U. S. UPLAND ECOLOGICAL HEALTH ASSESSMENT
FOR UPLAND SITES (Survey)
USER MANUAL
(Current as of 6/14/2023)

The user manual is intended to accompany the *U. S. Upland Ecological Health Assessment for Upland Sites (Survey) Form* for the rapid evaluation of upland forest or woodland sites.

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BACKGROUND INFORMATION

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. Other examples include *Fraxinus pennsylvanica* (green ash), *Acer negundo* (box elder), *Ulmus americana* (American elm), and *Salix amygdaloides* (peachleaf willow).

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)
Salix amygdaloides (peachleaf willow)

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)

DATA FORM ITEMS

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.

B6. Upland area label.

B7. Provided location information (decimal degrees).

B8. Provided reach-code of primary NHD flow line (NHD permanent identifier) (if provided).

B9. Provided location (Township, Range, Section).

B10. Average elevation of polygon (feet).

B11a. 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.***

B11b. Record any comments pertaining to the "other" location.

B12. Polygon centroid location (as determined by GIS) (decimal degrees lat./long.).

B13. Imagery used in delineating polygons (I.e., data sources)

B14. Date of imagery (if known).

Physical Site Data
C1. Provide a compass bearing (in degrees) indicating the direction the slope faces.

C2. 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.

C3a, b. Does the polygon contain exposed soil surface (bare ground)? If yes, record the percent of the polygon having 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., they do not erode or allow weeds to invade) and are not counted in item C3.

C3c. Separate the exposed soil surface from C3b 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.

C3d. 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.

C4. Vegetation Community Structure. Vegetation community structure is the vertical layering of the various plant growth forms on a site. This is important for ecological function, i.e., primary biomass productivity, for habitat values, and for maintenance of soil and hydrologic resources. This question assesses the current vegetation structure, as it compares to the potential vegetation structure on the site. The potential vegetation structure on a site can be determined from the species composition that is described for the habitat type/community type or ecological site identified for the site.

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 example, in western Montana use *Forest Habitat Types of Montana* (Pfister and others 1977), 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.

See Item #3 in the Factors for Assessing Upland Sites Health (Survey) Section below for determination of community structure.

C5. 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.*

C6. Plant Material Litter and Duff. Health 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.

See Item #12 in the Factors for Assessing Upland Sites Health (Survey) Section below for determination of adequate amount and distribution of plant litter.

C7a. Human-Caused Physical Site Alteration. Many human activities can alter the physical integrity and/or natural topography of the site in other ways that disrupt its health capacity, especially the natural movement of water. Such alterations may be caused by farming practices (plowing), terracing, contour ditching (either to spread water across the site, or to convey water to some other site), soil compaction (by vehicle, machinery, or livestock), industrial activities (mining, timber harvest, etc.), construction, etc. Examples of such alteration include roads, animal trails, fields converted to hay production or tame pasture species, plowed crop fields, compaction by industrial or recreational equipment, over-grazed rangeland, etc. Look for visible physical evidence of the human-caused alterations. Use none to describe when there is no physical alterations to the site by human activity. If there are human-caused physical alterations to the site and there is either no visible evidence of health effect or only limited effect, the answer to the question would be slight.

C7b. Severity of Human-Caused Alterations. Use none to describe when there is no physical alterations to the site by human activity. If there are human-caused physical alterations to the site and there is either no visible evidence of functional effect or only limited effect, the answer to the question would be slight.

C8. Human-Caused Live Native Woody Vegetation Removal by Other Than Browsing. 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. It is 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.*

C9a-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.

C10. Polygon trend. Select the *one category* (Improving; Degrading; Static; or Status Unknown) which best indicates the current trend of the vegetative community on the polygon to the extent possible. Trend refers, in the sense used, 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 evaluator may notice healing (revegetating) of a degraded shoreline and recent establishment of woody seedlings and saplings. This would indicate changing conditions that suggest an improving trend. If such indicators are not apparent, enter the category status unknown.

Selected Summary Data

D1a. 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

Dealing with Sites Affected by Fire
When using the key to determine the habitat type of a site that is not well vegetated by trees and shrubs, it is important to look around for indication that the site has been burned. If you are in a stand of mostly herbaceous vegetation, or such fire adapted or early seral shrubs as *Yucca glauca* (soapweed), *Rhus aromatica* var. *trilobata* (skunkbush sumac), *Ericameria nauseosa* (rubber rabbitbrush), look for indication of potential for trees and/or later seral shrub species (e.g., *Artemisia* spp. [sagebrushes], *Cercocarpus ledifolius* var. *intercedens* [curl-leaf mountain mahogany], *Purshia tridentata* [antelope bitterbrush], etc.).

Look around at what is growing on nearby sites with similar topographic position. If you see trees and/or late seral shrubs on those sites, then your herbaceous stand may have that same potential. As confirmation, you may find fire killed tree and/or shrub remains among the herbaceous vegetation on your site. Fire killed *Juniperus scopulorum* (Rocky Mountain juniper) stems often persist for decades, while dead *Pinus* spp. (pine trees) usually fall and decay much more quickly. Also, look closely for low, blackened, *Artemisia* spp. (sagebrush) stumps among the grasses. Another common indicator of recent fire is the presence on a site of more than a small amount of annual *Bromus* spp.(brome).

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**

NOTE: The field form described below is for use on forest/woodland sites, shrubland sites, and grassland sites. If the site on which you are working keys to a modified upland site, then you will need a Modified Site Field Form.

