches plus several sporadically occurring plants	••• ••• •••		
		•	• - •			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	••••••••••		
TOTAL SHRUB COVER		FOREST COVER	HEIGHT CLASS DISTRIBUTION CODE (m) 91 = 0 - 0.5 92 = 0.5 - 1 93 = 1 - 3 94 = 3 - 6	COMMENTS						
DOMINANT	HEIGHT CLASS									DENSITY DIST. CLASS
SUB DOMINANT										
POISONOUS PLANTS			% AREA COVER	DENSITY DIST. CLASS	WEEDS		% AREA COVER	DENSITY DIST. CLASS		
SPECIES		GPS LOCATION			SPECIES		GPS LOCATION			
1					1					
2					2					
3					3					

WATER SOURCE
 creek dugout trough slough lake / pond other (specify) _____

GPS LOCATION _____ Required Not Required Distance (km) _____

Water Quality / Access (specify) _____

SALT SOURCE
 Natural Block Bag Other (specify) _____

GPS LOCATION _____

ACCESS (CATTLE)
 G F P truck trail road seismic game trail valley bottom other (specify) _____

COMMENTS: CONCERNS / RECOMMENDATIONS / RESOURCE INTEGRATION

**VEGETATION INVENTORY FORM
CONTINUATION**

DISPOSITION/ALLOTMENT	FIELD/DU	PLOT NO.	YR	MO	DAY
-----------------------	----------	----------	----	----	-----

SPECIES	PLOT NUMBER															AVERAGE COVER	VEGETATION NOTES		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
21																		•	
22																		•	
23																		•	
24																		•	
25																		•	
26																		•	
27																		•	
28																		•	
29																		•	
30																		•	
31																		•	
32																		•	
33																		•	
34																		•	
35																		•	
36																		•	
37																		•	
38																		•	
39																		•	
40																		•	
41																		•	
42																		•	
43																		•	
44																		•	
45																		•	
46																		•	
47																		•	
48																		•	
49																		•	
50																		•	
LITTER <input type="checkbox"/> TOTAL VEGETATION <input type="checkbox"/>																		•	
EXPOSED SOIL																		•	
MOSS & LICHEN																		•	

Suggested Cover Percentages:

1-10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90-100

pg. _____ of _____

Forest Range Health Assessment - SCORE SHEET

Date:		Observer:		Disposition/Project:			Plot:	
Field Unit:				Polygon:			Decile:	
Latitude:				Longitude:			Elevation:	
LSD:	QS:	SEC:	TWP:	RGE:	M:	Photo #:		

Special Observations (e.g., climate, management) _____

Dominant Species **Cutblock site (circle):** **yes** or **no**; if **yes**, was a level 1 assessment completed? **yes** or **no**

Grass and grass - like	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Subregion/Plant Community (PC) or Conditional PC Name (code) _____

Scoring: circle appropriate value(s) and add to the score box

1. Does the PC resemble the reference PC?

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. Are there changes to the surface organic layer (LFH thickness and compaction)?

20 14 8 0	Comments	Score
-----------------	----------	--------------

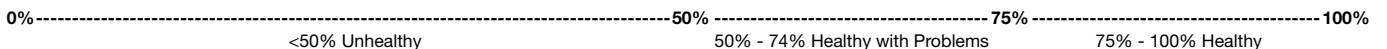
4. Is there accelerated soil erosion? Answer both 4.1 and 4.2.

4.1 Erosion Evidence 5 3 1 0	Comments Site is normally stable / unstable (circle) Human-caused bare soil (%) _____ Moss and lichen cover (%) _____	Score (4.1+4.2)
4.2 Bare Soil 5 3 1 0		

5. Are prohibited noxious and/or noxious weeds present? Answer both 5.1 and 5.2.

5.1 Cover (%) 5 3 1 0	Species	%	DD	Infestation			Score (5.1+5.2)
				Size	Unit	Treated	
					ha, ac, m ²	UNK, no, yes	
					ha, ac, m ²	UNK, no, yes	
5.2 Density Distribution (DD) 5 3 1 0					ha, ac, m ²	UNK, no, yes	
	Comments						

Grazing Intensity (estimated long term; circle) U U-L L-M M M-H H	Total
Observed Utilization _____ %	
Trend (apparent; circle): Upward Downward Stable Unknown	



