U. S. UPLAND INVENTORY
USER MANUAL
(Current as of 5/16/2023)

This user manual is intended to accompany the *U. S. Upland Inventory Form* for the inventory of upland sites. This document serves as a field reference to assist data collectors in answering each item on the form. It can also serve as an aid to the database user in the interpretation of data presented in the *U. S. Upland Inventory Form* format.

ACKNOWLEDGEMENTS

Development of these assessment tools has been a collaborative and reiterative process. Many people have contributed greatly their time, effort, funding, and moral support for the creation of these documents, as well as to the general idea of devising a way for people to look critically at upland sites in a systematic and consistent way. Some individuals and the agencies/organizations they represent who have been instrumental in enabling this work are Dan Hinckley, Tim Bozorth, and Jim Roscoe of the USDI Bureau of Land Management in Montana; Karen Rice and Karl Gebhardt of the USDI Bureau of Land Management in Idaho; Bill Haglan of the USDI Fish and Wildlife Service in Montana; Barry Adams and Gerry Ehlert of Alberta Public Lands Division; Lorne Fitch of Alberta Environmental Protection; Greg Hale and Norine Ambrose of the Alberta Cows and Fish Program, and especially Mike Frisina of Montana Department of Fish, Wildlife and Parks, and Art Soukkala and Dale Becker of the Confederated and Salish Tribes in northwest Montana.

BACKGROUND INFORMATION

Public and private land managers are being asked to improve or maintain upland habitat on lands throughout western North America. Three questions that are generally asked about a upland site are: 1) What is the potential of the site (e.g., climax or potential natural community)? 2) What plant communities currently occupy the site? and 3) What is the overall health (condition) of the site? For an upland site, the first two questions can be answered by using the Upland Inventory Form along with a document such as the *Forest Habitat Types of Montana* (Pfister and others 1977), *Grassland and shrubland habitat types of Western Montana* (Mueggler and Stewart 1980), and for eastern Montana use *Classification and Management of Upland, Riparian, and Wetland Sites in the USDI Bureau of Land Management's Miles City Field Office, Northern Great Plains, Eastern Montana* (Hansen and others 2008). When the name of the habitat type(s) or successional community type(s) on the site are known, then one can compare the vegetation on the site to that described in the document for late seral to climax, or relatively undisturbed, stands of that type.

The U. S. Upland Ecological Health Assessment Forms (i.e., forest/woodland, shrubland, grassland, and modified) define methods for rapidly addressing the third question above: what is the site's overall health (condition)? Upland ecological health assessments evaluate the ability of a site to perform natural functions (such as primary production, maintenance of natural biotic diversity, provision of wildlife habitat, retention of water incident to the site, the development and maintenance of the soil resource). They are designed for use in conjunction with an ecological site classification such as a vegetation-based site classification (habitat type and/or community type) that has been written for the region. The resulting health rating is a measure of departure of a site from full functional capacity that may be attributed to human-caused disturbance. Due to differing site processes and characteristics that are reflected in the dominant vegetation physiognomy, four different ecological health assessment formats are presented. (***NOTE: A project area may include various amounts of any, or all, of the vegetational site types defined below.***) Following are definitions of the terms used to differentiate these forms and a key to assist in determining which one to use on a site.

Upland Vegetative Lifeform Site Types Defined

A ***forest/woodland*** is a site dominated by trees that are generally distributed (i.e., not limited to microsites of special hydrologic or edaphic conditions) at a density of at least 10 per acre, and that are reproducing successfully (i.e., there are well established seedlings and/or saplings present in the population). As compared to a forest, a woodland is generally defined as a site with vegetation dominated by a rather open stand of trees of short stature. For example, some woodland stands of *Juniperus scopulorum* (Rocky Mountain juniper) may form an open canopy of stunted trees, especially in xeric sites.

A ***shrubland*** (or shrub steppe) is a form of grassland (steppe) where zonal soils are too dry for trees, and herbaceous perennial grasses are well represented. Shrubs may be aggregated into thickets confined to relatively moist micro-environments or the shrubs may rise above the grasses and form a discontinuous upper layer on the landscape. Therefore,

shrublands (shrub steppe) are a grassland (steppe) with a conspicuous shrub element, with the shrubs usually forming an open overstory above the grass layer. ***NOTE:*** Some sites may have varying amounts of low-growing shrubs, such as *Artemisia frigida* (fringed sagewort), *Gutierrezia sarothrae* (broom snakeweed), *Yucca glauca* (soapweed), *Juniperus horizontalis* (creeping juniper), *Opuntia polyacantha* (plains prickly-pear), or *Opuntia fragilis* (fragile cactus). Since these low-growing shrubs are typically shorter than the associated grasses, these sites are considered grassland sites.

A ***grassland*** (or steppe) is also a site where zonal soils are too dry for trees, and where herbaceous perennial grasses are well represented. The dominant grasses of steppe vary greatly in height, but all die back to the ground each year. They may be rhizomatous so that a continuous or interrupted sod is formed, or they may be cespitose, forming bunchgrass or tussock grassland. Forbs are less important in the drier portions of the steppe, but toward the wetter edge they become conspicuous, and may even exceed the graminoids in dry-matter production. Such forb-rich steppe is called meadow steppe. Some shrubs may be present, but these are few and are usually dwarfed and/or shorter than the herbaceous vegetation and interspersed amongst them. Examples include sites with varying amounts of the low-growing shrubs *Artemisia frigida* (fringed sagewort), *Gutierrezia sarothrae* (broom snakeweed), *Yucca glauca* (soapweed), *Juniperus horizontalis* (creeping juniper), *Opuntia polyacantha* (plains prickly-pear), or *Opuntia fragilis* (fragile cactus). Medium-to-tall shrubs may be present in limited microsites. Trees may also be present, but with less than 10 trees per acre and/or not successfully reproducing.

Modified sites are dominated by vegetation that has been modified by human manipulation. These sites essentially lack naturally occurring native perennial plants, as the result of human manipulation, such as plowing and seeding (i.e., tame pasture mixes, crops, etc.), hydrologic alteration, irrigation, etc. This designation does not include sites that still have enough native perennial plant components present to key them to a natural habitat type or community type (e.g., a site heavily altered by livestock grazing). Examples of a ***modified upland vegetation site*** include: tame pastures of seeded introduced or cultivar grass species or varieties, Conservation Reserve Program (CRP) lands seeded to species like *Agropyron cristatum* (crested wheatgrass), and improved forest stands (e.g., monoculture stands of trees planted by humans).

Examples of Possibly Confusing Lifeforms (due to intermediate stature)

Trees: *Juniperus scopulorum* (Rocky Mountain juniper)
Juniperus virginiana (red cedar)
Quercus macrocarpa (bur oak)
Quercus gambelii (Gambel oak)

Shrubs: *Artemisia frigida* (fringed sagewort)
Cercocarpus species (mountain mahogany)
Coryphantha missouriensis (pincushion cactus)
Coryphantha vivipara (pincushion cactus)
Crataegus species (hawthorns)
Eriogonum microthecum var. *laxiflorum* (slenderbush buckwheat)
Gutierrezia sarothrae (broom snakeweed)
Opuntia fragilis (fragile cactus)
Opuntia polyacantha (plains prickly-pear)
Purshia tridentata (antelope bitterbrush)
Yucca glauca (soapweed)

KEY TO UPLAND LIFEFORM SITE TYPE

At the outset of field data collection for an upland inventory project, it is necessary to understand the distribution and relative abundance of vegetative lifeform site types present. Inventory plot selection and location must be done to reflect this distribution and relative abundance, so that the various types present are correctly represented. Therefore, the project area must be examined using map and aerial imagery, and by walking the site, to become familiar with the vegetation character and distribution. Most upland projects occur on areas with a mosaic of vegetation types. Below, a key is provided for identifying the four vegetative lifeform site types. Reduce the values if the site is highly disturbed.

1. Trees present ***AND*** successfully reproducing (average of 10 or more trees per acre) ***AND NOT*** restricted to microsites ***OR*** to draws/drainages that comprise a limited proportion of the polygon. .....**FOREST/WOODLAND SITE**

1. Trees absent; ***OR*** if present, ***EITHER*** restricted to microsites, or to draws/drainages that comprise a limited proportion of the landscape, ***OR*** not successfully reproducing (less than an average of 10 trees per acre).....**2**

    2. Shrubs (excluding the low-growing shrubs *Artemisia frigida* [fringed sagewort], *Gutierrezia sarothrae* [broom snakeweed], *Yucca glauca* [soapweed], *Juniperus horizontalis* [creeping juniper], *Opuntia polyacantha* [plains prickly-pear], or *Opuntia fragilis* [fragile cactus]) present and generally having greater than 10 percent canopy cover in the polygon. The mature shrubs form either a closed canopy (i.e., thickets) or an open overstory above the herbaceous layer.....**SHRUBLAND SITE**

    2. Shrubs absent; ***OR*** if present, have less than 10 percent canopy cover in the polygon ***OR*** the shrubs are shorter than the herbaceous vegetation and interspersed amongst them, such as sites with varying amounts of the low-growing shrubs *Artemisia frigida* (fringed sagewort), *Gutierrezia sarothrae* (broom snakeweed), *Yucca glauca* (soapweed), *Juniperus horizontalis* (creeping juniper), *Opuntia polyacantha* (plains prickly-pear), or *Opuntia fragilis* (fragile cactus). **3**

3. The site is dominated by native, perennial, herbaceous vegetation; shrubs are either absent ***OR*** when present have less than 10 percent canopy cover in the polygon (do not include the low-growing shrubs *Artemisia frigida* [fringed sagewort], *Gutierrezia sarothrae* [broom snakeweed], *Yucca glauca* [soapweed], *Juniperus horizontalis* [creeping juniper], *Opuntia polyacantha* [plains prickly-pear], or *Opuntia fragilis* [fragile cactus]), ***OR*** the shrubs may be dwarfed and/or shorter than the herbaceous vegetation and interspersed among them. Medium-to-tall shrubs may be present in very limited microsites. (***NOTE:*** *Artemisia cana* [silver sagebrush] may be present on disturbed upland sites that are not considered old alluvial terraces or floodplains.) .....**GRASSLAND SITE**

3. The site has little naturally occurring perennial native vegetation, but has been manipulated purposely to replace the native vegetation with introduced or agronomic species. .....**MODIFIED UPLAND SITE**

SAMPLING CRITERIA AND POLYGON DELINEATION

Assumptions and Conditions:

- Riparian sites within the project area are inventoried separately, using the lotic and lentic wetland forms.
- Maximum upland polygon size = approximately 20 ac (933 ft by 933 ft, if square, ***NOTE:*** *1 ac = 43,560 sq ft*);
- Vegetative lifeforms within the property are pre-stratified (delineated and inventoried separately), according to:
    - Forest/Woodland;
    - Shrubland;
    - Grassland;
    - Modified sites.
- Minimum size of vegetative lifeform type area to include in pre-stratification for sampling (i.e., inclusions) = 5 ac (***NOTE:*** A smaller area may be delineated for inventory, if it is identified as an important type.)
- Polygons do not have to be square shaped; they may be rectangular or irregular to better conform to the terrain (i.e., laid out to follow a hillside) or configuration of the plant community (e.g., a linear stand of forest cover).
- Sample approximately10 percent of each upland vegetative lifeform type (i.e., forest/woodland, shrubland, grassland, modified sites) that is present on the property. Some types may be entirely sampled (100 percent) due to their small size, greater importance, and/or client request; however, all types need to have approximately 10 percent of their total acres sampled.
- One person can do approximately three polygons (or more) of normally accessible sites per day. More difficult terrain and greater complexity of vegetation (i.e., dense forest cover or steep and broken topography) may reduce the rate of polygons that can be sampled per day.

Pre-stratification of the Project Area

Using Google Earth, or other aerial imagery, delineate the project area into its component vegetation lifeform types. This is to allow stratification and estimation of the proportional representation of each type on the project area. (***NOTE:*** *Riparian areas are handled separately, using the lotic and lentic wetland inventory tools. So, if a project area covers a total of 1,000 ac, and 50 ac of it are riparian/wetland, then the upland area is the remaining 950 ac.*)

Sampling Scheme
Determine how the property will be sampled from the following choices:

a) 100 percent inventory of the entire project area;
b) A subsample of the project area, with the results representing the entire property;
c) A combination of a and b. (***For example:*** A property has all four vegetation types present, with forest/woodlands and modified sites representing only small patches the whole. For the client, it may be important to sample 100 percent of the lands occupied by the small patches forest/woodland and modified types, while only sampling a percentage of the larger shrubland and grassland areas.)

Prior to beginning the field work, distribute the sampling throughout each of the various vegetative lifeform types so that the sampling is proportionally representative of each vegetative lifeform type on the property. Identify the approx. Lat/Lon coordinates of one corner of each polygon on a map. The actual polygon dimensions and exact location of the four corners will be determined in the field.

