NFMA ANALYSIS FOR THE GLADE ALLOTMENTS EIS LANDSCAPE

DOLORES DISTRICT

SAN JUAN NATIONAL FOREST

March 10, 2015

NFMA= National Forest Management Act (Pre-NEPA Analysis)

Introduction

This project file document describes the gathering and analysis of information for the pre-NEPA or National Forest Management Act (NFMA) portion of the planning process. Before looking at each allotment specifically, the ID team reviewed the landscape as a whole and discussed how the landscape functions and what would its potential condition be regardless of any type of use. This provided important background to explain why changes may be needed in livestock grazing, and can be used as reference material for other project activities in the area.

This process included,

1) Lumping similar vegetation and soil types together into 'vegetation types' that provide a workable framework for discussion.
2) Defining potential condition (soil structure, hydrologic function and vegetation) for each of the types
3) Describing factors that would indicate when an area is 'moving towards' potential and what those same factors would look like if the area were 'moving away from' potential (this provides a tool for range managers to use changing future conditions).
4) Describing what factors signal that a vegetation type is transitioning into a different type to the point of not being able to return).
5) Confirming whether or not desired condition is the same as potential condition for each vegetation type and if not, describing the differences. Describing desired conditions as a range of objectives. Focusing on a few key desired conditions which represent the resilient, healthy rangelands described in the Forest Plan, the Watershed Conservation Practices Handbook (FSH 2509.25), and other documents.
6) Describing the History and past, present and future actions that have influenced the Glade Landscape
7) Referencing Forest Plan desired conditions
8) Describing existing conditions
9) Describing existing conditions in detail for each allotment)
10) Other considerations for the Upcoming NEPA Analysis

11) Brain-storming potential solutions in moving allotments from existing conditions toward desired conditions.

Key Assumptions for this work include,

1) There is a close link between soil structure, hydrologic function, precipitation and vegetation. This analysis focused on the concept of how the land functions, and how to maintain that function.
2) An overriding theme in these discussions was to maintain the ability of the land to withstand fluctuations in weather and be resilient while anticipating drying trends with or without increased precipitation events. A key assumption is that dry periods are a new 'normal' for this landscape and no longer just a periodic cyclic event.
3) Themes described in the San Juan Land and Resource Management Plan include the lands ability to be resilient to changes in temperature and/or precipitation and its ability to move towards, not away ,from desired conditions.
4) It is important to understand the potential of a site in order to set realistic goals for desired future conditions . For example, expecting deep rooted native bunchgrasses to grow in shallow soil areas is not realistic.
5) An ecosystem that functions with resiliency provides a variety of benefits such as clean water, livestock forage, wildlife habitat, and watershed health, etc.
6) The mature condition of tree and shrub communities across the Glade landscape is not expected to change dramatically in the next 20 years. Some prescribed fire or tree/shrub cutting projects may occur but will be at a y small scale. Wildfires have occurred in the past and will occur in the future but the size and extent has typically been small. This may change but cannot be predicted.
7) When a vegetation type has already experienced a shift into another (a "threshold" has been passed such that a return to the pre-existing situation is extremely difficult or even impossible), our objectives are to manage the current vegetation type and not try to 'go back'. Examples include parklands seeded with nonnatives, areas where sagebrush was removed, and the channel structure of Ryman and Hunt Creek.

NFMA Analysis

The following paragraphs describe the NFMA analysis which occurred in calendar year 2014. The process evolved during lengthy discussions by the Interdisciplinary Team about the Glade Landscape, available data, and desired outcomes. Meeting notes are located in the project file.

Step 1 – Identification of Workable 'Vegetation Types'

For some areas, Ecological Site Descriptions, were available that provided information about potential vegetation, biophysical properties, and how sites respond to disturbance. Where ecological site data were not available, the ID team used soil maps (Web Soil Survey) to interpolate plant associations to areas on the ground. The location of the vegetation type was depicted using FSVeg Spatial data. The team made note of a few areas where FSVeg Spatial data did not match their on-the-ground observations. Explanations of the methodology used to delineate and describe vegetation types are in the Project File.

Since this analysis is directly related to livestock grazing, it is focused on forage resources within each vegetation type. For example, although ponderosa pine is the dominant plant species in the Ponderosa Pine type, the shrub and herbaceous (grass and forb) layers in the stands contain the forage resources. So, when we describe each vegetation type, we focus on its forage resources and not the forest structure of tree-dominated vegetation types.

Here are the six major upland vegetation types and nine subtypes identified within the landscape and analyzed.

- Ponderosa Pine/Gambel Oak
  - Subtype #1: Ponderosa Pine/Shortgrass/Shallow Soils/More Dry
  - Subtype #2: Ponderosa Pine/Midgrass/Shallow to Mid-Depth Soils/Medium moisture
  - Subtype #3: Ponderosa Pine/Bunchgrass/Deep Soils/Less Dry
- Mountain Grassland
  - Subtype #1: Native Parks (Deep Soils/Less Dry)
  - Subtype #2: Brome Parks (Deep Soils/Less Dry)
- Aspen
  - Subtype #1: Colorado Plateau
  - Subtype #2: Terrain-Isolated (stringers)
- Pinyon-Juniper

  - Subtype #1: Ryman Pinyon-Juniper/Shallow Soils/More Dry/Northwest Corner
  - Subtype #2: Pinyon Pine/Black Sage/Shallow Soils/Rim Country
- Mountain Shrubland/Shallow to Mid-Depth Soils/Medium Moisture/Oak and other Shrubs Dominate
- Sagebrush Shrubland

Eight riparian types were identified as follows:

- Low gradient swales/slope wetlands
- Glade Canyon
- High gradient streams
- Headwater transition zones
- Moderately steep, rocky canyons
- Low gradient, deeply incised channels
- Dolores River
- Lentic areas (Springs, Depressional Wetlands and Reservoirs)

Step 2 – Defining Potential Conditions

Potential condition was described in terms of vegetation and how the plant species are linked to geomorphology. Plant associations were identified as they relate to soil type at potential. For example, blue grama, low muhly grasses, and low-growing carex species would be expected on drier shallow soil sites where as other species, such as mountain muhly would not. Additional information about how this was determined can be found in the project file.

Given the lack of understory vegetation often found in drier pinyon-juniper sites, potential conditions for these areas are described in terms of water flow patterns, litter, woody debris, and cryptogamic soils. While woody debris and plant litter occur in the other vegetation types, trees, shrubs and herbaceous vegetation are the primary 'soil holders' and therefore used to describe potential conditions.

Steps 3 and 4 – Describing 'Moving Away From' and 'Moving Towards' Potential Conditions, including indicators of irreversible change.

The ID team described indicators of whether a vegetation type is moving towards or away from potential condition. With this information, a grazing permittee or range manager can assess the current condition and relative trend of a site.

The team recognized that soil and site stability, hydrologic function, and biotic integrity are all components of site resiliency. They also discussed the point at which a system starts to "unravel" or is no longer resilient to such things as prolonged drought, , periodic disturbances, and current management.

Step 5 – Describing Desired Conditions for Each Vegetation Type

After describing potential conditions for various vegetation types it became apparent that not all areas would be able to achieve potential given such constraints as current resource management, expected grazing (wildlife and/or livestock), and the expectancy of natural disturbances. In these cases desired conditions are those that are resilient, given the constraints upon the vegetation type.