Grassland Range Health Assessment - SCORE SHEET



Date:		Observer:		Disposition/Project:			Plot:	
Field Unit:				Polygon:			Decile:	
Latitude:				Longitude:			Elevation:	
LSD:	QS:	SEC:	TWP:	RGE:	M:	Photo #:		

Special Observations (e.g., climate, management) _____

Dominant Species

Grass and grass - like	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Subregion/Plant Community (PC) or Conditional PC Name _____

Scoring: circle appropriate value(s) and add to the score box

1. Does the PC resemble the reference PC? Circle the appropriate score, and answer 1A (native) OR 1B (modified)

1A	40	27	20	15	0	Comments	Score (1A or 1B)
1B			15	8	0		

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
----	----	---	----------	-------

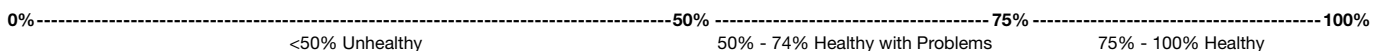
4. Is there accelerated soil erosion? Answer both 4.1 and 4.2

4.1 Erosion Evidence	10	7	3	0	Comments Site is normally stable / unstable (circle) Human-caused bare soil (%) _____ Moss and lichen (%) _____	Score (4.1+4.2)
4.2 Bare Soil	5	3	1	0		

5. Are prohibited noxious and/or noxious weeds present? Answer both 5.1 and 5.2.

5.1 Cover (%)	Species	%	DD	Infestation			Score (5.1+5.2)
				Size	Unit	Treated	
5	3	1	0		ha, ac, m ²	UNK, no, yes	
					ha, ac, m ²	UNK, no, yes	
5.2 Density Distribution (DD)					ha, ac, m ²	UNK, no, yes	
5	3	1	0	Comments			

Grazing Intensity (estimated long term; circle)	U	U-L	L-M	M	M-H	H	Total
Observed Utilization _____%							
Trend (apparent; circle):	Upward	Downward	Stable	Unknown			



Tame Pasture Health Assessment - SCORE SHEET

Date:		Observer:		Disposition/Project:			Plot:	
Field Unit:				Polygon:			Decile:	
Latitude:				Longitude:			Elevation:	
LSD:	QS:	SEC:	TWP:	RGE:	M:	Photo #:		

Special Observations (e.g., climate, weed or brush control, grazing management) _____

Dominant Species

Grass and grass - like	Cover %	Forbs	Cover %	Shrubs	Cover %	Trees	Cover %

Subregion/Plant Community (PC) or Conditional PC Name _____

Scoring: circle appropriate value(s) and add to the score box

1. Do introduced forage plants dominate the site? Answer 1A (tame) OR 1B (modified tame)

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

2. What kind of plants are on the site? Shift in stand composition. Answer both 2.1 and 2.2.

2.1 Tame & desirable native	14	7	0	Comments	Score (2.1+2.2)
2.2 Weedy & disturbance	14	7	0		

3. Is the site covered by litter?

Cover & distribution	25	16	8	0	Comments	Score
----------------------	----	----	---	---	----------	-------

4. Is there accelerated soil erosion? Answer both 4.1 and 4.2.

4.1 Erosion Evidence	10	7	4	0	Comments Site is normally stable / unstable (circle); Human-caused bare soil (%) _____	Score (4.1+4.2)
4.2 Bare Soil	5	3	1	0		

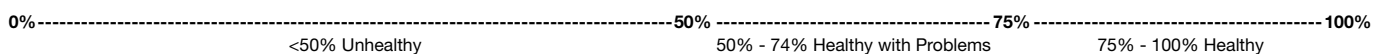
5. Are prohibited noxious and/or noxious weeds present? Answer both 5.1 and 5.2.