When locating polygons on a property, try to keep each polygon within as homogeneous an area as possible.
Things to keep in mind, besides the upland vegetative landform type, when considering this include:

- Slope steepness, or lack thereof;
- Aspect of slope;
- Management unit (i.e., fences—stay within one livestock management unit, and attempt to stay away from fences where the animals may trail);

Within a typical large property, there may be a variety of localized human-caused points of disturbance. Avoid over representing these disturbance points in any sampling scheme that samples less than the entire property (i.e., is not a 100 percent sample). Examples of such localized disturbances include: watering sites, salting sites, two-track roads, corrals, etc. Try to include such localized disturbances in a proportion that their area represents on the entire property.

INVENTORY FORM CODES AND INSTRUCTIONS

Class Codes
Field observers will use class codes to represent ranges of percent wherever percent data is recorded. The class codes are defined below. These codes and range classes are from the USDA Forest Service Northern Regions ECODATA (1989) program.

T = 0.1<1%	**2** = 15<25%	**5** = 45<55%	**8** = 75<85%
P = 1<5%	**3** = 25<35%	**6** = 55<65%	**9** = 85<95%
1 = 5<15%	**4** = 35<45%	**7** = 65<75%	**F** = 95-100%

The class codes are converted to class midpoints in the office. The class midpoints are: **T** = 0.5%; **P** = 3.0%; **1** = 10.0%; **2** = 20.0%; **3** = 30.0%; **4** = 40.0%; **5** = 50.0%; **6** = 60.0%; **7** = 70.0%; **8** = 80.0%; **9** = 90.0%; **F** = 97.5%. These class midpoints are used in data reporting and in all calculations throughout the data analysis process.

Polygon Data
The following are the codes and instructions for the individual data items on the form. All data items are to be recorded in the field unless otherwise noted. Numbering corresponds to that of items on the form. Also included are comments about the data, how it is collected, and its meaning. When the inventory methodology follows a published source, that source is cited. However, in many instances, due to the lack of pre-existing guidelines, we have developed our own methodologies.

Fill in all blanks on the field form, except those that are completed in the office. Enter 0 for any item to indicate the absence of value. Do not use — and do not leave items blank, except for the following: 1) items that logically would not be answered because they follow an answer of No in a leading Yes/No question, and 2) lines in a species list below the last species observed. An answer of 0 means the observer looked and saw none, whereas a blank line means the observer did not look, either by negligence or because the point was moot. ***NA*** means the item is not applicable to a particular polygon. ***NC*** means data was not collected for that item in a particular polygon. Observers must write legibly and should limit their use of abbreviations throughout to those, which allow for no confusion.

Record ID No. This is the unique identifier allocated to each polygon. This number will be assigned in the office when the form is entered into the database.

Administrative Data

A1. Agency or organization collecting the data.

A2. Funding Agency/Organization.

A3a. BLM (Bureau of Land Management) State Office.

A3b. BLM Field Office/Field Station.

A3c. BLM Office Code (recorded in the office).

A3d. Is the polygon in an active BLM grazing allotment (recorded in the office)?

A3e, f. For BLM polygons, the BLM Office Code, whether the polygon is in an active BLM grazing allotment, and the Allotment Number is supplied by the BLM. These items are entered into the computer in the office; the computer then references a master list of Allotment ID's to complete the remaining Allotment information. Because some polygons incorporate more than one Allotment, space is provided to enter two sets of Allotment information. The master Allotment list is periodically updated by the BLM National Applied Resource Sciences Center to make needed corrections.

A4. USDI Fish and Wildlife Service Refuge name.

A5. Indian Reservation name.

A6. USDI National Park Service Park/National Historical Site name.

A7. USFS (Forest Service) National Forest name.

A8. Other location.

A9. Year the field work was done.

A10. Date of field work by day, month, and year.

A11. Names of all field data observers.

NOTE: Information for items **A12a-h** is found in the office; field evaluators need not complete these items.

A12. The several parts of these items identify various ways in which a data record may represent a resampling of a polygon that may have been inventoried again at some other time. The data in this record may have been collected on an area that coincides precisely with an area inventoried at another time and recorded as another record in the database. It may also represent the resampling of only a part of an area previously sampled. This would include the case where this polygon overlaps, but does not precisely and entirely coincide with one inventoried at another time. One other case is where more than one polygon inventoried one year coincides with a single polygon inventoried another year. All of these cases are represented in the database, and all have some value for monitoring purposes, in that they give some information on how the status on a site changes over time. ***This is done in the office with access to the database; field evaluators need not complete these items.***

A12a. Has any part of the area within this polygon been inventoried previously, or subsequently, as represented by any other data record in the database? Such other records would logically carry different dates.

A12b. Does the areal extent of this polygon exactly coincide with that of any other inventory represented in the database? In many cases, subsequent inventories only partially overlap spatially. The purpose of this question is to identify those records that can be compared as representing exactly the same ground area.

A12c. Does this record represent the latest data recorded for this site (polygon)?

A12d. If A12b is answered Yes, then enter the record ID number(s) of any other previous or subsequent re-inventories (resampling) of this exact polygon for purposes of cross-reference.

A12e. Enter the years of any records recorded in item A12d as representing other inventories of this exact polygon.

A12f. Even though this polygon is not a re-inventory of the exact same area as any other polygon, does it share at least some common area with one or more polygons inventoried at another time?

A12g. Enter the years of any other inventories of polygons sharing common ground area with this one.

A12h. If A12f is answered Yes, then enter the record ID number(s) of any other polygon(s) sharing common ground area with this one.

A13a. Has a management change been implemented on this polygon?

A13b. If A13a is answered Yes, in what year was the management change implemented?

A13c. If A13a is answered Yes, describe the management change implemented.

Location Data
B1. State in which the field work was done (recorded in the office).

B2. County or municipal district in which the field work was done (recorded in the office).

B3. This field for allotment, range, or management unit is intended for entities other than the BLM to use for grouping polygons by management unit. The BLM management units are grouped using the grazing allotment information in A3 above.

B4a. Give a name or local designation that identifies the area where the upland inventory is conducted. If possible, use a name that is shown on the 7.5 minute topographic map.

B4b, c. Polygons are grouped together for management purposes. For example, all polygons around Henry's Lake in the Idaho Falls Field Office could be identified as Group Name: Idaho Falls Field Office; Group Number: 1 (recorded in the office).

B5. Polygon number is a sequential identifier of the portion of the area assessed. This is referenced to the map delineations. Sequences normally progress clockwise.

B6. Elevation (feet or meters) of the polygon midpoint. Elevation is interpolated from the topographic map(s).

B7a. Record the latitude and longitude of the polygon, along with the GPS projection and accuracy. Record the degrees, minutes, and seconds, along with decimal degrees. ***NOTE: All of North America is latitude = North, and longitude = West.***

B7b. Record any comments pertaining to the "other" location.

Selected Summary Data
C1a. Vegetation type is a categorical description of predominant polygon character, based on kind of vegetative cover and/or land use. Use the key below to determine the site vegetation category that best characterizes the majority of the polygon. Observers will ***select only one category*** as representative of the entire polygon.

KEY TO UPLAND LIFEFORM SITE TYPE

1. Trees present ***AND*** successfully reproducing (average of 10 or more trees per acre) ***AND NOT*** restricted to microsites ***OR*** to draws/drainages that comprise a limited proportion of the polygon. .....**FOREST/WOODLAND SITE**

1. Trees absent; ***OR*** if present, ***EITHER*** restricted to microsites, or to draws/drainages that comprise a limited proportion of the landscape, ***OR*** not successfully reproducing (less than an average of 10 trees per acre).....**2**

    2. Shrubs (excluding the low-growing shrubs *Artemisia frigida* [fringed sagewort], *Gutierrezia sarothrae* [broom snakeweed], *Yucca glauca* [soapweed], *Juniperus horizontalis* [creeping juniper], *Opuntia polyacantha* [plains prickly-pear], or *Opuntia fragilis* [fragile cactus]) present and generally having greater than 10 percent canopy cover in the polygon. The mature shrubs form either a closed canopy (i.e., thickets) or an open overstory above the herbaceous layer.....**SHRUBLAND SITE**

    2. Shrubs absent; ***OR*** if present, have less than 10 percent canopy cover in the polygon ***OR*** the shrubs are shorter than the herbaceous vegetation and interspersed amongst them, such as sites with varying amounts of the low-growing shrubs *Artemisia frigida* (fringed sagewort), *Gutierrezia sarothrae* (broom snakeweed), *Yucca glauca* (soapweed), *Juniperus horizontalis* (creeping juniper), *Opuntia polyacantha* (plains prickly-pear), or *Opuntia fragilis* (fragile cactus). **3**

3. The site is dominated by native, perennial, herbaceous vegetation; shrubs are either absent ***OR*** when present have less than 10 percent canopy cover in the polygon (do not include the low-growing shrubs *Artemisia frigida* [fringed sagewort], *Gutierrezia sarothrae* [broom snakeweed], *Yucca glauca* [soapweed], *Juniperus horizontalis* [creeping juniper], *Opuntia polyacantha* [plains prickly-pear], or *Opuntia fragilis* [fragile cactus]), ***OR*** the shrubs may be dwarfed and/or shorter than the herbaceous vegetation and interspersed among them. Medium-to-tall shrubs may be present in very limited microsites. (***NOTE:*** *Artemisia cana* [silver sagebrush] may be present on disturbed upland sites that are not considered old alluvial terraces or floodplains.) .....**GRASSLAND SITE**

3. The site has little naturally occurring perennial native vegetation, but has been manipulated purposely to replace the native vegetation with introduced or agronomic species. .....**MODIFIED UPLAND SITE**

C1b. Identify the vegetation subtype, if appropriate. May include types such as all aspen stands, all conifer stands, all greasewood stands, all needle-and-thread stands, all crested wheatgrass stands, etc.

C2. The size (acres/hectares) of the polygon or sampling plot (microplot of usually a portion of an acre or up to 15 to 25 acres in size) is recorded in this field. The size of a polygon can be determined using a GIS, Google Earth Pro, planimeter, or dot grid.

C3. In some cases, the sampling plot data is used to characterize, or represent, a larger area. Give the acreage of the area actually represented by this polygon. For example, a sample plot of 15 acre is used to represent a 200 acre field. The observer would then enter 200 acres in this field.

Ecological Health Assessment Summary

C4. Polygon Health (PFC) Score is an ecological function rating derived by computer using data from several items in the polygon inventory. For detailed discussion of this process, see the companion document *Upland Ecological Health Assessment (derived from the Upland Inventory Form)*. The techniques used to obtain the data do not allow the ratings to be interpreted with a fine degree of precision. For example, two polygons rating 74 percent and 79 percent should be interpreted as functionally equivalent to each other, but they both are likely to differ functionally from a third polygon that rates 61 percent, although all three fall within the Healthy, but with Problems category. When considering the ecological health assessment result for any site, one should always look at the individual items, as well as the bottom line rating. Two sites can score overall identical results, but have profoundly differing areas of problem.

The health ratings are presented both as an overall polygon score and in two subsections (vegetation and soils/landscape stability) to give a broad indication of what part of the system may be in need of more management attention.

Vegetation Data

D1. The vegetation structural diversity category is automatically calculated in the office by computer using plant group and height layer data (item D9). Trees and shrubs are considered major components of structural diversity. These terms are used to describe vegetation height: tall = >1.8 m (6.0 ft) (layer 3); medium = >0.5-1.8 m (1.5-6.0 ft) (layer 2); short = <0.5 m (<1.5 ft) (layer 1). Graminoids and forbs are combined as the herbaceous lifeform. Trees and shrubs in layer 2 are also combined as medium trees/ shrubs. A polygon is assigned the highest structural diversity category it can meet. To meet a category, each lifeform (by height) named in the description must have a canopy cover of at least 15 percent in the polygon. Combination groups (i.e., medium trees/shrubs; and short, medium, and tall herbaceous) must have at least 5 percent cover of both components or at least 15 percent cover of one component. ***NOTE:*** Structural diversity on a site can change as succession proceeds or if management changes.

Category Description
Tall trees; tall shrubs; medium trees/shrubs; herbaceous understory present[1]
Tall trees; tall shrubs; herbaceous understory present[1]
Tall trees; medium trees/shrubs; herbaceous understory present[1]
Tall trees; herbaceous understory present[1]
Tall shrubs; medium trees/shrubs; herbaceous understory present[1]
Tall shrubs; herbaceous understory present[1]
Medium trees/shrubs; herbaceous understory present[1]
Tall herbaceous
Medium herbaceous
Short herbaceous
Sparsely vegetated[2]

[1]The herbaceous understory present does not need to have a minimum canopy cover.

[2]Sparsely vegetated refers to polygons in which the minimum canopy cover by the various lifeforms is not met.