D1b. Identify the vegetation subtype, if appropriate. May include types such as all aspen stands, all green ash stands, etc.

D2. Approximate. polygon size (acres).

D3. 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.*

Dominance types are the names tentatively assigned to sites where the observed vegetation can not be taken through any existing classification key for the local region. These tentative names are given in terms of dominant overstory and understory species of the vegetation on the site, and they represent apparently distinct units of vegetation that are seen as repeating across the landscape in predictable edaphic, hydrologic, and/or topographic positions. Such units are useful in recognizing the distinct units of different vegetation, but they provide little useful information to the land manager.

Dominance type (equivalent to cover type) is defined as an aggregation of all stands (individual plant communities), grouped and named simply by the species with the greatest canopy coverage in the overstory or upper layer. In this work, canopy cover of dominant species is greater than 25 percent.

Vegetation Data

E1a, 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 in this document, the term is used in a broader sense and not restricted to the over-mature. Therefore, 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 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).

E1c. 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 E1b. 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.

E1d. The tree size class distribution category is automatically calculated in the office by the computer using size class canopy covers recorded in item E1b. 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

E1e. 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.

E1f-j. Fill out the appropriate information.

E2a, 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

E2c. 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).

E2d-h. Fill out the appropriate information.

E3a-e and **E4a-e.** Record the species code and the percent canopy cover for graminoid and forb species observed in the polygon. Also fill out the appropriate information.

FACTORS FOR ASSESSING UPLAND SITES HEALTH (SURVEY)

On severely disturbed sites, vegetation potential can be difficult to determine. On such sites, clues to potential may be sought on nearby sites with similar landscape position.

Most of the factors rated in this evaluation are based on ocular estimations. Such estimation may be difficult on large, brushy sites where visibility is limited, but extreme precision is not necessary. While the rating categories are broad, evaluators do need to calibrate their eye with practice. It is important to remember that a health rating is not an absolute value. The factor breakout groupings and point weighting in the evaluation are somewhat subjective and are not grounded in quantitative science so much as in the collective experience of an array of riparian scientists, range professionals, and land managers.

The evaluator must keep in mind that this assessment form is designed to account for most sites and conditions in the applicable region. However, rarely will all the questions seem exactly to fit the circumstances on a given site. Therefore, try to answer each question with a literal reading. If necessary, explain anomalies in the comment section. Each factor below will be rated according to conditions observed on the site. The evaluator will estimate the scoring category and enter that value on the score sheet.

A ***forest or woodland*** refers to sites 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). (A woodland is defined as vegetation dominated by a rather closed stand of trees of short stature.)

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.

1. Native Plant Species Canopy Cover. The fraction of live plant canopy cover on the polygon by species that are not native to western North America is a strong measure of the degree of alteration to the natural vegetation on a site.

Scoring:
15 = Over 90% of all live plant canopy cover on the polygon is by native species.
10 = 70% to 90% of all live plant canopy cover on the polygon is by native species.
5 = 40% to 70% of all live plant canopy cover on the polygon is by native species.
0 = Less than 40% of all live plant canopy cover on the polygon is by native species.

2. Native Perennial Forb Canopy Cover. ***Answer this question only for grassland sites, as determined by using the Key to Upland Lifeform Site Type on page 5 above (answer NA if the site does not key to a grassland site type).*** Consider only native perennial forbs, and ignore annuals, biennials, and non native species. Estimate the total combined canopy cover of all the native perennial forbs on the polygon to determine the appropriate scoring category.

Scoring:
6 = More than 15% of the plant canopy cover on the polygon is by native perennial forbs.
4 = 10% to 15% of the plant canopy cover on the polygon is by native perennial forbs.
2 = 5% to 10% of the plant canopy cover on the polygon is by native perennial forbs.
0 = Less than 5% of the plant canopy cover on the polygon is by native perennial forbs.

3. Vegetation Community Structure. Vegetation community structure is the vertical layering of the various plant growth forms on a site. This is important for ecological function, i.e., primary biomass productivity, for habitat values, and for maintenance of soil and hydrologic resources. This question assesses the current vegetation structure, as it compares to the

potential vegetation structure on the site. The potential vegetation structure on a site can be determined from the species composition that is described for the habitat type/community type or ecological site identified for the site.

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 example, in western Montana use *Forest Habitat Types of Montana* (Pfister and others 1977), 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.

Figure 1 illustrates the categories of disturbance-caused alteration to understory structure on forest or woodland sites. Photos Photos 1-16 depict examples of the wide range of forest or woodland vegetation structure. Photos 17-24 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. Figure 2 is a conceptual illustration to assist in visualizing the categories of disturbance-caused alteration to the understory structure on forested sites. Photos 25-32 depict grassland examples of the four scoring categories. ***NOTE:*** *The user needs to refer to the appropriate ecological site or habitat type/community type description for information pertaining successional stages.*

Scoring:

9 = Good—All expected structural lifeform layers are present and well represented.

6 = 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.

3 = 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.

0 = 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.