5.1 Cover (%)	Species	%	DD	Infestation			Score (5.1+5.2)
				Size	Unit	Treated	
5 3 1 0					ha, ac, m ²	UNK, no, yes	
					ha, ac, m ²	UNK, no, yes	
5.2 Density Distribution (DD)					ha, ac, m ²	UNK, no, yes	
5 3 1 0	Comments						

6. Does this site have woody re-growth? Answer both 6.1 and 6.2.

6.1 Cover (%)	Dominant species	Cover %	Density Dist.	Score (6.1+6.2)
6 3 0 N/A				
6.2 Density Distribution	Comments			
4 2 0 N/A				

Grazing Intensity (estimated long term; circle) U U-L L-M M M-H H	Total _____ of _____ = _____ %
Observed Utilization _____ %	
Trend (apparent; circle): Upward Downward Stable Unknown	



Riparian Health Assessment SCORE SHEET - Streams and Small Rivers



Date:	Observer:	Disposition/Project:	Plot:		
Field Unit:		Polygon:	Decile:		
Latitude (lower reach/upper reach)			Longitude (lower reach/upper reach)		
LSD:	QS:	Section:	Township:	Range:	Meridian:
Photo #:					

Riparian Information

Waterbody Name: _____

Lotic Type (circle one):

Stream (perennial; intermittent; ephemeral; subterranean; pooled channel) river beaver dam wet meadow spring/seep irrigation canal other non-riparian

Define Channel (circle one): yes no not collected Riparian Length (km) _____ Average Riparian Width (m) _____

Ecological Information

Natural Subregion _____ Ecoregion _____

Dominant Plant Communities: _____

Conditional Plant Community: _____

Management Information

Current Utilization: None Light Moderate High Very High

Polygon Trend: Unknown Static Improving Degrading

% Accessible: _____

1. Vegetative Cover of Floodplain and Streambanks

Scores or N/A
Actual/Possible

6 4 2 0	Comments	____ / ____
---------	----------	-------------

2. Invasive Plant Species (Prohibited Noxious and Noxious Weeds) Answer both 2.1 and 2.2

2.1 Canopy Cover	Species	%	DD	Infestation			____ / ____
				Size	Unit	Treated	
3 2 1 0					ha, ac, m ²	UNK, no, yes	
					ha, ac, m ²	UNK, no, yes	
2.2 Density Distribution					ha, ac, m ²	UNK, no, yes	
	3 2 1 0	Comments					

3. Disturbance-caused Undesirable Herbaceous Species

3 2 1 0	Comments	____ / ____
---------	----------	-------------

4. Preferred Tree and Shrub Establishment and Regeneration

6 4 2 0 N/A	Comments	____ / ____
-------------	----------	-------------

5. Use of Trees and Shrubs Answer both 5.1 and 5.2

5.1 Preferred Trees and Shrubs - Browse 3 2 1 0 N/A	Comments	____ / ____
5.2 All Trees and Shrubs - Use other than browse 3 2 1 0 N/A		

6. Standing Decadent and Dead Woody Material

3 2 1 0 N/A	Comments	____ / ____
-------------	----------	-------------

7. Streambank Root Mass Protection

6 4 2 0	Comments	____ / ____
---------	----------	-------------

Riparian Health Assessment SCORE SHEET - Lakes, Sloughs and Wetlands



Date:	Observer:	Disposition/Project:		Plot:	
Field Unit:		Polygon:		Decile:	
Latitude (lower reach/upper reach)			Longitude (lower reach/upper reach)		
LSD:	QS:	Section:	Township:	Range:	Meridian:
Photo #:					

Riparian Information

Waterbody Name: _____

Lentic Type (circle one): wet meadow; spring/seep; reservoir; stock pond; pothole/slough; other; or non-wetland

Ponded Surface Water: yes no not collected Riparian Length (km) _____ Average Riparian Width (m) _____

Ecological Information

Natural Subregion _____ Ecosection _____

Dominant Plant Communities: _____

Conditional Plant Community: _____

Management Information

Current Utilization: None Light Moderate High Very High

Polygon Trend: Unknown Static Improving Degrading

% Accessible: _____

1. Vegetative Cover of Riparian Area

Scores or N/A
Actual/Possible

6	4	2	0	Comments	____ / ____
---	---	---	---	----------	-------------

2. Invasive Plant Species (Prohibited Noxious and Noxious Weeds) Answer both 2.1 and 2.2

2.1 Canopy Cover	Species	%	DD	Infestation			____ / ____
				Size	Unit	Treated	
3 2 1 0					ha, ac, m ²	UNK, no, yes	
					ha, ac, m ²	UNK, no, yes	
2.2 Density Distribution					ha, ac, m ²	UNK, no, yes	
3 2 1 0	Comments						