D2a, b. If present, record the 6-letter species code and the canopy cover in the two left-most columns for ***all*** tree species observed. Canopy cover is evaluated using ocular estimation following the Daubenmire (1959) method. Within the total canopy cover of each species, estimate the proportion of each of five groups (seedling, sapling, pole, mature, and dead trees). The canopy covers of the five groups of each species must total approximately 100 percent. If some individuals in a size class have at least 30 percent of the upper canopy dead (are decadent), record the decadence as a percentage of that group. Record the total group cover to the left of the slash (/) and the decadent portion to the right.

Example:

Species	Cover	Sdlg/Dec	Splg/Dec	Pole/Dec	Mat/Dec	Dead
PINPON	3	T / 0	P / 0	1 / P	8 / 1	P

Note 1: The most common usage of the term ***decadent*** may be for over-mature trees past their prime and which may be dying, but we use the term in a broader sense, not restricted to the over-mature. We count decadent plants, both trees and shrubs, as those with 30 percent or more dead wood in the upper canopy.

Tree Size Classes

Size Class	Conifers[1] and Cottonwoods/Poplars	Other Broadleaf Species[2]
Seedling	<1.37 m tall ***OR*** <2.5 cm dbh (<4.5 ft tall ***OR*** <1.0 inch dbh)	<0.91 m tall (<3.0 ft tall)
Sapling	≥1.37 m tall ***AND*** 2.5 cm to 12.4 cm dbh (≥4.5 ft tall ***AND*** 1.0 inch to 4.9 inch dbh)	>0.91 m tall ***AND*** <7.6 cm dbh (>3.0 ft tall ***AND*** <3.0 inch dbh)
Pole	12.7 cm to 22.6-cm dbh (5.0 inch to 8.9-inch dbh)	>1.8 m tall ***AND*** 7.6 cm to 12.7 cm-dbh) (>6.0 ft tall ***AND*** 3.0 inch to 5.0-inch dbh)

Mature	>22.7 cm dbh (>9.0-inch dbh)	>12.7 cm dbh (>5.0-inch dbh)
Dead	100% of canopy is dead	100% of canopy is dead

[1]*Juniperus scopulorum* (Rocky Mountain juniper) is an exception to the specifications given, because it lacks typical coniferous size, age, and growth form relationships. Assign age classes to individuals of these two species based on relative size, reproductive ability, and overall appearance.
[2]Other Broadleaf Species may include *Fraxinus pennsylvanica* (green ash), *Acer negundo* (box elder), *Populus tremuloides* (quaking aspen), *Betula papyrifera* (paper birch), and *Ulmus americana* (American elm).

Note 2: Treat the resprouts from cut-off stumps as regeneration of the plant that was cut. Most species that respond by resprouting this way will produce a viable new plant by this process.

Note 3: For field determination of vegetative cover related questions (questions D2 to D14) include **all rooted plant material** (live or dead). Do not include fallen wood or other plant litter. Do not consider the polygon area covered by water (such as between emergent plants).

D3. The tree regeneration category is automatically calculated in the office by the computer using the size class data collected with the species' canopy cover as described in item D2b. The canopy covers of the seedling and sapling size classes are combined to quantify tree regeneration. The categories represent actual, not potential, tree regeneration.

Code	Description
1	No seedlings or saplings were observed in the polygon.
2	Seedlings and/or saplings were observed; individually, or in combination, these size classes have less than 5% of the species canopy cover.
3	Seedlings and/or saplings were observed; individually, or in combination, these size classes have 5% or more of the species canopy cover, but less than 15%.
4	Seedlings and/or saplings were observed; individually, or in combination, these size classes have 15% or more of the species canopy cover, but less than 25%.
5	Seedlings and/or saplings were observed; individually, or in combination, these size classes have 25% or more of the species canopy cover.

D4. The tree size class distribution category is automatically calculated in the office by the computer using size class canopy covers recorded in item D2b. In classifying tree size class distribution, the seedling and sapling groups are combined. Three resulting size classes (seedlings/saplings, pole, and mature), ***and*** the percent of the mature individuals which are decadent, determine size class distribution categories.

Decadence of younger size classes is ignored in this calculation. Younger decadent trees are assumed to have the capacity to grow out of any current condition caused by injury, disease, or other non-age related factors. A species with decadent mature individuals may fall into one of two classes: those having 75 percent or more of mature individuals decadent and those having less than 75 percent of mature individuals decadent. The age distribution category of a tree species on a polygon is defined by the presence of certain size classes. To be present, size classes must have minimum canopy covers in the polygon: seedlings/saplings must have a combined total canopy cover of at least 1 percent; pole and mature are treated separately and must each have at least 5 percent canopy cover.

Tree Size Class Categories (An X under a size class indicates presence in that category.)

Category Code	Sdlg[1]/Splg[2] (CC >1%)	Pole (CC >5%)	Mature (Decadent[3]) (CC >5%)	Description
1	X			seedling/sapling only
2		X		pole age only
3	X	X		seedling/sapling and pole
4	X		X	seedling/sapling and mature (<75% dec.)
5		X	X	pole and mature (<75% dec.)
6	X	X	X	seedling/sapling, pole, and mature (<75% dec.)
7			X	mature only (<75% dec.)
8	X		X	seedling/sapling and mature (≥75% dec.)
9		X	X	pole and mature (≥75% dec.)
10	X	X	X	seedling/sapling, pole, and mature (≥75% dec.)
11			X	mature only (≥75% dec.)

[1]Sdlg indicates seedlings, Splg indicates saplings, Decadent indicates percent of mature trees, which are decadent

D5a. Record the appropriate category, that best describes the amount of browse utilization (Utl) of the combined seedling (Sdlg) and sapling (Splg) size classes for each tree species. When estimating amount of utilization, count browsed second year and older leaders on representative plants of tree species normally browsed by ungulates. Do not count current year's use, because this would not accurately reflect actual use when more browsing can occur later in the season. Browsing of second year or older material affects the overall health of the plant and continual high use will affect the plant's ability to maintain itself on the site. Determine percentage by comparing the number of leaders browsed or utilized with the total number of leaders available (those within animal reach) on a representative sample (at least three plants) of each tree species present. Do not count utilization on dead plants, unless it is clear that death resulted from over-grazing. ***NOTE:*** If a tree is entirely mushroom/umbrella shaped by long-term heavy browse or rubbing, count utilization of it as heavy.

Category	Description
None	0 to 5% of the available second year and older leaders are clipped (browsed).
Light	>5 to 25% of the available second year and older leaders are clipped (browsed).
Moderate	>25 to 50% of the available second year and older leaders are clipped (browsed).
Heavy	More than 50% of the available second year and older leaders are clipped (browsed).
Unavailable	Woody plants provide no browsed or unbrowsed material below 1.5 m (5 ft), or are inaccessible due to location or protection by other plants.
NA	Neither seedlings nor saplings of tree species are present.

D5b. Referring to Keigley and Frisina (1998), characterize seedling and sapling plants (if any) of each tree species by growth architecture type. Polygons will likely exhibit a range of effects caused by browse, therefore choose a best fit category to represent the majority condition for plants of each species. Categories are:

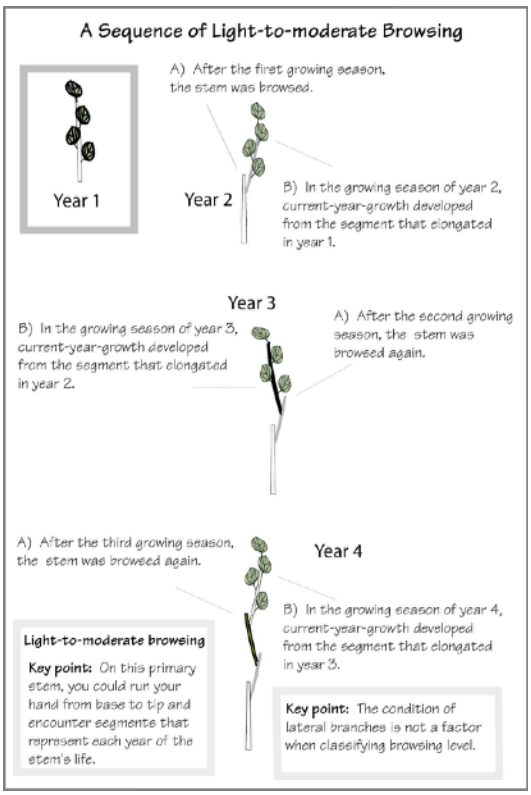
Uninterrupted—The plant has gained height each growing season; has at least one stem that not has no entire annual segment killed by browsing.

Arrested—A plant that has had intense browsing all its life; it is hedged from above.

Retrogressed—The plant grew normally in early life, but was switched to intense browse later in life.

Released—A plant that had intense browsing early in life, but later was switched to lighter use, and allowed to grow taller.

D5c. Referring to Keigley and Frisina (1998) and more recent illustrations (Figure 1a-d) (Keigley and Frisina [in press]) choose one of two categories of browse intensity: ***Light-to-Moderate*** or ***Intense***.



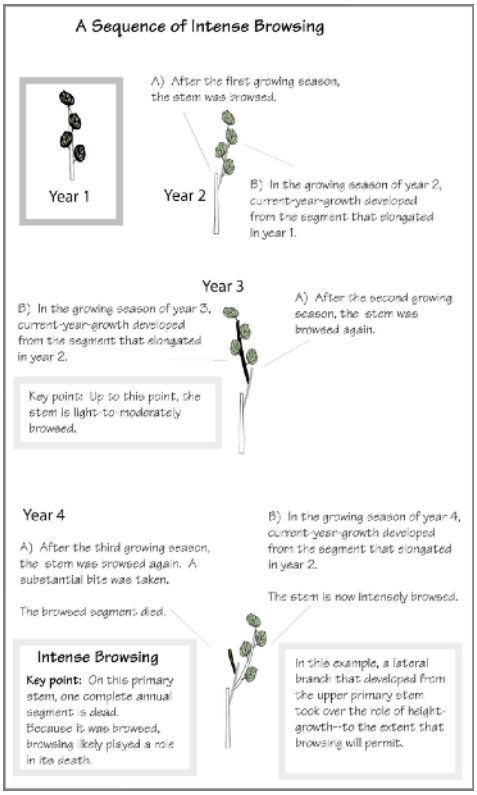
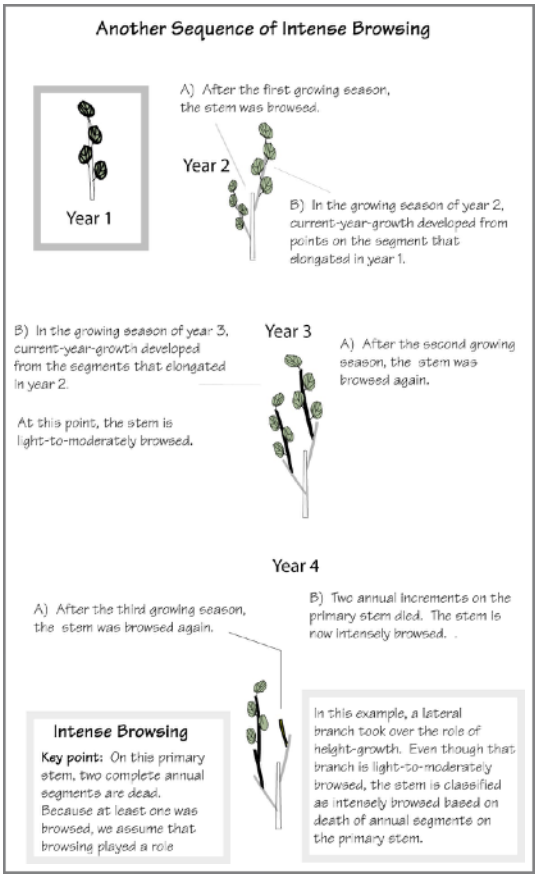


Figure 1a, b. Illustration of sequences of ***Light-to-Moderate*** browsing and ***Intense*** browsing (from Richard Keigley 2008)



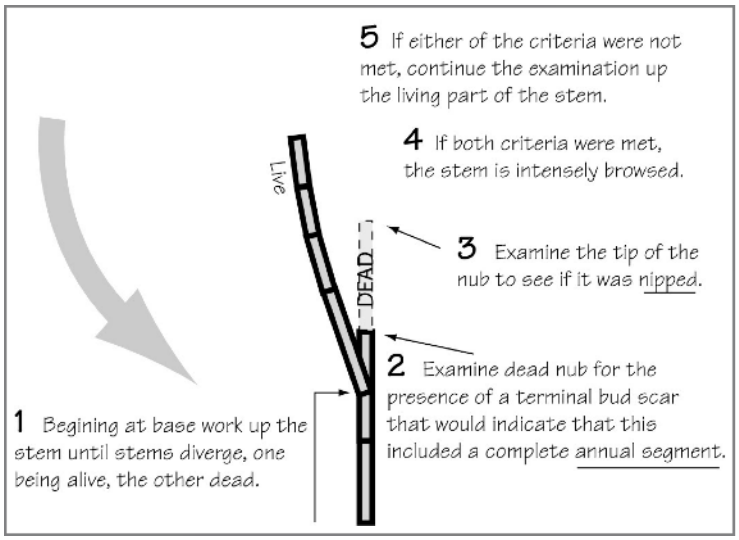


Figure 1c, d. Another sequence of ***Intense*** browsing how to recognize ***Intense*** browsing (from Richard Keigley 2008)

D6a, b. Record the species code and canopy cover for ***every*** shrub species observed on the polygon. Determine the portion of the species cover represented by each of three groups: seedling/saplings, mature, or decadent/dead. (***NOTE:*** For shrubs, all decadent individuals are included in one group with dead individuals. This contrasts to the method of recording tree decadence, where the decadence within each size class is recorded.) As with trees, decadent shrubs are individuals having 30 percent or more dead material in the canopy. The canopy covers of the three age/size groups for a species must total approximately 100 percent.

