Appendix A

BEST MANAGEMENT PRACTICES (BMPs) WHICH MAY BE IMPLEMENTED AS CONDITIONS OF APPROVAL (COAs)

Environmental Best Management Practices (BMPs) are state-of-the-art mitigation measures applied on a site-specific basis to reduce, prevent, or avoid adverse environmental or social impacts. A number of the BLM BMPs for oil and gas development are incorporated into the general oil and gas development requirements in the Approved Plan. These include minimizing the number and size of pads through utilization of multiple well designs and directional drilling; centralizing fracing; minimizing road footprints; centralized support facilities such as tank batteries; collocating utilities and pipelines in common corridors and aligning them along roadways; and implementing intensive interim reclamation practices. The BMPs identified in this Appendix are examples of activities which may be required; actual BMPs required during the permitting process to mitigate impacts may vary. The BMPs and specific methodologies associated with them are expected to change over time as technology changes, and to reflect the results of monitoring and ongoing adaptive management efforts. Additional practices may be required, practices may be withdrawn, or practices may be modified during activity, implementation, or project level planning; this may be done without future land use plan (i.e., RMP) decisions or amendments, but would be analyzed as part of the NEPA analysis associated with the permitting process. Monitoring and adaptive management practices will be used to refine and clarify needed practices consistent with the goals and objectives of this plan.

The following BMPs and standard operating practices are typical of those that will be applied to all long-term ground-disturbing activities, as appropriate to each site and activity. New or additional BMPs may be utilized as they are developed.

Reduced Oil and Gas Development Footprint (Included in the General Development Plan)

- Collocate multiple wells on well pads
- Use directional drilling to reduce the number of pads and allow pads to be placed in environmentally less sensitive areas.
- Use centralized production facilities for all natural gas liquids and produced water
- Co-locate utilities into common corridors where practicable.
- Bury flowlines and powerlines in or adjacent to the roadbed where practicable.
- Use remote monitoring with telemetry to reduce vehicular traffic.
- Adhere to seasonal road closures and restrictions on public vehicular access.
- Use recessed or below-ground wellheads.

Physical Site Protection/Water Quality Controls

- Employ dust suppression to minimize impacts to air, water, vegetation, and wildlife
- Install silt fences to protect riparian areas, wetlands, open water
- Use closed compressor buildings or mufflers to minimize noise
- Install catalytic converters to minimize emissions

Interim Disturbed Site Reclamation

- Limit surface disturbance to the minimum area necessary by avoiding development on steep slopes; through careful planning, consider the grouping structures and sharing rights-of-way.

- To achieve full interim reclamation, locate production facilities such as natural gas liquids tanks, produced water tanks, and dehydration equipment in centralized areas and not on individual well pads whenever practicable. Normally, the only facilities remaining on individual well pads will be the wellhead and metering facility. The entire portion of the well pad not subject to ongoing disturbance from production operations will be revegetated, including the areas within the remaining rig anchors.
- Minimize the area necessary for construction; determine the minimal area needed to facilitate necessary activities, and initiate interim reclamation as quickly as possible after construction.
- **Topsoil Salvage and Storage**
    - Strip topsoil to a minimum depth of six inches and salvage from potential disturbance sites. Exceptions to this practice may be granted in disturbance areas infested with noxious weeds or other undesirable plants species, or with seleniferous or erosive soils. Whenever possible, salvaged topsoil will be direct-hauled to disturbed areas with similar soil characteristics undergoing concurrent revegetation.
    - BLM may require stripping be conducted in stages to avoid topsoil compaction, beginning with a leading edge and moving in one consistent direction for subsequent loads.
    - Topsoil must be stockpiled where no vehicle traffic will cross topsoil mounds. Stockpiles shall be protected from wind and water erosion through the use of suitable weed-free mulch, seeding, and other measures as approved by BLM.
    - With the exception of active work areas, all disturbed soils that remain exposed, unprotected, or un-reclaimed for longer than one month shall be stabilized as approved by BLM. This may be conducted through the use of native or sterile non-native seed, or application of a covering such as mulch or matting.
- Interim reclamation includes re-contouring of the disturbed surface to blend with surrounding terrain, spreading salvaged topsoil evenly on disturbed areas, and re-vegetating with native plants.
- Install fencing where required to limit livestock grazing for a minimum of two growing seasons or until plants are sufficiently established to persist under some physical disturbance. Seeded species will be considered established when at least 50 percent of plants are producing seeds. Fencing should be installed after dirtwork, grading, and seeding are completed and prior to livestock turnout on the allotment. A defensible corridor around structure and facilities may be appropriate in areas where wildfire is a threat.
- Remove all equipment, debris, and surface structures that are not necessary for the intended use of the site. Remaining structures should blend in to the extent possible with the surrounding terrain. Consider the use of natural features such as trees, rock formations, terrain, or berms to conceal disturbed areas. Paint structures a color that blends with the surrounding vegetation.
- Install silt fences, straw wattles, or other adequate barriers to protect riparian areas, wetlands, and open water.
- Design and install drainage crossings to adequately convey a minimum of a 25-year flow event.
- Design and install drainage crossings to allow passage by aquatic biota.
- Use mulching (certified weed-free straw or hay) or biodegradable erosion matting where needed to stabilize soil and improve the chances for revegetation success.
- Apply soil amendments such as fertilizer, flocculants, pH modifiers, inoculants, or other techniques where necessary to increase reclamation success and site stabilization on erosive soils and locations lacking adequate or have contaminated topsoil.