Vegetation Type Tables

The following tables convey the results of steps 1-5. Characteristics common to all subtypes are found first in the tables, then those specific to the different subtypes are divided accordingly. All subtypes have been described in each table. The headings for each table are 1) Potential Conditions, 2) Desired Conditions, 3) Moving Towards Desired Conditions and 4) Moving Away From Desire Conditions. The goal of resource management should be to achieve conditions in the Moving Towards or Desired Conditions columns.

Ponderosa Pine/Gambel Oak

It is important to note that deep loam soils that support deep rooted native bunchgrasses can exist in a variety of phases leading up to that potential conditions. For these areas, grasses can be short-rooted species, can transition to a mix of mid-depth and deep rooted species and would reach dominance by deep rooted native bunchgrasses. This situation occurs in some of the mountain grasslands where existing conditions are departed from potential.

There are several grasses that grow in Ponderosa Pine type, regardless of subtype or site potential. For example, muttongrass can be found from the driest to the wettest sites in Ponderosa Pine. The lack of these species would be an indication that a Ponderosa Pine stand is lacking functionality and/or moving away from desired conditions.

Note that opening greater than 5 acres fall under the mountain grassland vegetation type described later in this document. The tables below display potential and desired conditions for the areas with enough sunlight hitting the ground to grow grass.

Subtype #1: Ponderosa Pine/Shortgrass. The shortgrass community occurs in openings of the Ponderosa Pine/Gambel Oak vegetation type, in areas of ponderosa pine/blue grama and in areas of ponderosa pine mixed with pinyon-juniper. Grass species are short rooted and are found on sites that range from dry to very dry. Management focus should be on promoting groundcover which is critical to keeping this plant community from eroding or becoming occupied by nonnative invasive species. Potential vegetation is a shortgrass community consisting of such species as blue grama, low muhly, and/or low carex.

Subtype #2: Ponderosa Pine/Midgrass. This grass community occurs in openings of Ponderosa Pine/Gambel Oak forests. A mix of shortgrasses and midgrasses is the potential vegetation in these areas where roots can grow to moderate depths. The management objective is to maintain a resilient cover of desirable grasses on these dry to moderately dry sites. Over time, mid-depth bunchgrasses should dominate shortgrass species. Midgrass species include prairie junegrass, needle-and-thread, and squirreltail grass.

Subtype #3: Ponderosa Pine/Bunchgrass. This vegetation subtype occurs in the wettest openings of the Ponderosa Pine/Gambel Oak vegetation type. The main objective for managing these areas is to maintain resilient grass cover that holds soil and absorbs water, and progress toward its potential of deep-rooted bunchgrasses. Examples of deep-rooted bunchgrasses include Arizona fescue, mountain muhly, and timber oatgrass.

Ponderosa Pine/Gambel Oak			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
There are no nonnative invasive species.	If nonnative invasive species are present, they occur in small, isolated populations and are declining.	If nonnative invasive species are present, they are either frequent small patches or infrequent larger patches, however, both are declining.	Nonnative invasive species are present in large patches and/or uniformly occur across the area and are possibly expanding.
Bare ground is not visible, grass and/or pine or oak litter is abundant. Rills and pedestals are absent.	Less than 10% bare ground, grass and/or pine or oak litter is dominant. Pedestals and rills are uncommon and if they occur they are mostly healed.	Bare ground 10-20% where grass and/or litter is abundant and mostly connected. Some signs of erosion are occasionally found. Pedestals are healing.	Bare ground over 20%, highly visible and connected. Rills and pedestals are active. Moderate size patches of erosion are found.
Seed stalks of shortgrasses are 8-12” high. Seed stalks of midgrasses are abundant and 6-12” high. Seed stalks of bunchgrasses are abundant and 20-30” high. Bunchgrass clumps are spaced close together 3-6” apart.	Seed stalks of shortgrasses are 8-12” high. Seed stalks of midgrasses are abundant and 6-12” high. Seed stalks of bunchgrasses are abundant and 20-30” high. Bunchgrass clumps are spaced close together 3-6” apart.	Seed stalks of shortgrasses are 4-6” high and moderately abundant. Seed stalks of midgrasses are 4-8” high and moderately abundant, seed stalks of bunchgrasses are less than 10” high and moderately abundant.	Seed stalks of any species are sparse and/or short.

Ponderosa Pine/Gambel Oak			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
In shortgrass communities common species are blue grama, low muhly, and/or low carex intermixed with pine litter. Blue grama is abundant. Shortgrasses form continuous sod in areas between tree driplines.	In shortgrass communities, common species include blue grama, low muhly, low carex, intermixed with pine litter and Kentucky bluegrass. Shortgrasses form continuous sod in areas between tree driplines.	In shortgrass communities Kentucky bluegrass is present but not expanding. Shortgrass sods are somewhat broken but water flow patterns are discontinuous.	In shortgrass communities Kentucky bluegrass and/or nonnative invasive species dominate the site. Shortgrass sods are broken and water flow patterns are continuous.
In midgrass communities common species include mutton grass, prairie junegrass, needle-and-thread, dropseed, squirreltail grass, and slender wheatgrass. In midgrass communities most vegetation basal cover is common midgrass species.	In midgrass communities, common species include mutton grass, prairie junegrass, needle-and-thread, pine dropseed, squirreltail, and slender wheatgrass In midgrass communities there is 20-40% vegetation basal cover of common midgrass species listed above.	In midgrass communities, species composition may include shortgrass species listed above until such time as mi-grasses reach dominance. In midgrass communities 10-20% of vegetation basal cover is comprised of midgrass species.	In midgrass communities, shortgrass species dominate the site with only remnant midgrass species present. In midgrass communities, less than 10% of vegetation basal cover is midgrass species.
In bunchgrass communities, common species include Arizona fescue, mountain muhly, timber oatgrass, native brome, and sand	In bunchgrass communities, common species include Arizona fescue, mountain muhly, timber oatgrass, Parry's oatgrass, native	Species composition may include short- or midgrass species listed above, until such time the site reaches dominance by bunchgrasses.	Bunchgrass species are sparse or only remnant and site is dominated by shortgrass species.

Ponderosa Pine/Gambel Oak			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
dropseed. In bunchgrass communities most vegetation basal cover is bunchgrasses in well developed, closely spaced clumps. In bunchgrass communities, fescue and mtn. muhly are abundant.	brome, and sand dropseed. In bunchgrass communities there is 20-40% vegetation basal cover (predominantly from bunchgrasses). Clumps are moderately to highly developed and closely spaced. In bunchgrass communities fescue and mtn. muhly are moderately abundant.	 In bunchgrass communities 10-20% of basal cover is made up of bunchgrasses. Clumps are moderately developed and moderately spaced. In bunchgrass communities, fescue and mtn. muhly are present and increasing.	 In bunchgrass communities less than 10% of basal cover is bunchgrass species. Clumps are small and widely spaced. In bunchgrass communities, fescue and mtn. muhly are absent.

Mountain Grassland (Native Parks)

This vegetation type occurs on deep loamy soils that support deep-rooted bunchgrass species. These Mountain Grasslands or "parks" range in size from 5 to 100+ acres. Grassy openings less than 5 acres in size are lumped with the forest type they associated with. The mountain grassland type includes some areas where sagebrush was removed in the 1950's and 1960's. Although remnant sagebrush plants exist, the areas are not likely to be dominated by sagebrush so the IDT recommends managing these sites as mountain grasslands.