In general, shrub seedling/saplings can be distinguished from mature plants on the following basis: For normally tall shrubs, which have an average mature height of over 1.8 m (6.0 ft), seedlings and saplings will be plants reaching only into the first and second vegetation layers (shorter than 1.8 m [6.0 ft]). For shrub species having normal mature height between 0.5 m (1.5 ft) and 1.8 m (6.0 ft), seedlings and saplings are individuals reaching only into the first vegetation layer (below 0.5 m [1.5 ft]). For short shrub species, whose mature height is 0.5 m (1.5 ft) or less, observers must judge individual plants for height, reproductive structures, and other characteristics that indicate relative age. Refer to reference manuals on the regional flora for information of normal sizes for unfamiliar species. Remember that browsing may have shortened the stature of mature specimens.

When estimating degree of utilization, count browsed second year and older leaders on representative plants of woody species normally browsed by ungulates. Do not count current year's use, because this would not accurately reflect actual use when more browsing can occur later in the season. Browsing of second year or older material affects the overall health of the plant and continual high use will affect the plant's ability to maintain itself on the site. Determine percentage by comparing the number of leaders browsed or utilized with the total number of leaders available (those within animal reach) on a representative sample (at least three plants) of each shrub species present. Do not count utilization on dead plants, unless it is clear that death resulted from over-grazing. ***NOTE:*** If a shrub is entirely mushroom/umbrella shaped by long-term intense browse or rubbing, count browse utilization of it as heavy. Record to the right of the slash (/) the ***one category*** that best describes shrub utilization for each size class (using the five categories in item D5 above).

Example:	Species	Cover	Sdlg-Splg/Util	Mature/Util	Dec-Dead/Util	Shrub Growth Form
	ARTTRI	2	P / Moderate	7 / Light	3 / Unavail.	N

D6c. Record the category best describing the dominant appearance of each shrub species in the polygon.

Code	Description
N	***Normal Growth Form.*** No apparent deviation from the normal appearance of the lifeform.
F	***Flat-Topped Growth Form*.** Shrubs with the tallest leaders hedged (e.g., hedging from the top down). (Moose during winter in deep snow browse exposed branches of shorter plants.)
U	***Umbrella-shaped/Heavily-hedged/High-lined.*** Shrubs that have most of the branches (up to 1.5 m [5 ft] in height) removed by browsing.
C	***Cut Off at or Near the Ground.*** Shrubs that have been cut off by beaver or humans, at or near the base of the main stem(s).

D6d. For each shrub species listed, record the type of architecture caused by browsing. Follow Keigley and Frisina (1998) in determining the architecture type. Refer to the Keigley and Frisina (1998) document (*Browse Evaluation by Analysis of Growth Form*) for greater detail and illustrations for this determination. Evaluate typical specimens of each species observed in making the determination. On some polygons there may be multiple situations causing different architecture types in the same species to occur (i.e., when there are areas of different accessibility within the polygon, causing browsing intensity to be greater in places). In such cases, enter multiple types for the species in descending order of the relative abundance (i.e., enter the type representing the greatest number of plants first, etc.). On the field data form, enter the codes from the table below.

Architecture Type	Description
Uninterrupted	The terminal leader of the plant has not had an annual growth segment killed by browsing.
Arrested	The plant has been intensely browsed all its life, and no stem has escaped having an entire annual segment killed.
Retrogressed	After a period of light-to-moderate browsing early in life, the plant then is intensely browsed from above.
Released	An ***arrested*** or ***retrogressed*** plant has had the intense browsing removed and has been allowed to resume normal vertical growth.

D6e. For each shrub species listed, record the level of browse intensity that characterizes usage of that species throughout the polygon. This is a generalization that acknowledges there is typically a range of usage levels determined by differing degrees of accessibility and animal movement patterns across the polygon. Follow Keigley and Frisina (1998) to determine which of the two levels of browse intensity (***Intense*** or ***Light-to-Moderate***) represents the predominant condition on the polygon. Browsing is ***Intense*** when a complete annual segment is killed. Describe wide variations in level of use that might exist and the reasons for it in the comment field (D18).

D6f, g. Excessive cutting or removing parts of plants or whole plants by agents other than browsing animals (e.g., human clearing, cutting, beaver activity, etc.) can result in many of the same negative effects to the community that are caused by excessive browsing. However, other effects from this kind of removal are direct and immediate, including reduction of physical community structure and wildlife habitat values. ***Do not include natural phenomena such as natural fire, insect infestation, etc. in this evaluation.***

Removal of woody vegetation may occur at once (a logging operation), or it may be cumulative over time (annual firewood cutting or beaver activity). **This question is not so much to assess long-term incremental harvest, as it is to assess the extent that the stand is lacking vegetation that would otherwise be there today.** Give credit for re-growth. Consider how much the removal of a tree many years ago may have now been mitigated with young replacements.

Invasive woody species or genera are excluded from consideration because these are aggressive, invasive exotic plants that should be removed. They are *Elaeagnus angustifolia* (Russian olive), *Rhamnus cathartica* (common buckthorn), *Caragana arborescens* (common caragana), and *Tamarix* species (saltcedar; tamarisk).

Determine the extent to which woody vegetation (trees and shrubs) is lacking due to being physically removed (i.e., cut by beaver, cut by humans, mowed, trimmed, logged, or otherwise removed from their growing position). The timeframe is less important than the ecological effect. Time to recover from this kind of damage can vary widely with site characteristics. The objective is to measure the extent of any damage remaining ***today*** to the vegetation structure resulting from woody removal. We expect that the woody community will recover over time (re-grow), just as an eroding bank will heal with re-growing plant roots. **This question simply asks how much woody material is still missing from what should be on the site?** The amount of time since removal doesn't really matter, if re-growth has been allowed to progress. If 20 years after logging, the site has a stand of sapling spruce trees, then it should get partial re-growth credit, but not full credit, since the trees still lack much of their potential habitat and ecological value. (***NOTE:*** In general, the more recent the removal, the more entirely it should be fully counted; and conversely, the older the removal, the more likely it will have been mitigated by re-growth.)

This question is really looking at volume (three dimensions) and not canopy cover (two dimensions). For example, if an old growth spruce tree is removed, a number of new seedlings/saplings may become established and could soon achieve the same canopy cover as the old tree had. However, the value of the old tree to wildlife and overall habitat values is far greater than that of the seedling/saplings. It will take a very long time before the seedlings/saplings can grow to replace all the lost habitat values that were provided by the tall old tree. On the other hand, shrubs, such as willows, grow faster and may replace the volume of removed plants in a much shorter time. **Answer this question by estimating the percent of woody material that is missing from the site due to having been removed by human action or other methods regardless of timeframe. Select a range category from the choices given that best represents the percent of missing woody material.**

Note 1: *If the polygon does not have the ability to support (potential for) any trees and shrubs (example: saline conditions) and there is no evidence that it ever had any,* ***record as NA*** *and record the reason in the comment section.*

Note 2: *If the polygon has potential for trees and shrubs but they are not present, look for evidence (i.e. stumps or cut woody plants within the polygon or other indicators [e.g. adjacent lands, across the fence, surrounding landscape, personal communication, historical imagery]).*

Note 3: *When insufficient data/evidence is available to make a call,* ***record as NC*** *and record the reason in the comment section. Also used for old polygons when data was not collected.*

D7 and **D8.** Record the species code and the percent canopy cover for graminoid and forb species observed in the polygon.

D9. The purpose of this item is to describe the vegetation structure in terms of height layers and plant lifeforms on the polygon. (Think of the layering as though it were a GIS file with 12 layers, each one representing one of four lifeforms [trees, shrubs, graminoids, and forbs] in one of three height layers.) Include the canopy cover on the polygon that is provided by all rooted plants (live or dead). Do not include fallen wood or other plant litter.

Record the percent canopy cover of each plant lifeform in each of the three height layers. Consider each group in each layer separately. For example, shrubs in layer 2 will be the canopy cover of all plants of all shrubs in the polygon between 0.5 m (1.5 ft) and 1.8 m (6.0 ft) tall (roughly knee high to head high). In estimating this value, ignore all plants taller and shorter than this range. Similarly, estimate the cover separately of those taller and those shorter shrubs. Proceed in this way through each lifeform and layer. As a check, refer to your species/canopy lists to help remember what all you have seen on the site. ***Leave no field blank;*** enter 0 to indicate absence of a value. (A blank field means the observer forgot to collect the data; a value means the observer looked.) See further discussion in the note for item D10.

D10. Record the total percent of the polygon area occupied by canopy cover of each plant lifeform. Include the canopy cover on the polygon that is provided by all standing, rooted plants (live or dead). Do not include fallen wood or other plant litter. Avoid counting overlapping areas more than once for one group. (For example, an area is not counted twice for total tree cover if seedlings cover all ground under mature trees.) However, the same piece of ground may occur under the canopy of more than one group. (For example, areas covered by grass which are also under trees would be counted for both tree and grass lifeforms.) On the other hand, when estimating total cover of all plants (item D12), the area covered by both trees and grass would only be counted once—trees and grass in this case being part of the same group (all four plant groups).

D11. Record the percent of the polygon area covered by tree and shrub (woody species) canopy considered as a group in the sense described above. Include the canopy cover on the polygon that is provided by all standing, rooted plants (live or dead). Do not include fallen wood.

D12. Record the percent of the polygon area covered by the canopy of all four plant groups together. Include the canopy cover on the polygon that is provided by all standing, rooted plants (live or dead). Do not include fallen wood or other plant litter. Do not consider the polygon area covered by water (such as between emergent plants).

D13a, b. Invasive plants (noxious weeds) are alien species whose introduction does or is likely to cause economic or environmental harm. Without regard to whether the disturbance that allowed their establishment is natural or human-caused, weed presence indicates a degrading ecosystem. While some of these species may contribute to some upland functions, their negative impacts reduce overall site health. This item assesses the degree and extent to which the site is impacted by the presence of noxious weeds. The severity of the weed problem on a site is a function of density/distribution (pattern of occurrence), as well as abundance of the weeds. A weed list should be used that is standard for the region.

Record the combined percent canopy cover and the overall density distribution class of all invasive plants on the polygon. Common invasive plant species are listed on the form. ***Leave no listed species field blank, however;*** enter 0 to indicate absence of a species. (A blank field means the observer forgot to collect the data; a value means the observer looked.) For each weed species observed record canopy cover as a percentage of the polygon (area being evaluated) and density/distribution class. Choose a density/distribution class from the chart (Figure 2) below that best represents each species' pattern of presence on the site.

CLASS	DESCRIPTION OF ABUNDANCE	DISTRIBUTION PATTERN
0	No invasive plants on the polygon	
1	Rare occurrence	
2	A few sporadically occurring individual plants	
3	A single patch	
4	A single patch plus a few sporadically occurring plants	
5	Several sporadically occurring plants	
6	A single patch plus several sporadically occurring plants	
7	A few patches	
8	A few patches plus several sporadically occurring plants	
9	Several well spaced patches	
10	Continuous uniform occurrence 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 associated with a wetter or drier zone within the polygon.	

Figure 2. Invasive plant species class guidelines (figure adapted from Adams and others [2003])

D13c. Record total presence of all invasive plant species on the polygon. Use the same method described above without consideration of individual species, but instead by considering all weed species together as though they were one. Enter the total canopy cover of all invasive plant species and the density/distribution class of all invasive plant species considered together.

D14a, b. Areas with historically intense grazing often have large canopy cover of undesirable herbaceous species, which tend to be less productive and which contribute less to ecological functions. A large cover of disturbance-increaser undesirable herbaceous species, native or exotic, indicates displacement from the potential natural community (PNC) and a reduction in upland health. These species generally are less productive, have shallow roots, and poorly perform most upland functions. They usually result from some disturbance, which removes more desirable species. Invasive plant species considered in the previous item are not reconsidered.

A list of disturbance-increaser undesirable species that are counted is presented below. Other disturbance-increaser undesirable species may also be present on a site, but consistency and comparability will be maintained by always counting the same set of species.