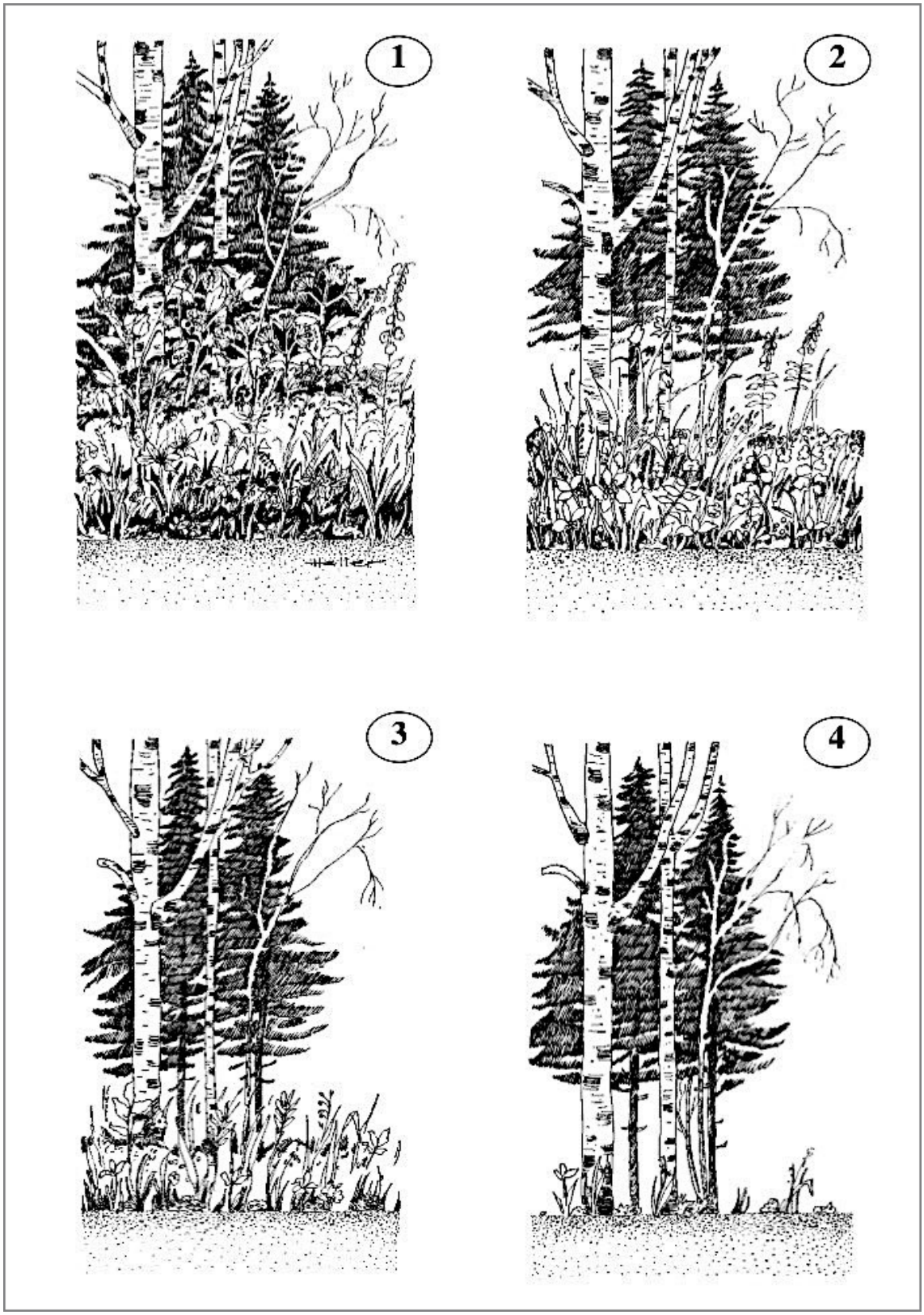

Figure 1. Example illustration of progressive loss of vegetation structural layers on a forested site. 1) All expected layers well represented; 2) One structural layer reduced by half, or more; 3) Tall shrubs eliminated and shorter shrubs noticeably reduced; and 4) Tall and shorter shrub layers absent,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

Photo 1. A dense woodland stand of *Fraxinus pennsylvanica/ Prunus virginiana* (green ash/chokecherry) habitat type with intact understory layers of tall shrubs and graminoids, at or near potential (Score = 9 points)

Photo 2. A *Fraxinus pennsylvanica/Prunus virginiana* (green ash/ chokecherry) habitat type stand with intact understory layers of tall shrubs and graminoids, also at or near potential (Score = 9 points)

Photo 3. A stand being opened up by grazing impacts. Notice the tall shrubs being replaced by the lower growing shrubs and a reduction of tree regeneration (Score = 6 points)

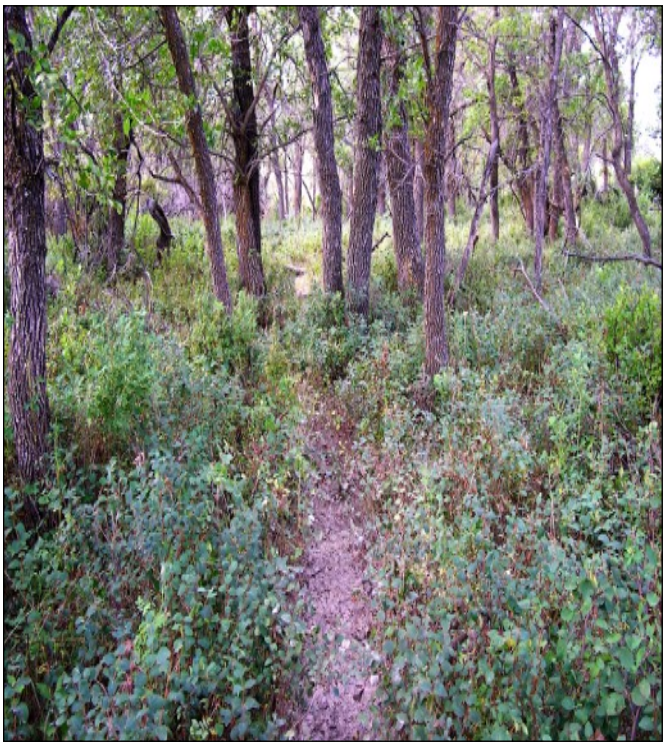

Photo 4. Another view of a stand opened up by high grazing pressure, with a tremendous reduction of the tall shrubs and an increase in low growing shrubs (Score = 6 points)