The hydrologic function of the mountain grassland type depends on deep rooted species that prevent this type from drying out. Hydrologic function of mountain grasslands is important for water storage. When these grasslands degrade, ground water tables drop and surface water is not captured and flows overland. Also, deep-rooted bunchgrasses such as Arizona fescue, mountain muhly, and king fescue provide more cover and food for wildlife and livestock than short-rooted species such as Kentucky bluegrass do. Kentucky bluegrass, a nonnative, is prevalent in the Mountain Grassland vegetation type.

Wetlands are an important hydrologic feature of the Mountain Grassland vegetation type. Wetlands hold water on the ground surface, increasing plant diversity, providing water for wildlife, and producing a high density of forage. These areas often occur in low-lying swales that are periodically wet. Swales (also called slope wetlands) are saturated throughout much of the year. Some swales show downcutting/gullying and a change in species composition as a result of drying. For more information on swales, see hydrologic vegetation types below.

Management goals are to: 1) maintain soil-holding and water-capturing capacity (even the short mat-forming grasses should not dry out and decline), 2) promote deep-rooted species for hydrologic function, wildlife habitat and forage, and 3) maintain the hydrologic function of swale/slope wetlands.

Mountain Grassland (Native Parks)			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Common species include Arizona fescue, mountain muhly, timber oatgrass, Parry's oatgrass, native brome species, and sand dropseed.	Common species include Arizona fescue, mountain muhly, timber oatgrass, Parry's oatgrass, native brome species, and sand dropseed.	Species composition may include short or midgrass species, until the site becomes dominated by bunchgrasses. Fescue and/or mountain muhly are present. Wild iris, dandelion and Kentucky bluegrass may be present but in small patches.	Bunchgrass species are sparse or only remnant and site is dominated by shortgrass species. Wild iris, dandelion, and Kentucky bluegrass are uniformly present.
No nonnative invasive species	If small isolated populations of nonnative invasive species are present, they are declining.	If small isolated populations of nonnative invasive species are present, they are declining.	If small isolated populations of nonnative invasive species are present, they are increasing.
Bare ground reflects the natural spacing where bunchgrasses are present	Bare ground is less than 10% Litter makes up at least 30-50%.	Bare ground is less than 20% and water flow patterns are discontinuous. Some evidence	Bare ground is greater than 20% and/or water flow patterns are continuous.

Mountain Grassland (Native Parks)			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
but overall is less than 10%.		of erosion may be occasionally found. Downcutting has not occurred.	
Most vegetation basal cover is bunchgrasses in well developed, closely spaced clumps. Seed stalks are 20-30" high.	40-60% vegetation basal cover (mostly bunchgrass), bunchgrass seed stalks are 20-30" high. Clumps are moderate to highly developed and closely spaced. Live bunchgrass clumps are present and have the highest relative dominance and density of any vegetation.	30-50% vegetation basal cover (mostly bunchgrasses). Clumps are moderately developed and moderately spaced.	Less than 30% vegetation basal cover (mostly bunchgrass). Clumps are small and widely spaced.

Mountain Grassland (Brome Parks)

Parks dominated by nonnative smooth brome are maintaining themselves with very little development of native species present. The development of native species in these parks is unlikely to occur without significant active management such as disking, harrowing, and seeding; even then, success is uncertain. Therefore, the ID team recommends the agency continue to maintain these parks with a dominance of smooth brome species. It is important to keep an eye on the hydrologic function of these parks as they tend to produce less plant and litter cover, exhibit more bare ground, and have a higher potential for erosion. Some disturbance may be necessary to maintain vigor and ground cover.

Mountain Grassland (Brome Parks)			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Common species include smooth brome, Kentucky bluegrass, Timothy, nonnative wheatgrass, and orchard grass. Smooth brome dominates. A characteristic of brome is the thin stalks that do not form clumps but spread evenly across the area. Brome stalks are about 6" high. Seedheads are present. Bare ground is less than 5% and interspaces have enough litter to prevent rills.	Common species include smooth brome, Kentucky bluegrass, Timothy, intermediate wheatgrass, and orchard grass. Smooth brome dominates. Brome stalks are about 6" high. Seedheads are present. Bare ground is less than 10% in a discontinuous pattern so that water flow patterns are not connected; litter, or vegetation is well distributed and adequate to capture water and prevent soil movement in most places.	Common species include smooth brome, Kentucky bluegrass, Timothy, nonnative wheatgrass, and orchard grass. Smooth brome dominates. Brome stalks are about 6" high. Seedheads are present. Bare ground is 10-20%. Smooth brome plants are not quite evenly distributed but progressing toward even distribution. Smooth brome seedlings are found in rill/bare-ground areas and are becoming established. Rills between plants are present but not expanding. Litter is increasing.	Common species include smooth brome, Kentucky bluegrass, Timothy, nonnative wheatgrass, and orchard grass. Smooth brome dominates. Nonnative invasive species are present and increasing. Brome stalks are about 6" high. Seedheads are present. Bare ground is greater than 20%. Bare ground is becoming continuous. Rills between plants are present and expanding.

Aspen

The Glade landscape supports two aspen subtypes: Colorado Plateau and Terrain-Isolated. Aspen stands provide biodiversity, both within individual stands and across the forest and typically produce some of the highest forage yields for livestock managers. Aspen stands across the Glade landscape are considered dry compared to stands at higher elevations. While some factors that cause aspen stands to dry out might be beyond a manager's control, certain actions – like keeping grazing and browsing at sustainable levels – can protect and promote their resiliency. Managers should routinely inventory stands for any issues that impede water retention, since a stand must retain enough water to support seedlings.

***Subtype #1: Colorado Plateau*.** This aspen subtype is found on flat or modest slopes and range in size from 25 acres to hundreds of acres. It is characterized by uneven-aged stands, where aspen seedlings are in the understory, aspen saplings in the mid-story, and mature aspen in the overstory. The Colorado Plateau Aspen subtype is stable and self-perpetuating over time (Rogers et al., 2014). Disturbance factors that promote regeneration in these stands tend to be minimal, not affecting the whole stand at once (Kurzel et al., 2007) (Rogers et al., 2010). This subtype has an understory dominated by tall forbs, especially osha and meadowrue. The most common shrub is Wood's rose. Diversity in aspen stands tends to be high and bare ground of any amount is rare. .

***Subtype #2: Terrain-Isolated*.** Terrain-Isolated Aspen stands occur on drier sites and tend to be much smaller than stands of Colorado Plateau Aspen. Terrain-isolated aspen stands are usually less than 25 acres in size. On the Glade landscape, these stands are generally found as inclusions surrounded by Mountain Grassland vegetation or on north-facing slopes intermixed with ponderosa pine. They often display stunted growth forms and are codominant with shrubs and grasses. Like Colorado Plateau Aspen, Terrain-Isolated Aspen is characterized by an uneven-aged profile and is self-perpetuating over time. Disturbance factors tend to be small or moderate in extent.