Antennaria species (everlasting; pussytoes)
Artemisia frigida (fringed sagewort)
Filago arvensis (field filago)
Gutierrezia sarothrae (broom snakeweed)
Lepidium densiflorum (prairie pepperweed)
Medicago lupulina (black medick)
Opuntia species (prickly-pear; cactus)
Phleum pratense (timothy)
Plantago lanceolata (English plantain)
Poa compressa (Canada bluegrass)
Poa pratensis (Kentucky bluegrass)
Sisymbrium altissimum (tall tumblemustard)
Sisymbrium loeselii (Loeselii tumblemustard)
Taraxacum laevigatum (red-seeded dandelion)
Taraxacum officinale (common dandelion)
Trifolium pratense (red clover)
Trifolium repens (white clover)

D15. List the upland habitat type(s) and/or community type(s) found in the polygon using a manual for identifying types in the region in which you are working, such as *Forest Habitat Types of Montana* (Pfister and others 1977), *Grassland and shrubland habitat types of Western Montana* (Mueggler and Stewart 1980), or *Classification and Management of Upland,*

Riparian, and Wetland Sites in the USDI Bureau of Land Management's Miles City Field Office, Northern Great Plains, Eastern Montana (Hansen and others 2008), or Ecological Site descriptions from the USDA Natural Resource Conservation Service (2013)—or a similar publication written for the region in which you are working. If the habitat type cannot be determined for a portion of the polygon, then list the appropriate community type(s) of that portion. If neither the habitat type nor community type can be determined for any portion of the polygon (or in areas where the habitat and community types have not been named and described), list the area in question as unclassified wetland type and give the dominant species present. Indicate with the appropriate abbreviation if these are habitat types (HT), community types (CT), dominance types (DT), or ecological site type, for example, PINPON/AGRSPI HT. For each type listed, estimate the percent of the polygon represented. If known, record the successional stage (i.e., early seral, mid-seral, late seral, and climax), or give other comments about the type. As a minimum, list all types which cover 5 percent or more of the polygon. The total must approximate 100 percent. Slight deviations due to use of class codes or to omission of types covering less than 5 percent of the polygon are allowed. ***NOTE:*** For any area classified as an unclassified wetland type, it is important to list any species present which can indicate the wetness or dryness of the site.

D16a-c. Fire plays an important role on shaping our landscape. Fire can dramatically alter the vegetational expression of a polygon, especially woody vegetation. This question pertains to the more recent fire history and the affect on the polygon.

D17. This question assesses the present vegetation structure on the site as it compares to the potential vegetation structure. Vegetation community structure is the vertical layering of various height plant growth forms created by the species composition as indicated by the appropriate ecological site or habitat type/community type. This is important for ecological function, i.e., primary biomass productivity, for habitat values, and for maintenance of soil and hydrologic resources.

It is important to key the site to a type using a vegetation-based classification appropriate to the region in which you are working. For habitat types/community types, in western Montana use the *Grassland and shrubland habitat types of Western Montana* (Mueggler and Stewart 1980), and for eastern Montana use *Classification and Management of Upland, Riparian, and Wetland Sites in the USDI Bureau of Land Management's Miles City Field Office, Northern Great Plains, Eastern Montana* (Hansen and others 2008). Ecological site descriptions are available from the USDA Natural Resource Conservation Service (2013). When the name of the habitat type(s) or successional community type(s) on the site are known, then one can compare the vegetation on the site to that described in the document for late seral to climax, or relatively undisturbed, stands of that type. Using the broad categories below, choose a best fit to indicate how structurally intact the site vegetation is, as compared to the habitat type description. To judge the standard of comparison for vegetation structure, refer to stand data summaries in the classification documents, such as named above, that show species average canopy cover and constancy of occurrence in each habitat type.

Without a locally appropriate vegetation based classification to use, the observer must use judgement in making the call of what the potential vegetative structure is on the site. ***NOTE:*** *The user needs to refer to the appropriate habitat type/ community type or ecological site description for information pertaining successional stages.*

Forest and/or Woodland Sites Community Structure—The following table is to be used for forest or woodland upland sites. (The tables for shrubland, grassland, and modified upland sites are found after the discussion of this table.)

Category	Description
Good	All expected structural lifeform layers are present and well represented.
Slight Reduction	There is noticeable light-to-moderate overstory and/or understory layer reduction, such as from a light selective or thinning timber harvest, or from the disturbance of light-to-moderate livestock grazing opening the understory.
Moderate	There is moderate opening of the overstory and/or understory, with the most palatable available woody species greatly reduced, or eliminated. Taller understory woody species generally have been replaced by shorter woody species. Palatable herbaceous forage species have been reduced in stature and abundance.
Severe	There has been severe opening of the stand overstory and/or understory; most palatable available woody species have been replaced by disturbance-induced low shrubs or less palatable herbaceous species.

Without a locally appropriate vegetation-based classification to use, the observer must use judgement in making the call of what the potential vegetative structure is on the site. Figure 3 is an illustrated example to assist in visualizing the categories of disturbance-caused alteration to understory structure on forested sites. Photo 1a-h show actual examples to illustrate the wide range of natural structure of forest and woodland vegetation types, and to assist in visualizing the categories of disturbance-caused alteration to the vegetation structure on forest and woodland sites.

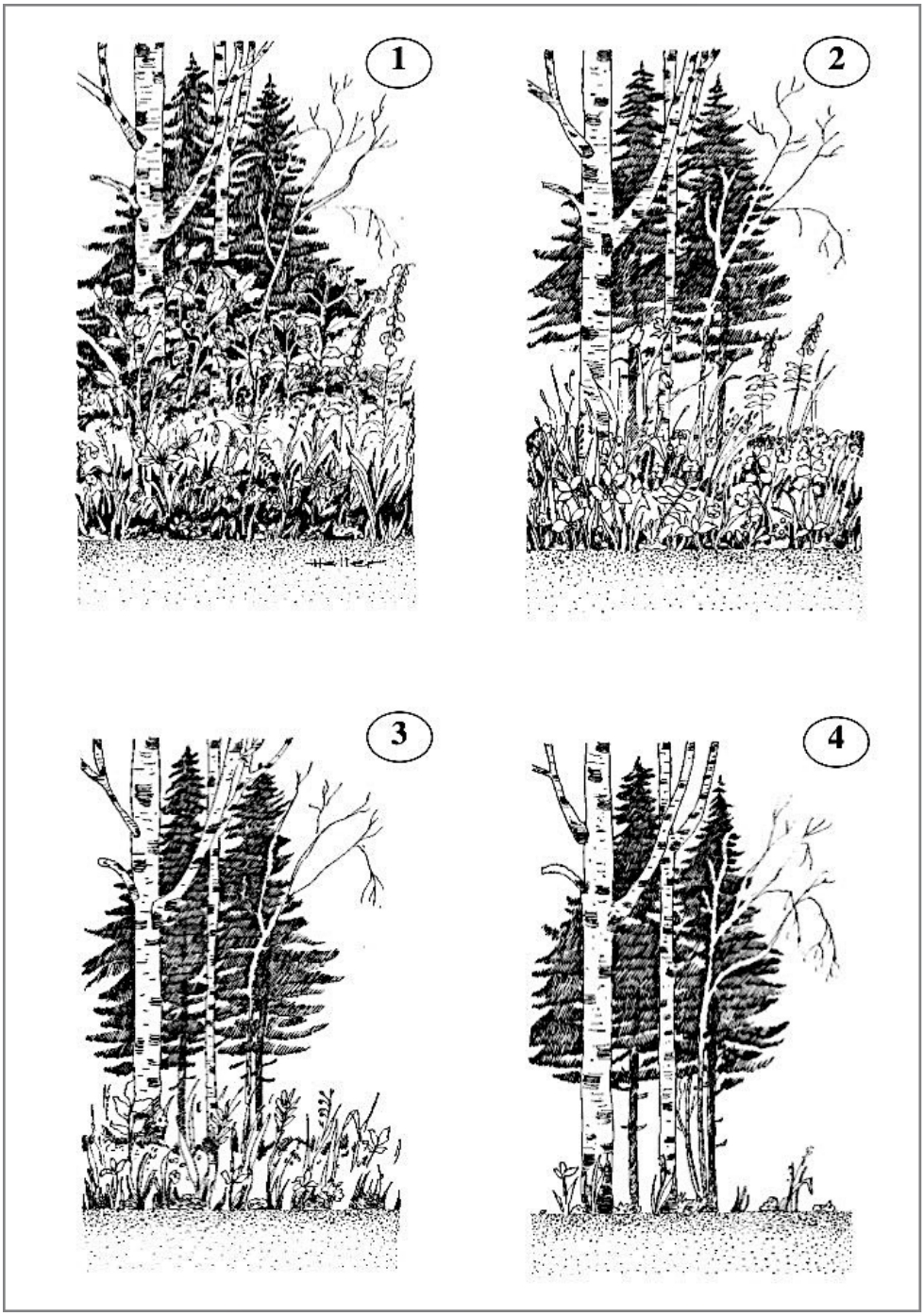


Figure 3. Example illustration of progressive loss of vegetation structural layers on a forested site. 1) All expected layers well represented; 2) One structural layer reduced by half, or more; 3) Tall shrubs eliminated and shorter shrubs noticeably reduced; and 4) Tall and shorter shrub layers absent, and herbaceous layer noticeably reduced. ***NOTE:*** *Not all forest sites will look like this figure or have the same site potential. The user needs to refer to the appropriate habitat type/community type or the ecological site description for information pertaining successional stages.* (figure adapted from Adams and others [2003]

Photo 1a. An open forest stand of *Pinus ponderosa/Agropyron spicatum* (ponderosa pine/bluebunch wheatgrass) habitat type with sparse understory at or near its potential
(Category = Good)

Photo 1b. A *Pinus ponderosa/Prunus virginiana* (ponderosa pine/chokecherry) habitat type stand with intact understory layers of tall shrubs and graminoids, also at or near potential
(Category = Good)

Photo 1c. A forest stand with a heavy and complex cover of all expected structural layers present; mid-to-late-mid seral
(Category = Good)

Photo 1d. A forest stand with overstory opened by timber harvest; regeneration is progressing and understory layer is intact; early seral
(Category = Slight Reduction)

Photo 1e. A forest stand with 2 decades regrowth after being opened by timber harvest, and understory layers opened by grazing and browsing; early seral (Category = Slight Reduction)

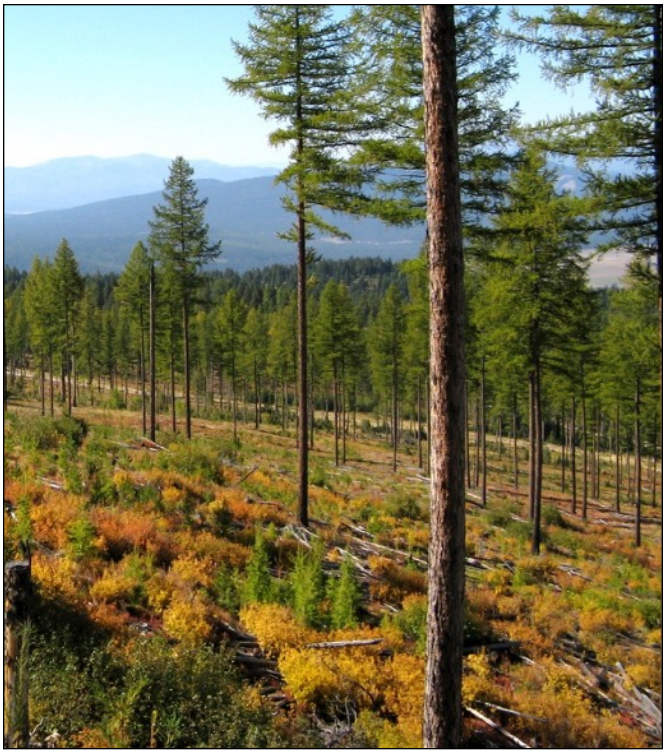


Photo 1f. Forest canopy opened by timber harvest; tall and medium layer removed; low shrubs may be near current potential; early to-early-mid seral (Category = Moderate)

Photo 1g. Forest canopy opened by timber harvest; little tall shrub site potential; low shrub and herbaceous understory layers remain intact (Category = Moderate)

Photo 1h. Forest canopy severely reduced by timber harvest; tall shrub layer is removed; medium and low shrub and herbaceous layers reduced (Category = Severe)

***Shrubland Sites Community Structure*—**The following table is to be used for shrubland upland sites. (The tables for grassland and modified upland sites are found after the discussion of this table.)