Photo 5. Continued high grazing pressure greatly reduces the canopy cover of all shrubs and dramatically increases the canopy cover of graminoids (Score = 3 points)

Photo 6. Another photo of a stand with the dense understory of shrubs being converted to graminoids, along with a reduction of tree regeneration (Score = 3 points)

Photo 7. If the grazing pressure is high enough over many decades, the stand is opened up with just widely scattered trees remaining (Score = 0 points)

Photo 8. Another stand of widely scattered trees dominated by graminoids and sun-loving (heliophytes) shrubs such as sagebrush (Score = 0 points)

Photo 9. An open forest stand of *Pinus ponderosa/Agropyron spicatum* (ponderosa pine/bluebunch wheatgrass) habitat type with sparse understory at or near its potential (Score = 9 points) points)

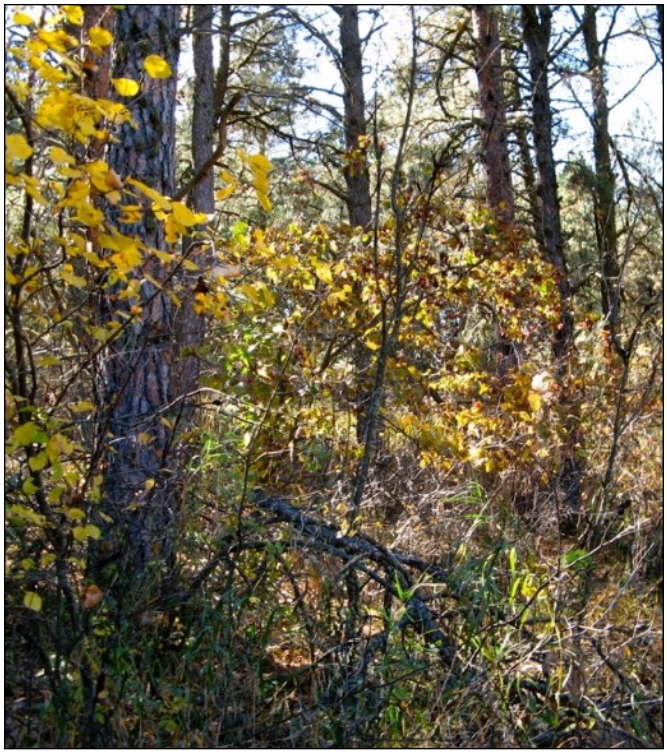

Photo 10. A *Pinus ponderosa/Prunus virginiana* (ponderosa pine/chokecherry) habitat type stand with intact understory layers of tall shrubs and graminoids, also at or near potential (Score = 9

Photo 11. A forest stand with a heavy and complex cover of all expected structural layers present; mid-to-late-mid seral (Score = 9 points)

Photo 12. A forest stand with overstory opened by timber harvest; regeneration is progressing and understory layer is intact; early seral (Score = 6 points)

Photo 13. A forest stand with 2 decades regrowth after being opened by timber harvest, and understory layers opened by grazing and browsing; early seral (Score = 6 points)

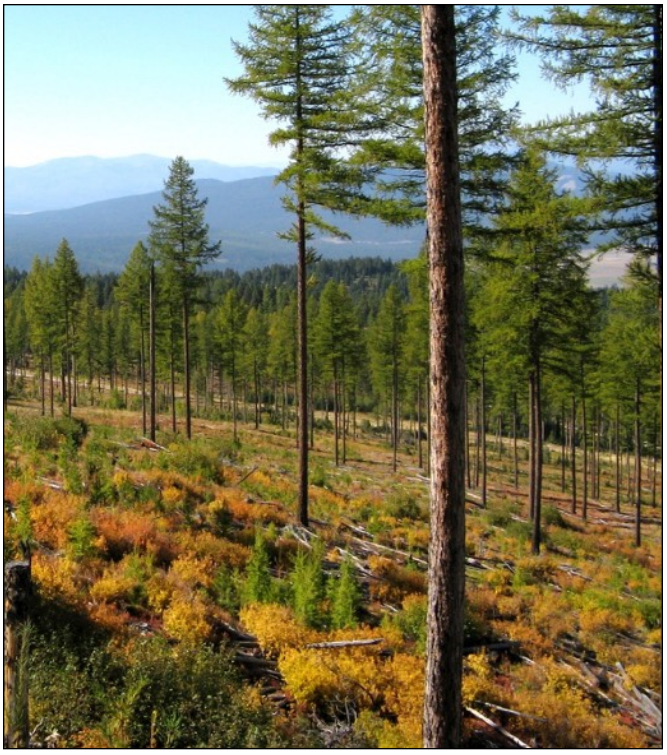

Photo 14. Forest canopy opened by timber harvest; tall and medium layer removed; low shrubs may be near current potential; early to-early-mid seral (Score = 3 points)