Aspen			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
An uneven-aged canopy, aspen seedlings and saplings are present throughout the stand or in patches, where disturbance has occurred. Where there has been no disturbance, relatively even aged stands of aspen with inclusions of sprouts or released young at edges. Across the landscape would be enough disturbance to overcome dominance by conifers/oak.	Aspen seedlings and saplings are present and thriving throughout the stand where disturbance has occurred or along the edges where it has not.	Aspen seedlings and saplings are present, but show signs of browse especially clipped leaders and stripped leaves. Browsing has only occurred for one to two years.	Aspens seedling have damaged tips and leaves and browsing pressure seems to have occurred for multiple years[1].
Common shrubs of the Colorado Plateau aspen subtype are Wood's rose, Oregon grape, snowberry, serviceberry, and Gambel oak. Grasses and grass-like plants include native bromes, native upland sedges, slender wheatgrass, Letterman's needlegrass, blue wildrye, and native bluegrass species. Forbs include osha, aspen peavine, Sweet Cicely, American vetch,	The Colorado Plateau aspen subtype contains a diverse mix of the common species listed under potential conditions..	While these Colorado Plateau aspen subtypes may include dry-site species with shallow roots such as Kentucky bluegrass, dandelion, mulesear, and coneflower plus nonnative invasive species, these are being replaced by more desirable species as listed under potential condition.	The Colorado Plateau aspen subtype lacks species listed in the Potential Condition (PC) column. Kentucky bluegrass, dandelion, mulesear, and coneflower are present dominant and/or increasing. [2]

[1] Aspen can withstand some browsing but multiple years of browsing may kill the seedlings, and roots system is less able to produce new sprouts in these situations.

[2] These species are problematic for several reasons: They hold little water, are less able than deeper-rooted species to hold soil in place, and their forbs are not palatable. In addition, Kentucky bluegrass and dandelion are nonnative species.

Aspen			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Fendler's meadowrue, Richardson's geranium, yarrow, bedstraw, wild strawberry, and Englemann's aster. In the Colorado Plateau subtype bare ground is 0%.	In the Colorado Plateau subtype Bare ground is 0%.	In the Colorado Plateau subtype, Bare ground is less than 10%.	Bare ground is greater than 10%.
Terrain-isolated aspen stands on the Glade landscape are dominated by Gambel oak, snowberry, serviceberry and grasses and may also include a mix of Wood's rose, Oregon grape, Gambel oak, snowberry, serviceberry, osha, aspen peavine, Sweet Cicely, American vetch, Fendler's meadowrue, Richardson's geranium, yarrow, bedstraw, wild strawberry, Englemann's aster, native brome grasses, slender wheatgrass, Letterman's needlegrass, blue wildrye, and native bluegrasses In the terrain-isolated stands bare ground is less than 10%.	A mix of species listed under potential conditions would be found. In the terrain-isolated stands bare ground is less than 10%	In Terrain-isolated aspen stands, undesirable species such as mulesear, skunk cabbage, coneflower, dandelion, Kentucky bluegrass may be present but are decreasing. In the terrain-isolated stands bare ground is less than 20%	These Terrain-isolated aspen stands are drying out and have started to shift to shrub dominance with little aspen in the overstory. Bare ground is greater than 20%.

Aspen			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Vegetation basal cover is mostly grass, forb and shrub cover with some litter in the few spaces that occur between plants.	Vegetation basal cover is 60-80% grass, forb, and shrub cover with grasses and forbs dominating; 10-30% litter.	Vegetation basal cover 40-60% grass, forb and shrub cover.	Vegetation basal cover is less than 40% grass, forb and shrub.

Pinyon-Juniper (Ryman)

Ryman Pinyon-Juniper occurs mostly in the northeast corner of the analysis area. Surface soils are gravelly clay loam, so small rock fragments often appear on the soil surface. Depth to bedrock can be 10-20 inches. The available water storage is very low. Soil stability is the key management concern. Where grasses do not occur, ground cover primarily consists of woody debris, litter, rock and/or biological crust. In order to achieve or maintain soil stability, there should be no more than 15% bare ground in pinyon-juniper stands.

Approximately one-third of pinyon-juniper stands in the Ryman area were burned in the Disappointment Fire of 1995. Both the burned and unburned portions are important winter range for big game and historically served as spring or fall pastures for cattle.

A majority of the stands have a multi-aged overstory of pinyon and juniper and a significant mid-story shrub layer that includes Gambel oak, squaw apple, serviceberry, and other shrubs. Understory production in these stands varies with some areas containing bunchgrasses while other areas have ground cover dominated mostly by pinyon and juniper litter or biological soil crust. Sometimes the crust is well developed, at other times it is absent or in early development.

The *Ips* beetle infestation of the early 2000's caused pinyon mortality across the Glade landscape. In some areas, the infestation resulted in an overstory predominated by juniper with a cheatgrass understory where pinyon pines had died.

The primary focus of management in the Pinyon-Juniper (Ryman) type is to maintain ground that is covered by plants, litter, or crust in order to prevent overland water flow that leads to more bare ground and more water loss with each precipitation event. Discontinuous overland water flow patterns are important for maintaining this vegetation type.

In addition, sagebrush age class diversity is listed as part of the desired condition because sagebrush is an important winter browse species for big game. While some factors such as excessive browsing by wildlife are beyond the range manager's control, certain actions – like discouraging cattle browsing- can promote sagebrush resiliency.

Pinyon-Juniper (Ryman)			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Understory species composition is variable; some areas support grasses, some areas are dominated by tree litter, and other areas are dominated by biological crust.	Same as potential	Shows species and litter increasing towards desired conditions.	Shows a decline in desirable species and litter.
Common species include Indian ricegrass, mutton grass, Western wheatgrass, prairie junegrass, blue grama, low muhly, needle-and-thread, Gambel oak, squaw apple, serviceberry, Wyoming big sage	Same as potential and includes diverse age classes of sagebrush as well.	Species diversity is increasing.	Species diversity is decreasing.
Cheatgrass is absent.	Cheatgrass, where present, is stable or decreasing over time.	Cheatgrass is present but not expanding.	Cheatgrass is expanding.
Where shortgrasses exist they form continuous sod.	Where shortgrasses exist they form continuous sod.	Where shortgrasses exist sod is somewhat broken with some bare ground visible. There is an increase in sod.	Where shortgrasses occur the sod is very broken with bare ground in between. Sod is decreasing.

Pinyon-Juniper (Ryman)			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Where midgrasses or bunchgrasses exist they are well formed with tall seed stalks and bunches grow close together.	Where midgrasses or bunchgrasses exist they are well formed with tall seed stalks and bunches grow close together.	Midgrasses and bunchgrasses where they exist are moderately developed with some spaces visible between the bunches	Bunchgrass clumps are small and widely separated. Bunchgrass seed stalks are short.
No active pedestaling or rills and overland water flow is not connected. Bare ground is in a discontinuous pattern Litter, crust, or vegetation is well distributed and adequate to capture water and prevent soil movement.	Pedestals and rills are stable and healing, overland water flow is not connected. Bare ground is in a discontinuous pattern. Litter crust and vegetation is well distributed and adequate to capture water and prevent soils movement in most places.	Rills and pedestals are present, stable, and preferably healing. Water flow patterns are moderately connected. Where litter dominates the understory it is moderately well distributed.	Active rills and pedestaling with connected flow patterns exist. Litter is absent or not well distributed. Where litter exists, it is light and unable to prevent soil movement.
Crusts are well developed where it occurs. Crusts are developed enough to hold soil and are an important component of ground cover.	All stages of crust development are apparent.	Where crusts occur it is in the early to mid-development stage but appears to be expanding.	Biological crusts are declining or absent.
Less than 5% bare ground.	Less than 5% bare ground would be ideal but realistically it will be more like 10%.	Less than 10% bare ground.	More than 10% bare ground in all areas.