Category	Description
Good	All expected structural lifeform layers are present and well represented.
Slight Reduction	There is noticeable light-to-moderate overstory and/or understory layer reduction, such as from a cutting or removal of shrubs, or the disturbance of light-to-moderate livestock grazing opening the understory.
Moderate	There is moderate opening of the overstory and/or understory, with the most palatable available woody species greatly reduced, or eliminated. Taller understory woody species generally have been replaced by shorter woody species. Palatable herbaceous forage species have been reduced in stature and abundance.
Severe	There has been severe opening of the stand overstory and/or understory; most palatable available woody species have been replaced by disturbance-induced low shrubs or less palatable herbaceous species.

Without a locally appropriate vegetation based classification to use, the observer must use judgement in making the call of what the potential vegetative structure is on the site. Photo 2a-h show examples to illustrate the wide range of natural structure of shrubland vegetation types, and to assist in visualizing the categories of disturbance-caused alteration to the understory structure on shrubland these sites. ***NOTE:*** *The user needs to refer to the appropriate ecological site or habitat type/community type description for information pertaining successional stages.*

Photo 2a. A dense stand of woody vegetation with tall, medium and low shrub layers intact (Category = Good)

Photo 2b. A stand of medium and low shrubs with all potential layers intact, including the herbaceous layer (Category = Good)

Photo 2c. A low shrub/bunchgrass stand with all layers at or near potential (Category = Good)

Photo 2d. A low shrub/bunchgrass stand with shrub and herbaceous layers only slightly reduced by grazing and browsing (Category = Slight Reduction)

Photo 2e. A stand of low shrubs with taller bunchgrasses replaced by annual and short perennial grasses
(Category = Slight Reduction)

Photo 2f. A stand with the shrub canopy noticeably reduced, and the taller bunchgrasses greatly reduced or replaced by annual and short perennial graminoid species (Category = Moderate)

Photo 2g. A stand with the medium and low shrub layer greatly reduced and the taller grass layer replaced with low, sod-forming, species and bare ground (Category = Severe)

Photo 2h. A low shrub stand with shrubs much reduced and most bunchgrasses replaced by low, sod-forming grasses or bare ground (Category = Severe)

Grassland Sites Community Structure—The following table is to be used for grassland upland sites. (The table for modified upland sites is found after the discussion of this table.)

Category	Description
Good	The vegetative community structure is fully intact and provides full ecological function appropriate to the ecological site(s) or habitat type(s)/community type(s).
Slight Reduction	There is noticeable, but not severe, alteration of the vegetative community structure, and ecological function is intact but slightly impaired.
Moderate	There is moderate alteration of the vegetative community structure and ecological function is moderately impaired.
Severe	The vegetative community structure has been severely altered, and provides greatly diminished ecological function.

Without a locally appropriate vegetation-based classification to use, the observer must use judgement in making the call of what the potential vegetative structure is on the site. Figure 4 is a conceptual illustration to assist in visualizing the categories of disturbance-caused alteration to the understory structure on grassland sites. Photo 3a-d depict grassland examples of the four scoring categories of grassland community structural integrity.

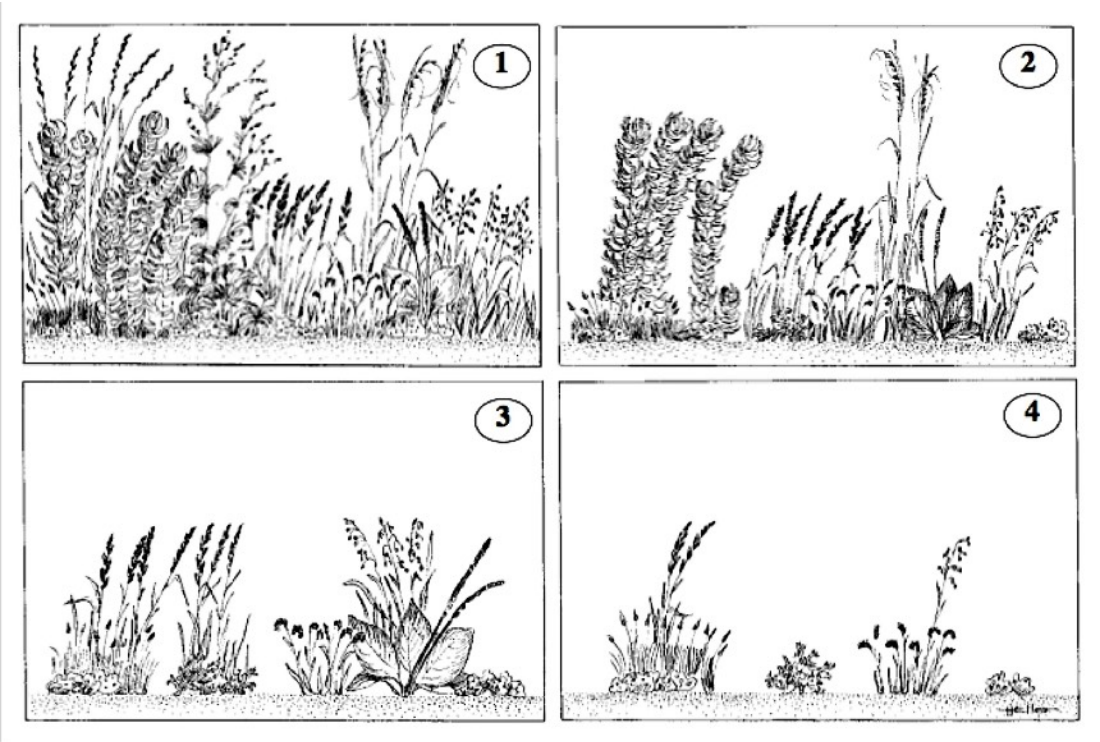


Figure 4. Example illustration of structural change to grassland plant community as disturbance level increases. 1) All expected structural layers well represented; 2) Tall grasses and forbs significantly reduced; 3) Tall grasses and forbs layer absent, and mid height layer reduced; 4) Community reduced to only low grasses and forbs. ***NOTE:*** *Not all grassland sites will look like this figure or have the same site potential. The user needs to refer to an appropriate ecological site or habitat type/community type description for information about successional stages.* (figure adapted from Adams and others [2003]

Photo 3a. A stand of *Agropyron spicatum* (bluebunch wheatgrass), the tallest late seral species on this productive site (Category = Good)

Photo 3b. A healthy bunchgrass stand on a xeric site with sparse vegetation potential (Category = Good)

Photo 3c. A healthy stand of *Andropogon scoparius/Carex filifolia* (little bluestem/threadleaf sedge) habitat type (Category = good)

Photo 3d. A bunchgrass stand with much of the tallest layer replaced by shorter species (Note the scattering of the low shrub *Artemisia cana* [silver sagebrush]) (Category = Slightly Reduced)

Photo 3e. A stand of *Agropyron spicatum* (bluebunch wheatgrass) with taller grasses reduced and the understory converted to disturbance induced *Artemisia frigida* (fringed sagewort) and increased *Carex filifolia* (threadleaf sedge)
(Category = Moderate)

Photo 3f. A stand of *Agropyron spicatum* (bluebunch wheatgrass) with taller bunchgrasses reduced and the understory converted to disturbance induced forbs and lower, and sod-forming graminoids (Category = Moderate)

Photo 3g. A severely overgrazed bunchgrass stand where most all tall grasses and mid height grasses are replaced by low, sod-forming, graminoid species and bare ground (Category = Severe)

Photo 3h. A close view of a severely disturbed grassland site converted to the low, sod-forming, *Bouteloua gracilis* (blue grama), *Opuntia polyacantha* (plains prickly-pear), and *Carex filifolia* (threadleaf sedge) (Category = Severe)

Modified Upland Sites Community Structure*—**Modified upland sites are dominated by vegetation that has been modified by human manipulation. These are sites essentially lacking naturally occurring native perennial plants, and that usually have undergone manipulation, such as plowing, seeding (i.e., tame pasture mixes, crops, etc.), hydrologic alteration, irrigation, etc. This designation does not include sites that still have enough native perennial plant components present to key the site to a habitat type or community type (e.g., a site altered by livestock grazing). Examples of a ***modified upland vegetation site include: a tame pasture of seeded introduced or cultivar grass species or varieties, Conservation Reserve Program (CRP) lands seeded to species like *Agropyron cristatum* (crested wheatgrass), and improved forest stands (e.g., monoculture stands of trees planted in rows). Photo 4a-d provides example illustrations of modified grassland sites, where the natural vegetation has been purposely converted by agricultural manipulation to a crop cover, usually of introduced species.

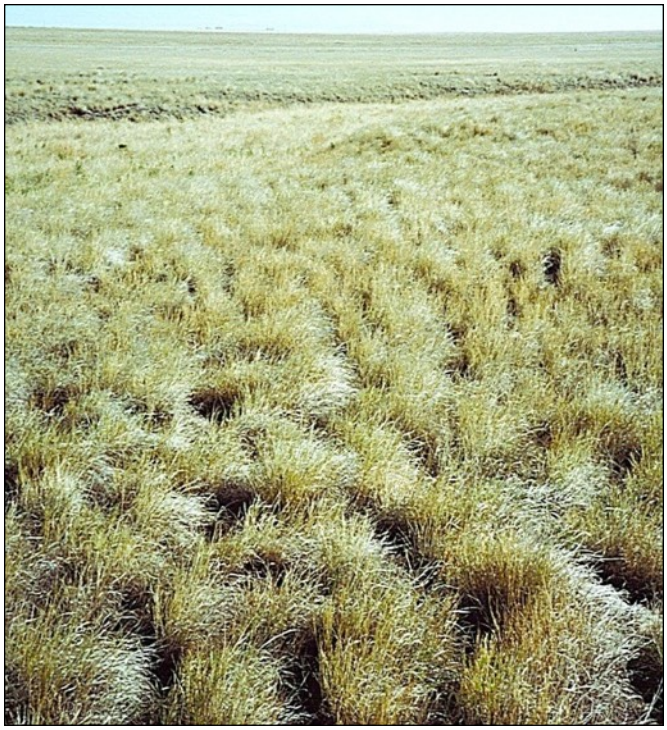


Photo 4a. A stand of *Agropyron cristatum* (crested wheatgrass), typically seeded on Conservation Reserve Program (CRP) lands

Photo 4b. A typical eastern Montana stand of *Agropyron cristatum* (crested wheatgrass) after several decades

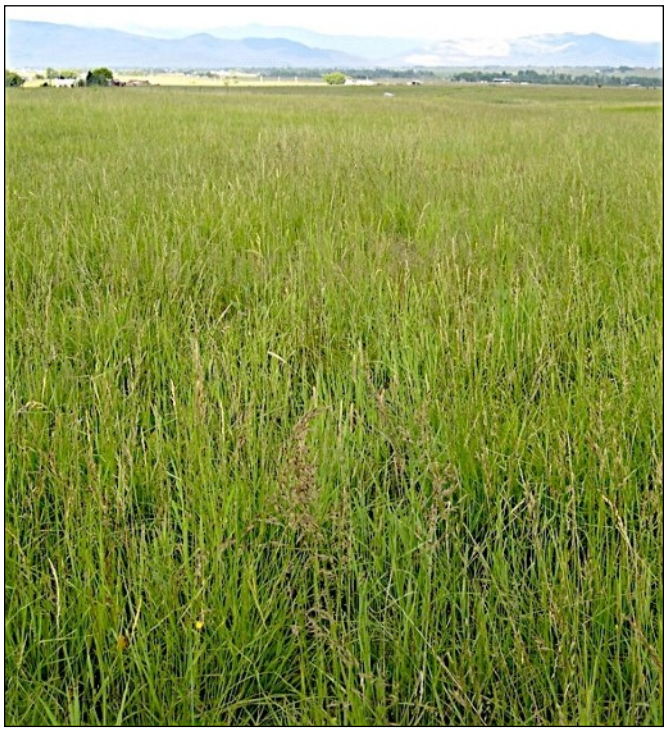


Photo 4c. A seeded pasture/hay mix on an irrigated field

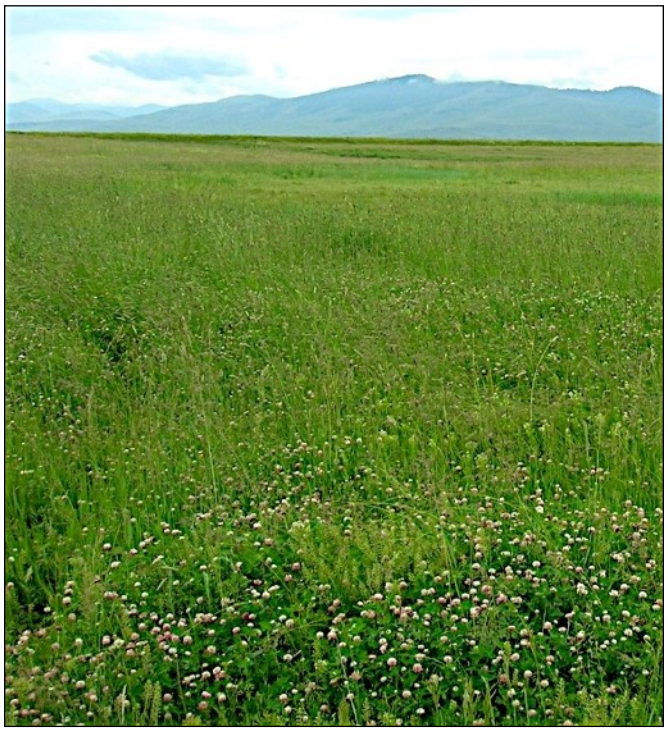


Photo 4d. Another seeded pasture/hay mix on an irrigated field

The following table is to be used for modified upland sites.