Photo 15. Forest canopy opened by timber harvest; little tall shrub site potential; low shrub and herbaceous understory layers remain intact (Score = 3 points)

Photo 16. Forest canopy severely reduced by timber harvest; tall shrub layer is removed; medium and low shrub and herbaceous layers reduced (Score = 0 points)

Photo 17. A dense stand of woody vegetation with tall, medium and low shrub layers intact (Score = 9 points)

Photo 18. A stand of medium and low shrubs with all potential layers intact, including the herbaceous layer (Score = 9 points)

Photo 19. A low shrub/bunchgrass stand with all layers at or near potential (Score = 9 points)

Photo 20. A low shrub/bunchgrass stand with shrub and herbaceous layers only slightly reduced by grazing and browsing (Score = 6 points)

Photo 21. A stand of low shrubs with taller bunchgrasses replaced by annual and short perennial grasses (Score = 6 points)

Photo 22. A stand with the shrub canopy noticeably reduced, and the taller bunchgrasses greatly reduced or replaced by annual and short perennial graminoid species (Score = 3 points)

Photo 23. 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 (Score = 0 points)

Photo 24. A low shrub stand with shrubs much reduced and most bunchgrasses replaced by low, sod-forming grasses or bare ground (Score = 0 points)

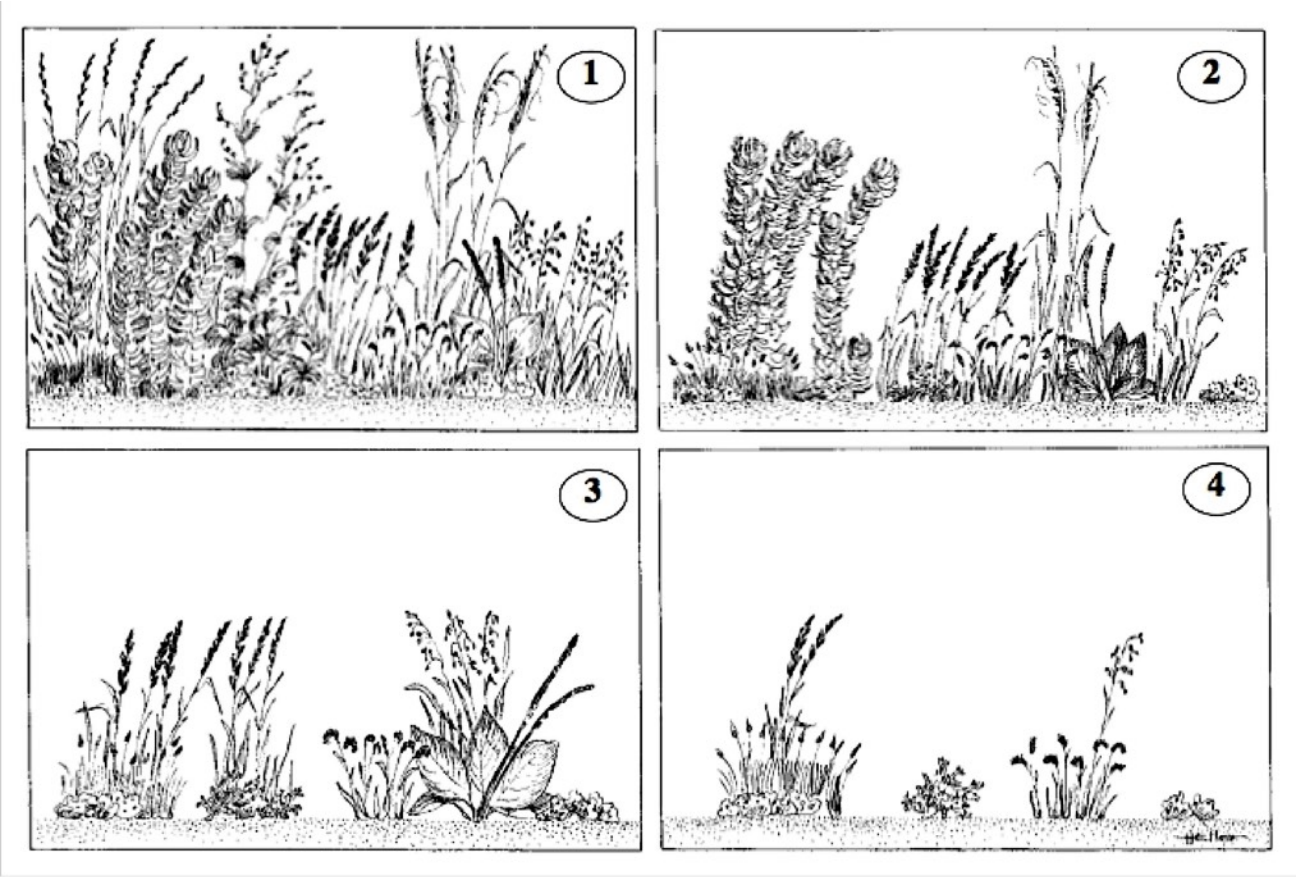

Figure 2. Example illustration of structural change to grassland plant community as disturbance level increases. 1) All expected structural layers well represented; 2) Tall grasses and forbs significantly reduced; 3) Tall grasses and forbs layer absent, and mid height layer reduced; 4) Community reduced 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 the appropriate ecological site or habitat type/community type description for information about successional stages.* (figure adapted from Adams and others [2003])