Pinyon-Juniper (Black Sage)

The Pinyon-Juniper/Black Sage type occurs mainly along the eastern rim of the Dolores River Canyon and along the rims of major drainages leading down to Disappointment Creek in the northern portion of the analysis area[3]. Surface soils are loamy, however, if soils have been eroded, they will be a very stony clay loam with rock fragments on the soil surface. Depth to bedrock can be 40-60 inches. Available water storage in the soil profile is low but not as low as with the Ryman Pinyon-Juniper type.

The stands in this type have a multi-aged overstory, dominated by pinyon pine with some Rocky Mountain juniper and occasional ponderosa pine. Major shrubs in this type are black sage, Gambel oak, and snowberry. These areas occur at higher elevation and receive more precipitation than Ryman Pinyon-Juniper, therefore herbaceous production is higher. Past vegetation treatments have influenced these areas.

The primary focus of management in the Pinyon-Juniper (Ryman) type is to maintain ground that is covered by plants, litter, or crust in order to prevent overland water flow that leads to more bare ground and more water loss with each precipitation event. Managing for discontinuous overland water flow patterns by maintaining plant, litter, or crust cover is important for maintaining this vegetation type. In addition, sagebrush age class diversity is listed as part of the desired condition because sagebrush is an important winter browse species for big game. While some factors such as excessive browsing by wildlife are beyond the range manager's control, certain actions – like discouraging cattle browsing- can promote sagebrush resiliency.

Pinyon-Juniper (Black Sage)			
Potential	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Common species include black sage, Gambel oak, snowberry, trailing fleabane, sun sedge, prairie junegrass, mountain muhly grass, squirreltail grass, and blue grama.	Same as potential.	Shows species diversity increasing towards desired conditions.	Shows a decline in desirable species.

[3] Sagebrush in these areas is showing signs of browse by elk.

Pinyon-Juniper (Black Sage)			
Potential	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Sagebrush intermixed with pinyon-juniper is actually part of this vegetation type.	Same as potential with a diverse age class of sagebrush present.	Sagebrush density and age diversity increasing.	Sagebrush density and age diversity decreasing.
Cheat grass is absent	Cheat grass is isolated and decreasing.	Cheatgrass, where present, is not expanding and possibly decreasing.	Cheatgrass dominates or is present and expanding.
Shortgrasses form continuous sod where they exist.	Same as potential	Shortgrasses exist and while sod is somewhat broken with some bare ground visible, it is not expanding and may be decreasing.	Where shortgrasses occur, the sod is very broken with bare ground in between which may be expanding.
Midgrasses have well-formed bunches growing close together with abundant seed stalks. Bunchgrasses present and robust.	Same as potential	Midgrass clumps moderately developed with some spacing between them. Bare ground decreasing between clumps. Bunchgrass seed stalks are short.	Midgrass clumps are small and widely separated and/or bare ground expanding between clumps. Bunchgrass seed stalks are short if present.
Crusts are well developed where they occur.	Crusts are in various stages of development but include a few areas where they are well-developed.	Crusts are in various stages of development.	Crusts are absent.
Bare ground may be visible but at a very low level. Litter, crust, and/or	Less than 10% bare ground in a discontinuous pattern. Litter, crust, and/or	Less than 10% bare ground moderately connected. Litter, crust and/or vegetation is	More than 10% bare ground with water flow patterns connected.

Pinyon-Juniper (Black Sage)			
Potential	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
vegetation is distributed adequately to capture water and prevent soil movement.	vegetation are well distributed and adequate to capture water and prevent soil movement in most places.	moderately well distributed and increasing.	
No active pedestaling or rills	Rills and pedestals are stable and healing.	Rills and pedestals are present but there are signs of healing.	Active rills and pedestaling with connected water flow patterns.

Mountain Shrubland

The Mountain Shrubland vegetation type is dominated by Gambel oak that is mixed with serviceberry, snowberry, and other shrubs. Ponderosa pine, pinyon, Rocky Mountain juniper, or aspen trees may be present in small amounts. The Mountain Shrubland type often grades into other vegetation types, making it difficult to tell where one type ends and another begins. Ponderosa Pine/Gambel Oak, Mountain Grassland, and Aspen are vegetation types that generally grade into or out of the Mountain Shrublands.

This vegetation type occurs primarily on deep, clay loam soils located on mesa tops, mountain slopes, valley sides, terraces, drainages, and alluvial fans. The soils have a very high runoff potential; Mountain Shrubland vegetation and associated litter are crucial to limiting this erosion. Species composition varies from patch to patch. The proportion of shrubs to grasses and forbs depends largely on disturbance; therefore, it's important to take advantage of opportunities to introduce disturbance (like prescribed fire) into this vegetation type to maintain a balance.

Like the pinyon-juniper vegetation types, controlling overland flow by maintaining plant, litter and crust cover will help to maintain this vegetation type.

Mountain Shrubland			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Common species consist of Gambel oak, snowberry, chokecherry, serviceberry, Wood's rose, mountain big sagebrush, upland sedges, slender wheatgrass, western wheatgrass, native brome grasses, Letterman's needlegrass, aspen peavine, trailing fleabane, western yarrow, American vetch, and silver lupine.	Same as potential with decreasing populations of invasive species such as rabbitbrush, Kentucky bluegrass, mulesear, and cheatgrass. Decreasing noxious species such as Canada thistle.[4] Diverse age classes of shrubs, including sprouts and seedlings are present.	Species diversity is increasing, with fewer nonnative invasive species and more of the species found under potential.	Gambel oak[5] predominates. Several species listed under potential are missing. Invasive species such as rabbitbrush, Kentucky bluegrass, Canada thistle, and cheatgrass are present and expanding.
50-70% of vegetation basal cover is grasses; 5-10% is forbs; 20-30% is shrubs; and 5-10% is trees.	Same as potential	40-60% of vegetation basal cover is grasses. In bare ground areas, vegetation basal cover is progressing to grasses, forbs and shrubs.	Vegetation basal cover is less than 40% with bare ground increasing.
Less than 10% bare	Less than 10% bare ground.	More than 10% bare ground but	More than 10% bare ground

[4] Because of their inability to hold water, it is important to minimize the presence of these species.

[5] Gambel oak, an invader or increaser, decreases species diversity. Its density can greatly increase after treatment or heavy browsing on more palatable shrubs.

Mountain Shrubland			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
ground. 70-80% of vegetation is litter, 1-2” deep. Bare ground is in a discontinuous pattern so that water flow patterns are not connected; litter, crust, or vegetation is well distributed and adequate to capture water and prevent soil movement in most places.	 70-80% litter is 1-2” deep (except immediately after disturbance). Same as potential	decreasing. The amount and depth of litter is increasing. Water flow patterns are somewhat connected but are not increasing. Litter, crust or vegetation are increasing to the point of becoming adequate to stop overland flow.	and/or increasing. Litter is decreasing. Water flow patterns are connected. Litter, crust or vegetation are not adequate to stop overland flow.

Sagebrush Shrubland

The Sagebrush Shrubland vegetation type occurs in the northern portion of the analysis area. To the northwest, it borders the Dolores River Canyon and the escarpment down to Disappointment Valley. At these locations patches of Sagebrush Shrubland are intermixed with the Pinyon-Juniper vegetation type and grade into the Ponderosa Pine/Gambel Oak vegetation type. Basin big sagebrush is the dominant sagebrush species in the draws and riparian areas, while Wyoming big sagebrush is the dominant sagebrush species in the uplands.

Controlling overland flow and maintaining browse species for big game winter range are important management considerations in this vegetation type.