Category	Description
Good	The vegetative community structure meets management goals and provides adequate ecological function.
Slight Reduction	There is noticeable, but not severe, alteration of the desired vegetative community structure, and ecological function is intact but slightly impaired.
Moderate	There is moderate alteration of the desired vegetative community structure and ecological function is moderately impaired.
Severe	The desired vegetative community structure has been severely altered, and provides greatly diminished ecological function.

Because the site is modified, the observer must use judgement in making the call of what the desired vegetative community structure is on the site. If management goals are known, consider them in making the call. If not, the observer should consider how the present vegetation community structure meets ecological functionality (such as wildlife habitat, soil stability, etc).

D18. Select the ***one category*** (Improving, Degrading, Static, or Trend Unknown) that best indicates the current trend of the vegetative community on the polygon to the extent possible. Trend refers, in the sense used here, not specifically to successional pathway change, but in a more general sense of apparent community health. By definition, trend implies change over time. Accordingly, a trend analysis would require comparison of repeated observations over time. However, some insights into trend can be observed in a single visit. For example, the observer may notice healing (revegetating) of a degraded shore area and recent establishment of woody seedlings and saplings. This would indicate changing conditions that suggest an improving trend. If such indicators are not apparent, select the category status unknown.

D19. Add any necessary commentary to explain or amplify the vegetation data recorded. ***Do not leave this space blank.*** Describe any unique characteristics of the site and other observations relating to the vegetation. This space is the place for general commentary to help the reader understand the larger context of the data. Such things as landscape setting and local land use history are appropriate.

Physical Site Data
E1. Ecological site name is entered only if this information is known from a previous ecological site determination.

E2. Ecological site ID also is entered only if this information is known from a previous ecological site determination.

E3. The major land resource area is entered only if this information is known from a previous ecological site determination.

E4a-c. Describe the physiographic features of the site by selecting the most appropriate choice from the list offered under each category, or by providing a numeric value, as appropriate. These are:

- **Aspect**—Provide a compass bearing (in degrees) indicating the direction the slope faces.
- **Slope Steepness:**
  - ***Slight***—Nearly level, gently sloping, and/or undulating (between 0 and 9 percent). Machinery use is hardly limited by the terrain.
  - ***Moderate***—Strongly sloping, rolling, or moderately steep and hilly (between 10 and 29 percent). Use of machinery can still be done, but much more care is necessary.
  - ***Severe***—Steep and very steep slopes (greater than 30 percent) that generally preclude wheeled machinery. Track machines can still be used.
- **Flooding/Ponding Frequency:**
  - ***Rare***—Occurs almost never. Surface water ponding does not affect vegetation potential or land use.
  - ***Occasional***—Occurs less than once every 2 years. There may be less than 25 percent plant species of *facultative wetland status* present, but the site is predominantly covered by *upland* species (Reed 1988).
  - ***Frequent***—Flooding and/or ponding occurs almost every year. Riparian/wetland vegetation comprises more than 25 percent of the plant canopy cover. (*The polygon should be inventoried using either the Lotic or Lentic Riparian Inventory Form.*)

E5a-b. Answer these questions in the office from published sources of climatic information.

E6. Estimate the surface soil texture class to characterize the polygon, and answer the drainage and parent material portions of this question in the office from published soil survey information.

E7a-d. Human alteration of the vegetation includes all changes to the plant community composition or structure on the polygon from human causes. It is not meant to include transitory or short-term removal of plant material that does not impact plant community composition (i.e., grazing at carefully managed levels). In **E7a,** estimate the cumulative total part (percentage) of the polygon vegetation that has been altered in ways such as described in E7b and E7c below.

E7b. Human causes of alteration to the vegetation may take many forms. Break this total down among the causes or agents of cause listed on the form. This breakdown attributed to each cause is only for management information. Rough estimation is appropriate, with some overlap likely among the effects. Causes identified need to approximate 100 percent. Great precision is not expected or needed. Common human causes of alteration to the vegetation on an upland site include:

- **Grazing.** Long-term livestock use often results in conversion of certain components of the plant community to dominance by species that are tolerant of such use, or that are less utilized by the domestic animals.
- **Cultivation.** This obvious cause of alteration may be either the conversion of wild vegetation to domestic pasture species for grazing, or the actual cropping of planted vegetation for hay or other products.
- **Timber Harvest.** The alteration from this cause is not simply the removal of some trees (which might be done without any real change to the vegetation community), but rather it is the larger scale opening of the canopy and the induced regression of the site to a much earlier seral stage of vegetation succession. Also common with this cause of disturbance is introduction of alien plant species, or even the pro-active planting of desired revegetation.
- **Mining.** With mining activities comes necessary disturbance of the land surface. The minerals introduced to the site may be unnatural to the native vegetation. The introduction of alien plant species may also occur.
- **Home or Urban Development.** Home development commonly causes disruption of the natural vegetation. Human development of domestic or commercial enterprise also occurs adjacent to urban settings. Such development necessarily causes the disruption of natural vegetation in many cases.
- **Construction.** Human infrastructure (roads, railroads, and/or earth moving for other construction purposes) impact the vegetation of upland sites. They inevitably represent disrupted natural vegetation, but also impermeable surface area, and the introduction of alien or invasive plant species.
- **Recreation.** The additional traffic of human usage may trample the vegetation, introduce trails with compaction of the soil, and introduce alien or invasive plant species.
- **Other.** List any other causes of alteration to the polygon vegetation that are not listed above, and describe them in the space provided.

E7c. Also of concern are the kinds of change that diminish the presence or disrupt the natural function of the vegetation, and that result from the causes listed above. As for the various causes, estimate the distribution of kinds of alteration observed on the site. Again, rough estimation is appropriate. Some overlap is likely and great precision is not needed, but recorded kinds indicated must add to approximate 100 percent. Among the kinds of change to look for are:

- **Physical clearing of vegetation**, such as removing woody species to create more herbaceous cover for hay production or livestock forage, timber harvest, road construction, etc. Clearing is purposeful, long-term removal of vegetation. Do not count short term removal of plant parts, such as from foraging by well managed livestock, or mowing of hay from a herbaceous meadow;
- **Replacing tall species with short species** (e.g., chokecherry for snowberry). This is a common result of long-term intense use by livestock in tall shrub communities.
- **Replacing native plants with non-native species**, such as for landscaping or to create pasture for livestock (e.g., *Poa pratensis* [Kentucky bluegrass] for native grasses, or dandelion and low clovers for native forbs);
- **Replacing woody species with herbaceous species**, such as shrubs for grasses and forbs (e.g., replacement of a tall shrub layer under a tree canopy by *Bromus inermis* [smooth brome]);
- **Other** kinds of alteration of the vegetation to consider (which may overlap with those listed above) include such as:
    - Removal of structural layers;
    - Allowing invasion by weedy species; and
    - Replacing late seral with early seral communities.

NOTE: Do not count the same area twice by including it as both a vegetative and a physical alteration, unless there clearly are both kinds of alteration. Decide into which category a particular effect should go. For example: A timber harvest may

clear vegetation, but not necessarily cause physical damage on one site; while on another site it causes both clearing of vegetation and disruption of the soil by heavy equipment.

E7d. Comment to explain your answers. Use this space to elaborate on any overlap between the various causes and kinds of alteration noted.

E8a-e. Human alteration of the physical site is meant to include all changes to physical attributes of the site caused by human actions (e.g., logging, mining, human structures, etc.) or by agents of human management (e.g., livestock). The kinds of physical change that diminish or disrupt natural functions include, but are not limited to, such things as:

Wallows and trails by large animals	Roads, driveways, walkways, trails, etc.
Buildings and landscaping	Land leveling
Plowing and tilling the land	Hydrologic draining, ditching, berming, etc.

NOTE: Do not count the same area twice by including it as both a vegetative and a physical alteration, unless there clearly are both kinds of alteration. Decide into which category a particular effect should go.

E8a. Estimate the total part of the polygon area that has been altered physically by human or livestock activity.

E8b. Break the total amount of physical alteration down among the various causes listed:

- **Grazing.** Long-term livestock use often results in such physical alterations as trails, etc.
- **Cultivation.** This would be the mechanical disruption of natural soil structure by farming activities.
- **Timber Harvest.** Although it may be minimized, timber harvest usually results in at least some physical damage to the soil surface by the machinery used in the process.
- **Mining**. Mining activities usually cause physical damage to the soil surface, but may also include introduction of waste materials to the site, including chemical effects to the soil.
- **Home or Urban Development.** Such development generally covers the soil surface with impermeable area. It often typically includes alteration to the local topography and mechanical disruption of drainage and soil structure.
- **Construction.** Human infrastructure (roads, railroads, and/or earth moving for other construction purposes) causes structural disruption.
- **Recreation.** Trails at popular sites often cause soil compaction and erosion, especially where mechanical devices (i.e., off-road vehicles and ATVs) are used. The banks of popular fishing sites are often susceptible to foot damage.
- **Water Management.** Include irrigation ditches, drainage ways, water diversions ditches and canals, etc.
- **Other.** List any other causes of physical alteration not listed above, and describe them in the space provided.

E8c. A polygon will typically have only a few kinds of alteration. For example: There may not be a bank present. Break down the total amount of physical alteration among these kinds:

- **Soil Compaction.** This kind of alteration includes livestock-caused hummocking and pugging, recreational trails that obviously have compacted the soil, vehicle and machine tracks and ruts in soft soil, etc.
- **Human Impervious Surface.** This includes roofs, hardened surfaces like walkways and roads, boat launches, etc.
- **Hydrologic Change.** Include area that is physically affected by removal or addition of water for human purpose. The physical effects to look for are structures, such as water diversions, ditches, and canals that affect the drainage pattern; as well as erosion due to reduced or increased water; bared soil surface that had water cover drained away; or area now flooded that previously supported a drier vegetation type.
- **Topographic Change.** This is the deliberate alteration of terrain for human purposes. It may be a result of earth moving by mining or construction activities, for aesthetic reasons (i.e., landscaping), or other reasons.
- **Plowing/Tilling.** This is disruption of the soil surface for cultivation purposes. It does not include the alteration of drainage or topographic pattern, which are included in the Topographic Change category.
- **Other.** List any other kind of physical alteration not named above, and describe it in the space provided.

E8d. If human-caused alteration to the physical site is recorded in F8a above, then estimate the severity of that alteration, without regard to how large or small a fraction of the polygon it might occupy. Categories of alteration degree are described in terms of change to the site vegetation and hydrologic function. (***NOTE:*** *This call uses vegetation change to indicate degree of alteration, but the alteration must be physical in nature, not just vegetative change alone; e.g., disruption of soil, hydrology, topography, etc.*) Document the call with photos and commentary. Categories of severity of human-caused physical alteration are described below with conceptual guidelines. These guidelines are not comprehensive, but are intended as a relative scale by which the observer can judge his/her site. Every case is different, and there is no absolute measuring stick to apply. Use the following comparative descriptions to choose a category of alteration on your site:

- ***None***—No human-caused alteration is observed to the polygon physical site.
- ***Slight***—Physical site integrity is near natural condition. Human-caused alteration is apparent (including recovery from any previous moderate or severe alterations), but is causing only minimal impact to the soil profile, to the plant communities, and to the hydrologic function on the site.
- ***Moderate***—As compared with nearby unaltered sites, human-caused physical alteration (including recovery from any previous severe alterations) has disrupted the physical site integrity on the polygon to the extent that plant communities and hydrological function show visible effects. The plant community differs noticeably from nearby sites on similar landscape position lacking such alterations by having introduced or missing components. Disruption of the soil profile is moderately deep, exposing the upper mineral horizon. Such alteration is either starting to become re-vegetated with appropriate species, or is already well covered with a mix of less desirable and appropriate species.
- ***Severe***—Human-caused alteration on the polygon has compromised the physical integrity of the impacted area (even if a only small area is affected). In this case, old alterations may not have recovered and may still be affecting the vegetation or hydrological functions (e.g., the plant community differs greatly from unaltered sites nearby on similar landscape position). Disruption of the soil profile extends through the upper mineral horizon, or livestock and/or other human activities have compacted the soil. Altered areas remain mostly bare of plant cover, or are being colonized by invasive or undesirable species.

E8e. Comment on any unusual or odd degree or aspect of the alteration to the polygon physical site. Use this space to elaborate on any overlap between the various causes and kinds of alteration noted.