Photo 25. A stand of *Agropyron spicatum* (bluebunch wheatgrass), the tallest late seral species on this productive site (Score = 9 points)

Photo 26. A healthy bunchgrass stand on a xeric site with sparse vegetation potential (Score = 9 points)

Photo 27. A healthy stand of *Andropogon scoparius/Carex filifolia* (little bluestem/threadleaf sedge) habitat type (Score = 9 points)

Photo 28. A bunchgrass stand with much of the tallest layer replaced by shorter species (Note the scattering of the low shrub *Artemisia cana* [silver sagebrush]) (Score = 6 points)

Photo 29. 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) (Score = 3 points)

Photo 30. 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 (Score = 3 points)

Photo 31. 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 (Score = 0 points)

Photo 32. 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) (Score = 0 points)

4. Preferred Native Woody Species Establishment and/or Regeneration. The presence of young age classes of native woody species are important indicators of succession of the vegetation community, as well as to the continued presence of those woody species populations into the future.

For shrubs in general, seedlings and saplings can be distinguished by a lack of thick stems or roughened bark near the plant base and which lack reproductive structures and the relative stature to suggest maturity. Remember: The important issue is whether there are young replacement plants of the species present. (***NOTE:*** Evaluators should take care not to confuse short stature resulting from heavy browsing with that due to youth.) For this reason, the following species are excluded from consideration when calculating the rate of preferred native woody species establishment and/or regeneration. ***Answer NA if woody vegetation is absent OR if all woody plants present are on the list below.***

The following species are excluded from the evaluation:

- *Artemisia cana* (silver sagebrush), including subsp. *cana* and *viscidula*;
- *Artemisia frigida* (fringed sagewort);
- *Crataegus* species (hawthorn);
- *Gutierrezia sarothrae* (broom snakeweed);
- *Juniperus horizontalis* (creeping juniper)
- *Opuntia* species (prickly pear);
- *Rosa* species (rose);
- *Sarcobatus vermiculatus* (greasewood);
- *Symphoricarpos* species (snowberry);
- T*etradymia canescens* (gray horsebrush)
- *Yucca glauca* (soapweed); and
- All introduced (non-native) woody species (e.g., *Elaeagnus angustifolia* [Russian olive], *Tamarix* species [saltcedar; tamarisk], etc.).

Scoring:
6 = More than 5% of the total canopy cover of native woody species is seedlings and/or saplings.
4 = 1% to 5% of the total canopy cover of native woody species is seedlings and/or saplings.
2 = Some, but less than 1%, of the total canopy cover of native woody species is seedlings and/or saplings.
0 = The site has potential for native woody species, but seedlings and saplings are absent.

5. Browse Utilization of Available Preferred Native Woody Vegetation. Most native woody species are browsed by livestock and/or wildlife at some time, or under some conditions. However, a few shorter statured shrubs are seldom browsed (except under extreme conditions), and are considered to be grazing-induced increasers under long-term intense grazing pressure. Therefore, ignore the following species when assessing the level of browse utilization on the polygon. ***Answer NA if the site has burned and live woody vegetation is absent OR if all woody plants present are on the list below.***

The following species are excluded from the evaluation:

- *Artemisia cana* (silver sagebrush), including subsp. *cana* and *viscidula*;
- *Artemisia frigida* (fringed sagewort);
- *Crataegus* species (hawthorn);
- *Gutierrezia sarothrae* (broom snakeweed);
- *Juniperus horizontalis* (creeping juniper)
- *Opuntia* species (prickly pear);
- *Rosa* species (rose);
- *Sarcobatus vermiculatus* (greasewood);
- *Symphoricarpos* species (snowberry);
- T*etradymia canescens* (gray horsebrush)
- *Yucca glauca* (soapweed); and
- All introduced (non-native) woody species (e.g., *Elaeagnus angustifolia* [Russian olive], *Tamarix* species [saltcedar; tamarisk], etc.).

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 ability of the plant 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). Do not count utilization on dead plants, unless it is clear that death resulted from excess browsing. ***NOTE:*** If a shrub is entirely mushroom/umbrella shaped by long-term intense browse or rubbing, count browse utilization of it as intense.

Scoring:
3 = None (0% to 5% of available second year and older leaders of preferred native woody species are browsed).
2 = Light (5% to 25% of available second year and older leaders of preferred native woody vegetation are browsed).
1 = Moderate (25% to 50% of available second year and older leaders of preferred native woody vegetation are browsed).
0 = Intense (More than 50% of available second year and older leaders of preferred native woody vegetation are browsed).

6. Human-Caused Live Native Woody Vegetation Removal by Other Than Browsing. 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. It is 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.*

Scoring: (*If the polygon does not have the ability to support [potential for] any trees and shrubs and there is no evidence that it ever had any, replace both Actual Score and Possible Score with* ***NA****. When insufficient data/evidence is available to make a call, replace both Actual Score and Possible Score with* ***NC****.*)

3 = None (0% to 5% of live native woody vegetation expected on the site is lacking due to human-caused direct removal).
2 = Light (5% to 25% of live native woody vegetation expected on the site is lacking due to human-caused direct removal).
1 = Moderate (25% to 50% of live native woody vegetation expected on the site is lacking due to human-caused direct removal).
0 = Intense (More than 50% of live native woody vegetation expected on the site is lacking due to human-caused direct removal).