3. Disturbance-caused Undesirable Herbaceous Species

3	2	1	0	Comments	____ / ____
---	---	---	---	----------	-------------

4. Preferred Tree and Shrub Establishment and Regeneration

6	4	2	0	N/A	Comments	____ / ____
---	---	---	---	-----	----------	-------------

5. Use of Trees and Shrubs Answer both 5.1 and 5.2

5.1 Preferred Trees and Shrubs - Browse	Comments	____ / ____
3 2 1 0 N/A		
5.2 All Trees and Shrubs - Use other than browse		
3 2 1 0 N/A		

6. Human Alteration of Riparian Area (Vegetation)

6	4	2	0	Comments	____ / ____
---	---	---	---	----------	-------------

Riparian Health Assessment SCORE SHEET - Large Rivers



Date:	Observer:	Disposition/Project:	Plot:		
Field Unit:	Polygon:		Decile:		
Latitude (lower reach/upper reach)		Longitude (lower reach/upper reach)			
LSD:	QS:	Section:	Township:	Range:	Meridian:
Photo #:					

Riparian Information

Waterbody Name: _____; Side _____; Riparian Length (km) _____ Average Width (m) _____

Ecological Information

Natural Subregion _____ Ecosection _____

Dominant Plant Communities: _____

Conditional Plant Community: _____

Management Information

Current Utilization: None Light Moderate High Very High

Polygon Trend: Unknown Static Improving Degrading

% Accessible: _____

Scores or N/A
Actual/Possible

1. Cottonwood and Balsam Poplar Regeneration

6	4	2	0	N/A	Comments	___ / ___
---	---	---	---	-----	----------	-----------

2. Regeneration of Other Native Tree Species

3	2	1	0	N/A	Comments	___ / ___
---	---	---	---	-----	----------	-----------

3. Regeneration of Preferred Shrub Species

6	4	2	0	N/A	Comments	___ / ___
---	---	---	---	-----	----------	-----------

4. Standing Decadent and Dead Woody Material

3	2	1	0	N/A	Comments	___ / ___
---	---	---	---	-----	----------	-----------

5. Use of Trees and Shrubs Answer both 5.1 and 5.2

5.1 Preferred Trees and Shrubs - Browse	Comments	___ / ___
3 2 1 0 N/A		
5.2 All Trees and Shrubs - Use other than browse		
3 2 1 0 N/A		

6. Total Canopy Cover of Woody Species

3	2	1	0	N/A	Comments	___ / ___
---	---	---	---	-----	----------	-----------

7. Invasive Plant Species (Prohibited Noxious and Noxious Weeds) Answer both 7.1 and 7.2

7.1 Canopy Cover	6 4 2 0	Species	%	DD	Infestation			___ / ___
					Size	Unit	Treated	
						ha, ac, m ²	UNK, no, yes	
7.2 Density Distribution	3 2 1 0				ha, ac, m ²	UNK, no, yes		
		Comments						

8. Disturbance-caused Undesirable Herbaceous Species

3	2	1	0	Comments	___ / ___
---	---	---	---	----------	-----------

Invasive Plants Form

Date	Observer
Activity #	Land Type

Comments

GPS Coordinates (NAD 83)	Lat.	Long.
--------------------------	------	-------

LSD:	QS:	SEC:	TWP:	RGE:	M:
------	-----	------	------	------	----

Invasive Plant	
Cover %	Distribution
Treatment	
Area (m ² , acres, or ha)	

Invasive Plant	
Cover %	Distribution
Treatment	
Area (m ² , acres, or ha)	

Invasive Plant	
Cover %	Distribution
Treatment	
Area (m ² , acres, or ha)	

Invasive Plant	
Cover %	Distribution
Treatment	
Area (m ² , acres, or ha)	

Appendix 3. Example format for vegetation type descriptions

Community: Rough fescue-Bluebunch fescue No. of sites: 1 (Carbondale River) Soil: Orthic Dark Grey Chernozem Slope: 5% Aspect: S Moisture: Mesic to submesic Elevation: 1370 m Parent Material: Morainal Production: Grass (kg/ha) 422

Forb 788

Total 1210

Stocking rate 5.2 (ac/AUM) or 2.4 (ha/AUM)