E9a, b. Does the polygon contain exposed soil surface (bare ground)? If yes, record the portion of the polygon with exposed soil surface (bare ground). Exposed soil surfaces are those surfaces not protected from erosional forces by plants, litter or duff, downed woody materials, rocks of cobble size or larger (>6.25 cm [2.5 in]), or hardened impervious surfaces. Hardened, impervious surfaces (e.g., asphalt, concrete, etc.) are not bare ground (i.e., do not erode nor allow weeds to invade) and are not counted in item E9. ***NOTE:*** Areas quantified in items D12, E9b, and E10 account for the entire polygon.

E9c. Separate the exposed soil surface from E9b into two categories: that resulting from natural and human causes. These must total approximately 100 percent. Examples of human causes include livestock wallows and trails, hiking trails, ATV trails, roads, timber harvesting skid trails, mining, and construction activities.

E9d. Within both the natural and human-caused categories, record the proportions of exposed soil surface (bare ground) resulting from the listed causes. Within each category, the portions assigned to the individual causes must total approximately 100 percent. Explain whatever is put in the other category.

Natural processes are:

- **Erosional.** Natural flows and flood events often result in erosion that removes the soil cover. Attribute polygon bare ground to this process when there is no human cause apparent on the site that would cause the erosion.
- **Depositional.** The deposition of sediment by water flow is perhaps the greatest source of naturally occurring bare ground. If the source of sediment is some human activity (i.e., sheet erosion from plowed field, road surface, etc.), then list this bare ground under the most appropriate human-caused process.
- **Wildlife Use.** Trails and digging are common wildlife activities that result in natural bare ground.
- **Type Dependent.** Some vegetation types naturally space-out individual plants, leaving bare ground between. Typically this is a characteristic of arid land vegetation.
- **Saline/Alkaline.** The natural accumulation of mineral salts often reaches local concentrations that either support no vegetation, or support only sparse populations of adapted species. The observer should decide whether the source of such mineral accumulation is natural or caused by human activity. If unknown, then default to the natural cause.
- **Other.** Account for any naturally occurring bare ground that is not included in the categories named above, and describe what caused it in the field provided.

Human-caused bare ground may result from:

- **Grazing.** Livestock use often results in bare ground from trailing, trampling, hoof shear, and the removal of vegetation cover by overgrazing.
- **Cultivation.** Tillage and other mechanical activities in the process of cultivation of crops result in bare ground.
- **Timber Harvest.** Log skidding and other activities in the process of timber harvest may result in bare ground.
- **Mining.** Extraction and processing of minerals can result in bare ground. The deposition of waste rock (either cast aside overburden or processed tailings) is a common type of mining-caused bare ground.

- **Construction.** Construction activities of all kinds often involve excavation, earth moving, and other disruptions of the soil surface or natural soil covering.
- **Recreation.** Many modern forms of recreation involve use of mechanical vehicles that damage the vegetation cover and the integrity of soil. Even foot traffic along trails can result in significant areas of bare ground.
- **Other.** Account for any human-caused bare ground that is not included in the categories named above, and describe what caused it in the space provided.

E10. The three categories: total plant canopy cover, exposed soil surface (bare ground), and "other" account for the entire polygon area (i.e., the three categories must add to approximately 100 percent). *This question is answered in the office by the computer using data from items elsewhere on the form that are entered in the field.*

E11. Across the area of the polygon, there may be a variety of things covering the soil surface, or nothing covering some of it (the bare ground). It is of value for management reasons to know how great each of these various covers are. Record the percent of the polygon covered independently by each of the items listed. These values are to reflect the entire amount of each of these items on the polygon, without regard to whether or not they may also be covered by vegetation. For example, record the percent of the polygon covered by rocks of cobble size or larger (>6.25 cm [2.5 in]) ignoring everything else; then record the percent covered by all litter/duff, again ignoring everything else; etc. **The sum of these values, plus total vegetation cover and any bare ground, will often exceed 100 percent due to layering.**

NOTE: Animal dung, mulch/wood chips, and dead, non-rooted or rooted plant material that is not considered wood (branches, logs) are all considered litter/duff. This means that rooted standing dead herbaceous plants are considered both litter and vegetative cover. The sum of these values will often exceed the value for "other" in the previous question, because that value does not count rock, litter, wood, etc. that is covered by standing vegetation.

E12. Choose the category of percent of the polygon showing evidence of accelerated soil erosion by water and/or wind. Look for signs of soil or litter movement (e.g., deposition of sediment or litter by surface water flow, rills, pedastalling, gully formation, and blow-outs) as evidence of accelerated soil erosion. Answer this question by assessing how much of the entire polygon area exhibits these kinds of evidence of soil movement. ***NOTE:*** *On badland topography, carefully evaluate evidence of accelerated soil erosion by water and/or wind vs. normal rates of soil erosion for this setting.*

E13. Plant material litter and duff. Functional benefits of a layer of plant material residue (litter and duff) at the soil surface include: 1) the conservation of soil moisture by enhancing moisture retention and infiltration; 2) mitigation of soil temperature extremes; and 3) recycling of nutrients on the site. Although the amount of litter and duff expected on a healthy natural site varies greatly by site type, all stages of decomposition should be present, and the litter and duff distribution within a given stand of one type should be relatively even across the stand in a pattern that generally mimics the pattern of plant species distribution. Look for areas of thinner or absent litter and duff associated with evidence of animal use patterns (i.e., near trails or easily grazed areas, versus areas of more restricted access). Information about litter and duff amount and distribution can sometimes be gained by examining conditions across fences separating different management regimes.

Expected litter and duff amounts are usually developed from monitoring of long-term benchmark sites under light to moderate grazing. The reference site should be a light to moderately grazed site with enough litter and duff to retain moisture. Litter and duff includes residual plant material from previous years growth including standing stems, fallen stems and leaf material, and partially decomposed material. Estimate litter and duff across the entire polygon. Look at the distribution, evenness, and patchiness of litter and duff across the polygon. Categories are:

Amount	Category Description
>90%	Litter amounts are more or less uniform across the polygon and includes last year's growth (standing dead plant material), fallen dead plant material and variably decomposed material on the soil surface. Litter standing crop (lb/acre) is more than 90% of expected levels under a light to moderate grazing intensity.
60 to 90%	Litter amounts appear to be slightly to moderately reduced and are somewhat patchy across the polygon. Last year's growth (standing dead plant material) is less abundant with fallen dead plant material and variably decomposed material on the soil surface being more or less equal in amount. Litter standing crop (lb/acre) is between 60% to 90% of expected levels under a light to moderate grazing intensity.
30 to 60%	Litter amounts appear to be moderately reduced and are very patchy across the polygon. Last year's growth (standing dead plant material) is greatly reduced, with fallen dead plant material and variably decomposed

	material on the soil surface being the dominant form of litter. Litter standing crop (lb/acre) is between 30% to 60% of expected levels under a light to moderate grazing intensity.
<30%	Litter amounts appear greatly reduce or absent in the polygon. The extent and distribution of exposed soil has increased. There is littler or no standing or fallen litter. Decomposing material on the oils surface is the main type of litter. Litter standing crop (lb/acre) is less than 30% of expected levels under a light to moderate grazing intensity.

E14. Record comments that could summarize unique characteristics or problems not evident from the data collected. This could include a description of the landform setting context of the site, as well as any alteration or other extreme uses of the site.

E15. Describe the polygon boundaries in terms of landmark features, fences, or whatever the delineation is based upon. This is to help future observers relocate the same polygon area. Describe inner and outer boundaries. Name physical character of the delineations between wetland and upland; or give arbitrary dimensions, if that is what was used.

Additional Data Items

F1. Record the rating category that best describes the vegetation use by animals (Platts and others 1987). This is intended to measure herbivore utilization of available forage. However, it may be extended to include human removal of this forage by mowing or other means. Although Platts and others (1987) state that this available forage is mainly herbaceous, the concept is extended to also include normally utilized and available woody species. Record the category, not a precise value.

Code	Category Description
0 to 25%	Vegetation use is light or none. Almost all plant biomass at current development stage remains. Vegetation cover is close to that which would occur without use. Unvegetated areas (such as bedrock) are not a result of land uses.
26 to 50%	Vegetation use is moderate. At least half the potential plant biomass remains. Average stubble height is more than half its potential at the present stage of development.
51 to 75%	Vegetation use is high. Less than half the potential plant biomass remains. Plant stubble height is usually more than 2 inches (on many ranges).
76 to 100%	Vegetation use is very high. Only short stubble remains (usually less than 2 inches on many ranges). Almost all plant biomass has been removed. Only the root systems and parts of the stems remain.

F2 and F3. Break down the polygon and the area adjacent to the polygon using the land uses (activities) listed to reflect what is contributing to the site health. Name any others observed.

No Land Use Apparent—using information provided as well as what is observed at the site suggests there is no human land use. Very light and well managed land uses that show little or no negative impacts should still be recored in the appropriate land use type, not “no land use;”
Turf Grass (Lawn)—ground has been broken and seeded or sodded;
Tame Pasture (Grazing)—lands that are purposefully converted to non-native species for the purpose of livestock grazing;
Native Pasture (Grazing)—refers to grazing environments that are usually dominated by native plants and may occur as grasslands or woodlands (i.e., land that has not been broken and seeded but may contain introduced/invasive species that have encroached due to land practices);
Recreation (ATV Path, Campsites, etc.)—various recreational activities for pleasure or enjoyment;
Development (Building, Corrals, Paved Lots, etc.);
Tilled Cropping—for the raising of crops, by plowing and harrowing;
Perennial Forage (e.g., alfalfa hayland)—herbaceous plants cultivated for livestock feed that have a life span of more than one year;
Roads—prepared/built surfaces used by vehicles;
Logging—process of cutting, processing, and moving trees to a location for transport;
Mining—extraction of valuable minerals or other geological materials;
Railroads—includes actual rail tracks and elevated lands they are built upon; and
Other—describe.

F4a-c. Record any plant species observed that is listed or being considered for listing as threatened and/or endangered. Note the location of any threatened or endangered (T&E) species observed relative to polygon boundaries, stream, or other mapped features. More precise location can be determined using the GPS unit. If this is done, record the GPS unit number and the name or number of the waypoint designator in item F3c. Refer to the appropriate guide to determine which species to include. (***NOTE:*** This inventory is not a canvas for T&E species. Since this inventory focuses on the more abundant plant species, any T&E plants are likely to be overlooked.)

Wildlife Data (These wildlife data represent incidental observations only.)
F5a, b. Record the number and type of any amphibians observed.

F6a, b. Record the number and type of any reptiles observed.

F7. If possible, name the amphibian or reptile species, number of each, and sighting locations observed within the polygon (e.g., upper 1/3 of polygon, throughout polygon, lower 1/4 of polygon).

F8a-d. List threatened and endangered animal species observed in the polygon along with any nesting sites. (Include the recently de-listed bald eagle.) Space is provided to list species observed. Consult relevant documents to determine appropriate species. Record the location in the polygon where animals or nests were sighted.

Photograph Data
NOTE: Take a number of photos of the site. Using photos may be the most cost effective and reliable way to track change on the site and success/failure of treatments over time. If possible, take photos in optimal light conditions (i.e., not at dawn or dusk, nor during low light conditions). Record GPS waypoints of photo points with the most accurate GPS unit available. Keep the camera lens set at the wide angle (zoomed out) to show the widest view and for consistency. The only exception would be in the case where you may wish to zoom in on a particular detail or feature.

When recording the photo number, also provide the compass bearing of the direction of view, so that future evaluations will be able to photograph the same ground—***Example:*** #0028 (245°), #0029 (98°). Care should be taken to minimize influence the photograph location by trampling.

G1. Take photos from the polygon corner designated as ***WPT1.*** Take at least one photo toward the polygon center and one close view of the typical ground cover near ***WPT1.*** Take additional photos, as necessary to capture the range of conditions present.

G2. Take photos from the polygon corner designated as ***WPT2.*** Take at least one photo toward the polygon center and one close view of the typical ground cover near ***WPT2.*** Take additional photos, as necessary to capture the range of conditions present.

G3. Take photos from the polygon corner designated as ***WPT3.*** Take at least one photo toward the polygon center and one close view of the typical ground cover near ***WPT3.*** Take additional photos, as necessary to capture the range of conditions present.

G4. Take photos from the polygon corner designated as ***WPT4.*** Take at least one photo toward the polygon center and one close view of the typical ground cover near ***WPT4.*** Take additional photos, as necessary to capture the range of conditions present.

G5. Additional photos should be taken at the site to illustrate important details and conditions not adequately covered by the prescribed photos taken at each polygon corner. Provide detailed descriptions of these photos. Remember for these additional photos also to record a GPS waypoint at the photo location, as well as the compass bearing of the direction of view—***Example:*** #0028 (245°), #0029 (98°). Where possible, it is always good to obtain overview shots from a higher vantage point to show the general terrain and context of the polygon.

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