7. Native Woody Vegetation Standing Decadent and Dead. A large amount of decadent and dead native woody material on a site can result from severe over-utilization and mean a conversion from one vegetation type to another, or it may indicate climatic impacts, disease, and/or insect damage. For instance, severe winters may cause extreme die back of native woody vegetation, and cyclic insect infestations may kill individuals in a stand.

The term ***decadent*** is used to mean those individual plants with 30 percent or more dead wood in their canopy. In this item, scores are based on the percentage of total woody canopy cover which is decadent or dead, not on how much of the total polygon canopy cover consists of dead and decadent woody material. Only standing material is included, not that which is lying on the ground. Answer NA if woody vegetation is absent.

Scoring:
3 = Less than 5% of the total canopy cover of native woody species is decadent and/or dead.
2 = 5% to 25% of the total canopy cover of native woody species is decadent and/or dead.
1 = 25% to 50% of the total canopy cover of native woody species is decadent and/or dead.
0 = More than 50% of the total canopy cover of native woody species is decadent and/or dead.

8. Invasive Plant Species (Weeds). Invasive plants (noxious weeds) are alien species whose introduction does or is likely to cause economic and *environmental* harm. Use a weed list that is standard for the region, or use the list that is printed on the field form. Noxious weed presence indicates a degrading ecosystem. Although some of these species may contribute to some ecological functions, their negative impacts reduce overall site health. This item assesses the extent to which the site is impacted by noxious weeds. Severity of the problem is a function of density/distribution (pattern of occurrence), as well as abundance of the weeds.

Record the combined percent canopy cover and the overall density distribution class of all invasive plants (from the standard list) that occur on the polygon. Invasive plant species in Montana, Idaho, North Dakota, and South Dakota are listed on the form, and space is allowed for recording others. ***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 below that best represents each species' pattern of presence on the site.

8a. Total Canopy Cover of Invasive Plant Species (Weeds). The observer must evaluate the total percentage of the polygon area that is covered by the combined canopy of all plants of all species of invasive plants. Invasive plant species to count for this assessment item are generally those listed by the state or county noxious weed control agency where the site is located. It is important to list the species found and counted at the site being assessed. Determine which rating applies in the scoring scale below.

Scoring:
3 = No invasive plant species (weeds) on the site.
2 = Invasive plants present with total canopy cover less than 1% of the polygon area.
1 = Invasive plants present with total canopy cover between 1% and 15% of the polygon area.
0 = Invasive plants present with total canopy cover more than 15% of the polygon area.

8b. Density/Distribution Pattern of Invasive Plant Species (Weeds). The observer must pick a category of pattern and extent of invasive plant distribution from the chart (Figure 3) below that best fits what is observed on the polygon, while realizing that the real situation may be only roughly approximated at best by any of these diagrams. Choose the category that most closely matches the weed distribution on the polygon.

Scoring:
3 = No invasive plant species (weeds) on the site.
2 = Invasive plants present with density/distribution in categories 1, 2, or 3.
1 = Invasive plants present with density/distribution in categories 4, 5, 6, or 7.
0 = Invasive plants present with density/distribution in categories 8, or higher.

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

9. Disturbance-Increaser Undesirable Species. A large cover of disturbance-increaser undesirable species, whether native or exotic, indicates displacement from the potential natural community (PNC) and a reduction in overall health. These species generally are less productive and poorly perform many important ecological functions. They usually result from some disturbance, that removes more desirable species. Invasive plant species considered in the previous item are not counted again here. A list of disturbance-increaser undesirable species that are to be counted is presented below. Other disturbance-increaser undesirable species may be present on a site, but greater consistency and comparability will be maintained by always counting the same set of these common 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)

Scoring:
3 = Less than 5% of the site covered by disturbance-increaser undesirable species.
2 = 5% to 25% of the site covered by disturbance-increaser undesirable species.
1 = 25% to 50% of the site covered by disturbance-increaser undesirable species.
0 = More than 50% of the site covered by disturbance-increaser undesirable species.

10. Human-Caused Bare Ground. Bare ground is soil not covered by plants, litter or duff, downed wood, or rocks larger than 2.5 inches (6 cm). The amount of an upland site that lacks plant canopy cover can vary greatly, depending of site type; however bare ground caused by human activity on any site indicates a deterioration of site health. Human land uses commonly causing bare ground include livestock grazing, recreational activities, vehicle traffic, industrial activities, etc. The evaluator should consider the causes of all bare ground observed and estimate what fraction of it is human-caused. ***NOTE:*** *On sites having a large amount of natural bare ground (e.g., on badland topography or saline soils) carefully evaluate evidence of human-caused bare-ground vs. normal amounts of bare-ground for this setting.*

Scoring:
9 = Less than 1% of the polygon is human-caused bare ground.
6 = 1% to 5% of the polygon is human-caused bare ground.
3 = 5% to 15% of the polygon is human-caused bare ground.
0 = More than 15% of the polygon is human-caused bare ground.

11. 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.*

Scoring:
12 = Less than 1% of the polygon shows evidence of accelerated soil erosion.
8 = 1% to 15% of the polygon shows evidence of accelerated soil erosion.
4 = 15% to 25% of the polygon shows evidence of accelerated soil erosion.
0 = More than 25% of the polygon shows evidence of accelerated soil erosion.

12. Plant Material Litter and Duff. Health 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.

Photos 33-38 provide illustrations of a range of site litter conditions for forests and woodland sites. Photos 39-44 provide illustrations of a range of site litter conditions for shrubland sites. Photos 45-50 provide illustrations of a range of site litter conditions for grassland sites.