Sagebrush Shrubland			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Common species include basin big sagebrush, Wyoming big sagebrush, cliff fendlerbush, fourwing saltbush, Utah serviceberry, mountain mahogany, antelope bitterbrush, mutton grass, western wheatgrass, Indian ricegrass, bottlebrush squirreltail, prairie junegrass, slender wheatgrass.	Diverse mix of species, same as potential.	Vegetation species diversity are not at desired but are increasing.	Vegetation species diversity are decreasing. Increase in bare ground, lack of biological soil crusts Decrease in litter
Cheatgrass is absent.	Where present, cheatgrass is stable or decreasing.	Where present, cheatgrass is stable or decreasing.	Cheatgrass is present and increasing.
Less than 10% bare ground. Bare ground is in a discontinuous pattern so that water flow patterns are not connected; litter, crust, or vegetation is well distributed and adequate to capture water and prevent soil movement.	Less than 10% bare ground. Same as potential in most places.	Bare ground greater than 10% but decreasing. Increase in basal vegetation, biological soil crust, and litter; fewer connected flow patterns.	Bare ground greater than 10% and increasing. Areas of continuous water flows where litter, crust and vegetation are not well developed and inadequate to prevent overland flow

Sagebrush Shrubland			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Rills and Pedestals are absent.	Rills and pedestals are stable or healing.	Some areas of continuous water flow patterns exist where litter, crust and vegetation are only moderately developed. Rills and pedestals are stable and showing signs of healing.	Rills and pedestals are active.

Riparian

Wetlands are areas that are saturated by surface or ground water. Vegetation that grows in wetlands is typically adapted for life in saturated soil conditions. Riparian areas, such as a streambank, are a transition area between permanently saturated wetlands and upland areas. These areas can be detected on the landscape by their physical features and sometimes by their characteristic vegetation. Lands along perennially and intermittently flowing rivers and streams and the shores of lakes and reservoirs with stable water levels are typical riparian areas.

Riparian plant density and plant community development can vary based on saturation level of the soil. Natural and human-caused disturbance can also affect the plant community. For example, after the Disappointment Fire, Pine Creek ran perennially for two years. Once brush became dominant, flows were severely restricted. A range of stages, from the absence of stabilizing plants to the presence of these plants to the development of riparian plant community complexes (ecological potential) are possible depending upon conditions. Eight riparian types exist across the Glade landscape and include the following:

- Low gradient swales/slope wetlands
- Glade Canyon
- High gradient streams
- Headwater transition zones
- Moderately steep, rocky canyons
- Low gradient, deeply incised channels
- Dolores River
- Lentic areas (Springs, Depressional Wetlands and Reservoirs)

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Low Gradient Swales/Slope Wetlands			
Saturated at or near the surface in relatively frequent events.	Same as potential	Saturation at or near the surface occurs for longer periods of time.	Diversity of riparian species decreasing; species such as shrubby cinquefoil, wild iris, dandelion, redtop and Kentucky bluegrass is increasing.
Riparian-wetland area at potential extent.	Riparian-wetland area widening or at potential extent.	Riparian-wetland area widening.	Riparian-wetland area is decreasing through drying/loss of riparian species or downcutting.
Diverse composition of riparian vegetation that includes water sedge, beaked sedge, common spikerush; minimal amount of forbs.	Same as potential	Diversity of riparian species is increasing.	Diversity of riparian species is decreasing. There is often an increase in coyote willow with a decline in mid-seral willows such as plane leaf.
Continuous mat of riparian species providing adequate cover to protect soil surface.	Same as potential	Amount of riparian species is increasing/cover is increasing.	
System is vertically stable or if system was vertically unstable before, the riparian	Same as potential	If previously vertically unstable, system has stopped downcutting and now has	Riparian species sparse; bare ground is increasing.

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
width is likely to be limited by the width of the incised channel; however, it is no longer downcutting, vegetation is stabilizing the bed and banks, previously bare areas are covered with a continuous mat of riparian species, and headcuts are no longer actively eroding.		vegetation stabilizing the bed and slopes.	System is vertically unstable/downcutting is occurring/headcuts are actively eroding.
Glade Canyon			
Saturated at or near the surface in relatively frequent events.	Same as potential	Saturation at or near the surface occurs for longer periods of time.	Saturation at or near the surface occurs for less amount of time/area is drying out.
Riparian-wetland area at potential extent.	Riparian-wetland area widening or at potential extent.	Riparian wetland area widening.	Riparian wetland area is decreasing through drying/loss of riparian species or downcutting.
Diverse composition of riparian vegetation that includes predominantly Booth willow, tufted hairgrass, smallwing sedge, creeping spike-rush, and American vetch; minimal amount of forbs.	Same as potential	Diversity of riparian species is increasing which includes Booth willow, tufted hairgrass, smallwing sedge, creeping spike-rush, and American vetch, among others.	Diversity of riparian species is decreasing; species such as Kentucky bluegrass, dandelion, and yellow sweet clover are increasing.

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Diverse age-class of willow with young age-classes present.	Same as potential	Amount of riparian species is increasing/cover is increasing. Willow, in particular, is establishing/increasing.	Willow species are being heavily browsed; no young age-class willows present
Riparian species exhibit high vigor.	Same as potential	Riparian species sparse but increasing, bare ground decreasing, plant vigor improving.	Riparian species sparse; bare ground is increasing.
Continuous mat of riparian species providing adequate cover to protect soil surface. System is laterally and vertically stable or if system was vertically unstable before, the riparian width is likely to be limited by the width of the incised channel; however, it is no longer downcutting, vegetation is stabilizing the bed and banks, previously bare areas are covered with a continuous mat of riparian species, and headcuts are no longer actively eroding.	Same as potential	Vertically unstable areas have stopped downcutting and now have vegetation stabilizing the bed and slopes. Laterally unstable areas have stopped eroding the banks; banks are stabilized with vegetation.	System is vertically unstable/downcutting is occurring/headcuts are actively eroding. System is laterally unstable/bank erosion is occurring.

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
To the west, where the mesa top gives way to the Dolores River canyon, the swales become high gradient streams that are both entrenched and confined. These high gradient channels are predominantly ephemeral and are dominated by Ponderosa pine and dense Gambel oak. Aspen are occasionally present. Very little disturbance occurs along these sections of stream because of their steepness and inaccessibility and therefore most are functioning at their potential.			
High Gradient Streams			
Entrenched and confined with ponderosa pine and dense Gambel oak. Aspen occasionally present. Little disturbance occurs given their steepness and inaccessibility.	Entrenched and confined with ponderosa pine and dense Gambel oak. Aspen occasionally present. Little disturbance occurs given their steepness and inaccessibility.	Entrenched and confined with ponderosa pine and dense Gambel oak. Aspen occasionally present. Where disturbance has occurred it is attempting to heal. The steepness may prevent healing therefore, bank sloughing and downcutting may continue to occur.	Entrenched and confined with ponderosa pine and dense Gambel oak. Aspen occasionally present. While little disturbance occurs given their steepness and inaccessibility, where it has occurred it is not healing and there is bank sloughing and downcutting occurring.
Headwater Transition Zones			
Saturated at or near the surface in relatively frequent events. Riparian-wetland area at potential extent. Diverse composition of riparian vegetation that	Same as potential Riparian-wetland area widening or at potential extent. Same as potential	Saturation at or near the surface occurs for longer periods of time. Riparian wetland area widening. Diversity of riparian species is increasing which includes aspen	Saturation at or near the surface occurs for less amount of time/area is drying out. Riparian wetland area is decreasing through drying/loss of riparian species or downcutting. Diversity of riparian species is decreasing; aspen are not