Vegetation Type	Scientific Name	Common Name	Cover (%)
Graminoid			
	<i>Festucascabrella</i>	Rough Fescue	1
	<i>Danthoniacalifornica</i>	California oatgrass	6
	<i>Koeleriamacrantha</i>	Junegrass	6
	<i>Stiparichardsonii</i>	Richardson needlegrass	2
	<i>Festucaidahoensis</i>	Idaho fescue	14
	<i>Poapratensis</i>	Kentucky bluegrass	26
	<i>Carexobtusata</i>	Blunt sedge	6
Forbs			
	<i>Lithospermaruderales</i>	Woolly gromwell	T
	<i>Geumtriflorum</i>	Old Man's whiskers	8
	<i>Achilleamillefolium</i>	Common yarrow	11
	<i>Selaginelladensa</i>	Little clubmoss	T
	<i>Anemone multifida</i>	Cut leaved anemone	1

This plant community appears to be representative of low and midslope positions in the Castle area south of Blairmore. Moving upslope from the rough fescue community, Idaho fescue becomes co-dominant with rough fescue. The slightly drier site conditions appear to favour the growth of Idaho fescue. In Montana, Mueggler and Stewart (1980) described a Rough fescue-Idaho fescue habitat type on mountain slopes on both sides of the divide. Looman (1969) described similar vegetation that occurs on warm slopes and stony soils at higher elevations in the southern foothills as the Rough fescue-Intermediate oatgrass association.

Grazing pressure on this site causes rough fescue to decline and Idaho fescue, Kentucky bluegrass and sedge species tend to increase. Continued grazing pressure causes forage productivity to decline or it could be the result of drier site conditions. The original clippings occurred on a drier portion of the site than inside the enclosure.

Appendix 4. Instructions for Capturing Infrastructure Features

Use letters g, n, or p to provide information on feature condition: g = good, n = needs improvement, p = poor

General Feature Type	Feature Name	Code		Comments
Water Feature	Dugout	Dgt + g, n or p	•	
	Spring -Developed	Spd + g, n or p	•	
	Spring - Undeveloped	Spu + g, n or p	•	
	Water Troughs	Wtr + g, n or p	•	
	Creek Watering	Ckw + g, n or p	•	Important creek watering sites only
	Water Tank	Wtk + g, n or p	•	
	Water Line	Wln + g, n or p	•	
	Water Well	Wwl + g, n or p	•	
	Creek Crossing	Crs + g, n, or p	•	Important creek crossings only
	Structure	Cabin	Cbn + g, n or p	•
Corral		Cr1 + g, n or p	•	
Loading Chutes		Lch + g, n or p	•	
Gates		Gt + g, n or p	•	
Cattleguard - gated		Cgg + g, n or p	•	
Cattleguard - ungated		Cgu + g, n or p	•	
OHV fence crossing		Qfc + g, n or p	•	
Culvert		Clv + g, n or p	•	
Permanent Salting Structure		Pss + g, n or p	•	Permanent salting structures – for salting sites with no structure use Ss
Storage Shed		Ssh + g, n or p	•	
Bridge		Bdg + g, n or p	•	
Oiler		Oil + g, n or p	•	
Barn		Brn + g, n or p	•	
Rider's Camp		Rcp + g, n or p	•	Important camping area with no permanent cabin or structures – may contain outhouse

General Feature Type	Feature Name	Code		Comments
Fence	Fence point	F + g, n or p	•	Use when capturing fences as waypoints – although it is MUCH preferred that fences are captured as tracks
	Fence	F + g, n or p	-----	Use when fences are collected as tracks
	Fence – corner post	c	•	Capture a waypoint at each fence corner post (whether tracks or waypoints for fence capture)
	Fence to be cont. (stop)	w	•	Use when capturing fence as a track when it becomes impossible to continue along the fence line due to topography or barriers – this is a stop point
	Fence restart point	z	•	Use this restart point to signify the continuation of a fence line track (when this is used a fenceline will be drawn straight between the stop (to be cont.) and restart point
	Fence End	x	•	Use where fence stops (an end point)
	Fence down	Fd	•	Use in addition to a fence track or fence waypoints to denote a fence is down
Other	Trail - built	Trl + g, n or p	----	Use only for built trails which have had funding put into them
	Trail - important	Tri + g, n, or p	----	Use for trails important to your operation which have not had funding put into them
	Salting site	Ss + g, n or p	•	For salting sites w/ no permanent structure
	Biocontrol site	Bio	•	Biocontrol release