Scoring:

9 = Litter and duff amounts are fairly 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 and duff (lb/acre) is more than 90% of expected levels under a light to moderate grazing intensity.

6 = Litter and duff 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 and duff (lb/acre) is between 60% to 90% of expected levels under a light to moderate grazing intensity.

3 = Litter and duff amounts appear to be moderately reduced and unevenly distributed 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 and duff. Litter and duff (lb/acre) is between 30% to 60% of expected levels under a light to moderate grazing intensity.

0 = Litter and duff amounts appear greatly reduced or absent in the polygon. The extent and distribution of exposed soil has increased. There is little or no standing or fallen litter. Decomposing material on the soil surface is the main type of litter. Litter and duff (lb/acre) is less than 30% of expected levels under a light to moderate grazing intensity.

Photo 33. An open forest stand with normal accumulation of litter evenly distributed (Score = 9 points)

Photo 34. A *Pinus ponderosa/Prunus virginiana* (ponderosa pine/chokecherry) habitat type with excellent forest floor litter cover (Score = 9 points)

Photo 35. A *Pinus ponderosa/Agropyron spicatum* (ponderosa pine/ bluebunch wheatgrass) habitat type stand with uneven distribution and areas of thin litter (Score = 6 points)

Photo 36. A western Montana forested slope with understory burned and mostly recovered, but litter cover is still thin (Score = 6 points)

Photo 37. A forested slope with moderately reduced litter amount, thin and unevenly distributed (Score = 3 points)

Photo 38. A disturbed forested site with litter amount greatly reduced, and areas lacking litter cover (Score = 0 points)

Photo 39. A shrubland stand with normal accumulation of litter evenly distributed (Score = 9 points)

Photo 40. A shrubland stand now infested by the invasive *Bromus tectorum* (cheatgrass) that creates a large amount of litter (Score = 9 points)

Photo 41. A shrubland stand with slightly reduced accumulation of litter, with bare spots (Score = 6 points)

Photo 42. A shrubland stand, with moderately-to-greatly reduced litter accumulation (Score = 3 points)

Photo 43. A shrubland stand with greatly reduced accumulation of litter (Score = 0 points)

Photo 44. A shrubland stand, with greatly reduced accumulation of litter (Score = 0 points)

Photo 45. A grassland stand with normal accumulation of litter evenly distributed (Score = 9 points)

Photo 46. A grassland stand now dominated by the invasive *Bromus japonicus* (field brome) that makes a large amount of litter (Score = 9 points)

Photo 47. A grassland stand with slightly reduced accumulation of litter, with bare spots (Score = 6 points)

Photo 48. A grassland stand, with moderately reduced litter accumulation, but lower vegetative potential as well, (Score = 3 points)

Photo 49. A grassland stand with a moderately to greatly reduced litter accumulation (Score = 3 points)

Photo 50. A severely overgrazed grassland stand, dominated by *Bouteloua gracilis* (blue grama), with almost no litter cover (Score = 0 points)

13. Human-Caused Physical Site Alteration. Many human activities can alter the physical integrity and/or natural topography of the site in other ways that disrupt its health capacity, especially the natural movement of water. Such alterations may be caused by farming practices (plowing), terracing, contour ditching (either to spread water across the site, or to convey water to some other site), soil compaction (by vehicle, machinery, or livestock), industrial activities (mining, timber harvest, etc.), construction, etc. Examples of such alteration include roads, animal trails, fields converted to hay production or tame pasture species, plowed crop fields, compaction by industrial or recreational equipment, over-grazed rangeland, etc. Look for visible physical evidence of the human-caused alterations. Use none to describe when there is no physical alterations to the site by human activity. If there are human-caused physical alterations to the site and there is either no visible evidence of health effect or only limited effect, the answer to the question would be slight.

13a. The percentage of the whole polygon area that is altered by human activities.

Scoring:
9 = Less than 5% of the polygon is physically altered by human activity.
6 = 5% to 15% of the polygon is physically altered by human activity.
3 = 15% to 35% of the polygon is physically altered by human activity.
0 = More than 35% of the polygon is physically altered by human activity.

13b. Severity of the human-caused alteration.

Scoring:
6 = ***No physical alterations*** to the site by human activity.
4 = Human alterations to the physical site are ***slight*** in effect.
2 = Human alterations to the physical site are ***moderate*** in effect.
0 = Human alterations to the physical site are ***severe*** in effect.

14. Select the ***one category*** (Upward, Downward, Not Apparent) that best indicates the apparent trend for Healthy, but with Problems sites. 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 draw and recent establishment of woody seedlings and saplings. This would indicate changing conditions that suggest an upward trend. If such indicators are not apparent, select the category not apparent.

15. Indicate whether factorings are contributing to unacceptable site conditions that are outside of the control of the land manager.

16a-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.

17. 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.

18. Describe the polygon boundaries in terms of landmark features, fences, or whatever the delineation is based upon (if necessary). 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.

Photograph Data
NOTE 1: At sites that qualify as a woody draw, take a minimum of 8 photos of the site. These should show overviews, vegetation characteristics (pattern of distribution, stand structure, etc.), and other features of interest. 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 of the photograph location by trampling.

NOTE 2: For those sites that are determined to ***NOT*** be a woody draw site, still take 8 photos of the site. This will help document that the site is not a woody site.

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