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
includes aspen and serviceberry and lesser amounts of chokecherry, Rocky Mountain maple, mountain snowberry, and Woods rose.		and serviceberry and lesser amounts of chokecherry, Rocky Mountain maple, mountain snowberry, and Woods rose.	regenerating.
Diverse age-class of aspen. Riparian species exhibit high vigor.	Same as potential	Amount of riparian species is increasing/cover is increasing and plant vigor is improving.	Riparian species sparse; bare ground is increasing. Young aspen are heavily browsed or there is only older age-classes of aspen present.
Continuous mat of riparian species providing adequate cover to protect soil surface. System is laterally and vertically stable or if system was vertically unstable before, the riparian width is likely to be limited by the width of the incised channel; however, it is no longer downcutting, vegetation is stabilizing the bed and banks, previously bare areas are covered with a continuous mat of riparian species, and headcuts are no	Same as potential	Vertically unstable areas have stopped downcutting and now have vegetation stabilizing the bed and slopes/headcuts are no longer actively eroding.	System is vertically unstable/downcutting is occurring/headcuts are actively eroding.

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
longer actively eroding.			
Moderately Steep Rocky Canyons			
Inundated in relatively frequent events.	Same as potential	Floodplain inundated in places where it is connected.	Floodplain no longer inundated.
Riparian-wetland area at potential extent.	Riparian-wetland area widening or at potential extent.	Riparian wetland area widening.	Riparian wetland area is decreasing through drying/loss of riparian species or downcutting.
Diverse composition of riparian vegetation that includes narrowleaf cottonwood, coyote and/or yellow willow, red-osier (dogwood), Saskatoon serviceberry, silvertop sedge, swamp bluegrass, blue wildrye, slender wheatgrass, and fringed brome.	Same as potential	Diversity of riparian species is increasing which includes narrowleaf cottonwood, coyote and/or yellow willow, red-osier (dogwood), Saskatoon serviceberry, silvertop sedge, swamp bluegrass, blue wildrye, slender wheatgrass, and fringed brome.	Diversity of riparian species is decreasing; condition of palatable shrubs (willows, red-osier, serviceberry) will be poor; shrubby cinquefoil, Kentucky bluegrass, and Ponderosa pine will increase/invade.
Diverse age-class of cottonwood and willow with young age-classes present.	Same as potential	Young age-classes of cottonwood and willow are present/increasing.	Willow species are being heavily browsed; no young age-class willows present. Cottonwood not regenerating.
Riparian species exhibit high vigor.	Same as potential	Amount of riparian species is increasing/cover is increasing.	Riparian species sparse; bare ground is increasing.

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Continuous mat of riparian species providing adequate cover to protect soil surface.	Same as potential	Vertically unstable areas have stopped downcutting and now have vegetation stabilizing the bed and slopes/headcuts are no longer active.	System is vertically unstable/downcutting is occurring/headcuts are actively eroding.
System is laterally and vertically stable (stream channel is connected to its floodplain) or if system was vertically unstable before, the riparian width is likely to be limited by the width of the incised channel; however, it is no longer downcutting, vegetation is stabilizing the bed and banks, previously bare areas are covered with a continuous mat of riparian species, and headcuts are no longer actively eroding.	Same as potential	Laterally unstable areas have stopped eroding the banks; banks are stabilized with vegetation.	System is laterally unstable/bank erosion is occurring.
Low Gradient, Deeply Incised Channels			
Inundated in relatively frequent events.	Same as potential	Floodplain inundated in places where it is connected. Floodplain capturing sediment and building banks.	Floodplain no longer inundated. Sediment is not being captured; banks eroding/washing out.

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Riparian-wetland area at potential extent.	Riparian-wetland area widening or at potential extent.	Riparian wetland area widening.	Riparian wetland area is decreasing through drying/loss of riparian species or downcutting.
Diverse composition of riparian vegetation that includes plains or Rio Grande cottonwood, sandbar and other types of willow, a variety of sedges, some bulrush and common spikerush.	Same as potential	Diversity of riparian species is increasing which includes narrowleaf cottonwood, coyote and/or yellow willow, red-osier (dogwood), Saskatoon serviceberry, silvertop sedge, swamp bluegrass, blue wildrye, slender wheatgrass, and fringed brome.	Diversity of riparian species is decreasing; cocklebur, yellow sweet clover, Kentucky bluegrass, redtop, hair grass, and smooth brome invading.
Diverse age-class of cottonwood and willow with young age-classes present .	Same as potential	Young age-classes of cottonwood and willow are present/increasing.	Willow species are being inundated with sediment. Cottonwood not regenerating or unable to establish.
Riparian species abundant and exhibit high vigor.	Same as potential	Amount of riparian species is increasing/cover is increasing.	Riparian species sparse; bare ground is increasing.
Continuous mat of riparian species providing adequate cover to protect soil surface. System is laterally stable	Same as potential	Vertically unstable areas have stopped downcutting and now have vegetation stabilizing the bed and slopes/headcuts are no longer active. Laterally	System is vertically unstable/downcutting is occurring/headcuts are actively eroding. System is laterally unstable/bank

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Because the system was vertically unstable and has downcut 10's of feet, the riparian width is likely to be limited by the width of the incised channel; however, it is no longer downcutting, vegetation is stabilizing the bed and banks, previously bare areas are covered with a continuous mat of riparian species, and headcuts are no longer actively eroding.		unstable areas have stopped eroding the banks; banks are stabilized with vegetation.	erosion is occurring.
Dolores River			
Floodplain above bankfull occassionally and partially inundated.	Same as potential	Floodplain inundated in places where it is connected. Floodplain capturing sediment and building banks.	Floodplain disconnected, not able to capture sediments.
Riparian-wetland area at potential extent.	Riparian-wetland area at potential extent.	Riparian wetland area widening.	Riparian wetland area is decreasing through drying/loss of riparian species.
Diverse composition of riparian vegetation that includes narrowleaf cottonwood, box elder, privet, thinleaf alder, and a	Same as potential	Diversity of riparian species is increasing which includes narrowleaf cottonwood, box elder, privet, thinleaf alder, and a variety of willow .	Diversity of riparian species is decreasing.

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
variety of willow.			
Diverse age-class of cottonwood and willow with young age-classes present.	Same as potential	Young age-classes of cottonwood and willow are present/increasing.	Willow dominates stream banks and is growing further into active channel. Cottonwood not regenerating or unable to establish
Riparian species are abundant and exhibit high vigor.	Same as potential	Amount of riparian species is increasing/cover is increasing.	Riparian species sparse; bare ground is increasing
Continuous mat of riparian species providing adequate cover to protect soil surface.	Same as potential	Riparian species increasing, soils are beginning to hold and stabilize. No active erosion.	Riparian development insufficient to hold soils and prevent erosion.
System is laterally and vertically stable (stream channel is connected to its floodplain).	Same as potential	Stream channel stable and/or healing.	Stream channel becomes entrenched or further entrenched. System is unstable.
Riffle habitat is occasionally flushed of sediment. Pools are occasionally flushed of sediment.	Same as potential	Riffle habitat is being maintained by flushing flows. Pools are being flushed of sediment.	Pool habitat dominates and pools fill with sediment such that the stream channel gradient approaches zero.
Lentic			
Saturated at or near the surface in relatively frequent events.	Same as potential	Saturation at or near the surface occurs for longer periods of time.	Saturation at or near the surface occurs for less amount of time.

Riparian			
Potential Condition (PC)	**Desired Condition (DC)**	**Moving Toward DC**	**Moving Away From DC**
Riparian-wetland area at potential extent.	Riparian-wetland area widening or at potential extent.	Riparian-wetland area widening.	Riparian-wetland area shrinking.
Natural surface or subsurface flow patterns not altered by disturbance.	Same as potential	Altered flow patterns are returning to their previous undisturbed conditions.	Flow patterns are altered by disturbance and connecting to concentrate flow.
If a reservoir, the structure accommodates safe passage of flows.	Same as potential	If a reservoir, any structural damage is healing.	If a reservoir, the structure is failing
Diverse age-classes of riparian wetland vegetation.	Same as potential	Diversity of age-classes in increasing.	Diversity of age-classes decreasing.
Diverse composition of riparian wetland vegetation (species composition may change based on current and recent climatic and hydrologic conditions).	Same as potential	Diversity of riparian species is increasing.	Diversity of riparian species decreasing.
Continuous mat of riparian species providing adequate cover to protect shoreline/soil surface.	Same as potential	Amount of riparian species is increasing/cover is increasing.	Amount of riparian species is decreasing/cover is decreasing.

Step 6 - Describing the History and Past, Present and Future Actions that Influenced the Glade Landscape

For some of the vegetation types historical uses have caused the departure from potential conditions. Examples are the seeding of nonnative brome which now dominate some parks on the Glade Landscape, the incising of Ryman Creek and Hunt Creek resulted in a lowered floodplain, the dam at the Dolores River which changed water flows, sage treatments that essentially removed sage as a component of the vegetative community in some places, and tree planting that resulted in forested areas where there may have been parks previously.

As part of the NFMA analysis, past, present and reasonably foreseeable future actions were compiled and are included with the History Report (Appendix A).

Step 7 – Forest Plan Review

Throughout the NFMA discussions the ID Team reviewed the background information and desired conditions statements in the Forest Plan for Ecological Framework, Terrestrial Ecosystems and Plants, Terrestrial Wildlife, Riparian Area and Wetland Ecosystems, Water Resources, Livestock and Range Management, and Invasive Species. The desired condition statements in the tables above are in keeping with the Desired Condition statements in the Forest Plan. The work done here by the ID team has refined the general Desired Condition statements into workable condition descriptions to assist resource managers for Glade Allotments effort and future projects. Excerpts from the Forest Plan related to desired conditions are located in a separate document in the project file.

Step 8 – Describing Existing Condition

The ID team discussed existing conditions for the vegetation types but it became necessary at this point to shift from landscape-wide to allotment specific descriptions. Some general conclusions from these discussions are shown below. Additional existing condition information can be found for each allotment in the Allotment Reports in the project file.

1) Ponderosa Pine/Gambel Oak areas are currently exhibiting desired conditions relative to their understory vegetation across the Glade Landscape.

2) Mountain grasslands are departed from desired conditions across the Glade Landscape. Some mountain grasslands are highly departed while others have moved closer to desired conditions.
3) Mountain Shrublands are not currently exhibiting desired conditions for litter and understory vegetation but this is due primarily to the maturity of the shrubland across the Glade landscape. Changes in conditions are dependent on future disturbances such as prescribed fire.
4) Pinyon-Juniper Ryman areas are departed from desired conditions primarily in the old burn areas and somewhat departed from desired conditions in the un-burned areas. Cryptogrammic soils are present and are influenced by hoof action of wildlife as well as cattle in some areas. There are some places in the Pinyon-Juniper Ryman area where the 'moving away from' threshold for bare ground and continuous flow patterns have already been reached with cattle management not contributing to its further decline.
5) The key to aspen management related to cattle grazing is protecting seedlings when they develop. Currently, the lack of natural disturbances has rendered most aspen stands departed from desired conditions with limited seedlings/saplings in the stands. We can only wait and respond to the next round of seedling growth following disturbance and react appropriately with cattle management.

Step 9 – Other Considerations

Lack of Natural Disturbance (Trees and Shrubs).

The pine and Gambel oak communities are primarily mature and contiguous. Except for the Narraguinnep and Disappointment fires, there has been little broad scale disturbances to the pine, oak and aspen communities. The Forest Plan notes the overabundance of older age classes and sets desired conditions for increasing young and mid age classes and decreasing the mature trees and shrubs.

Additional information is located in the Land and Resource Management Plan (LRMP) Environmental Impact Statement and LRMP.

Future water availability could affect cattle distribution

There may be a general scarcity of water for cattle under some climate change scenarios. Depending on which climate change scenario occurs, it is possible that water supplies may become increasingly scarce and seasonal(snowmelt may occur earlier in the

year). Ranchers with permits on the Glade Landscape rely on springs and reservoirs (earthen tanks that capture winter snow runoff and summer monsoon rainfall). During the recent droughts, many of these dirt tanks dried prematurely, making some pastures unusable for cattle even though forage was still available.

Choosing What to Monitor

When choosing objectives tied to desired conditions the ID team agreed that vegetation transects should not be the sole method used to monitor. A variety of other objectives were identified that would be checked by field observations that would be more indicative of recent precipitation influences such as ground cover/bare ground, seed stalk height, presence or absence of desired species, presence or absence of undesirable nonnative species, etc.

Rangeland Suitability

Development of the Forest Plan included an analysis of rangeland suitability. The project file contains documents that describe the process used to determine rangeland suitability at the San Juan National Forest scale. Based on ID team knowledge there are no places on the Glade landscape where rangeland suitability determinations need to be re-visited. The conclusions of the broader forest-wide analysis can be verified and carried forward at the project level. The Range Specialist Report will evaluate the effects of alternatives and will make a formal statement about rangeland suitability for the project file later in the analysis process.

References

Alexander, Robert R. *Major Habitat Types, Community Types, and Plant Communities in the Rocky Mountains* General Technical Report RM-123, Forest Service, USDA.

Bowns, J. E., and C. F. Bagley. 1986. Vegetation responses to long-term sheep grazing on mountain ranges. *Journal of Range Management* 39(5):431–434.

Brand, M., and H. Goetz. 1986. Vegetation of Exclosures in Southwestern North Dakota. *Journal of Range Management* 39(5):434–437.

Costello David F., Schwan H.E, Conditions and Trends in Ponderosa Pine Ranges in Colorado, Forest Service, USDA

Herrick, J.E., Pellant, M., Pyke, D.A., Shaver, P. (2005). *Interpreting indicators of rangeland health, version 4*. U.S. Department of the Interior, Bureau of Land Management: Denver.

Kurzel, B.P., Veblen, T.T., Kulakowski, D., 2007. *A typology of stand structure and dynamics of Quaking aspen in northwestern Colorado*. Forest Ecology and Management 252 (1–3), 176–190

Rogers, P.C., Landha¨usser, S.M, Pinno, B.D., Ryel, R.J. (2014). *A functional framework for improved management of western North American aspen (Populus tremuloides Michx.)*.

San Juan National Forest (2013). *San Juan National Forest Land and Resource Management Plan*.

TACCIMO (2013). TACCIMO Climate Report: Dolores County, CO.

USDA, Forest Service, Rocky Mountain Region, R2-ECOL-87-2, June 1987 *Plant Associations of Region Two* Edition 4.

USDI, Bureau of Land Management (2005). *Interpreting Indicators for Rangeland Health*, Version 4. Denver, CO: BLM National Business Center.