Reserve Pit Reclamation and Bioremediation

- Remove all fluids from the reserve pits immediately upon removal of the drilling rig. In addition, no oil or oily residue will be allowed to remain in the pits once the drilling rig is removed.
- If water accumulation in reserve pits is a problem, immediately implement measures to solidify the reserve contents following removal of the drilling rig and the free liquids to facilitate site reclamation and achieve VRM objectives. Closed mud systems may also be required by BLM to alleviate water accumulation or other problems associated with reserve pits
- Remove all oil or other hydrocarbon spills for proper disposal or bioremediate the spills *in situ* at the location of the spill.

Final Disturbed Site Reclamation

- Remove all equipment, surface structures, and debris from areas to be reclaimed.
- Recontour all disturbed areas to blend with the surrounding terrain. Areas that have received heavy equipment use such as roads and well sites will need to be ripped to a depth sufficient to accommodate the establishment of native vegetation similar to the surrounding undisturbed area.
- Respread salvaged topsoil to a uniform depth across all disturbed areas. The surface should blend with the surrounding non-disturbed area. A rough surface will accommodate broadcast seeding better than a smooth surface. Consider the use of a high phosphorus and low nitrogen fertilizer. Mulching may be necessary to control soil erosion and limit soil-water evaporation.
- Revegetate with native plant species similar in mix and kind to the surrounding native plant community. The type of cultural material used will depend on the attributes of the site and revegetation goals. Consider a combination of seeding grasses and forbs, and planting shrub tubelings. Temporary fencing or other means may be necessary to protect the newly established vegetation from livestock until plants are a sufficient size to withstand grazing.
- Monitor reclaimed areas for a sufficient period of time to ensure site stabilization and adequate vegetation establishment as determined by BLM and outlined in Appendix C.

Visual Resource Management

- Limit surface disturbance to the minimum area necessary as determined by BLM.
- Use natural features such as trees, rock formations, or terrain, to conceal disturbed areas. Constructed berms that blend with the terrain may be useful for concealment.
- Minimize contrast of the structure or activity with the surrounding terrain by using the visual resource management principles of form, line, color, and texture.
- Paint structures a color that blends with the surrounding vegetation.
- Remove unnecessary equipment, structures, and debris from the site that are not necessary for daily operation as determined by BLM.

Wildlife Protection Controls

- Incorporate measures to protect wildlife and wildlife habitat in designing and scheduling planned activities.
- Minimize wildlife habitat loss and fragmentation by carefully planning and considering the location, size, and number of such things as roads, utilities, fencing, ponds, and well pads. Pipelines and power lines should be buried in or along roadways.
- If appropriate, employ habitat enhancement in appropriate areas to offset habitat loss or fragmentation caused by the planned development.

- Accomplish interim rehabilitation and reclamation as soon as practicable after cessation of ground-disturbing activities.
- Group structures and facilities into a centralized area where practicable.
- Give preference to buried power, but design surface powerlines to minimize raptor attraction or reduce the electrocution hazard.
- Install perch guards on utility lines to reduce risk of raptor electrocution and discourage raptor perching on utility poles by the use of anti-perching devices.
- Install raptor perch protection on fenceposts in sage grouse habitat.
- Design activities to eliminate general hazards to wildlife.
- Adhere to restrictions or prohibitions on activities during critical periods such as nesting or fawning.
- Employ appropriate noise reduction devices in order to minimize noise.
- Following interim reclamation, gate or otherwise barricade access spur roads to eliminate motorized use by the general public.
- Design reclamation to meet key wildlife species habitat requirements.
- Limit activity to only the area that is necessary.
- Require that dogs be on leash in critical habit areas, or close the area to all dogs (on or off lease).
- Remotely monitor wells and production equipment.
- Monitor wildlife as needed to document impacts of planned development on population dynamics or behavior; and develop and implement mitigation based on the results of monitoring.
- Employ bear-proof refuse containers and empty the containers on a regular basis.
- Emphasize the use of closed-loop systems that avoid the need for pits. Install nets on all oil and gas reserve and permanent open water pits to exclude birds; enclose pits within an 8-foot-high fence to exclude ungulates; enclose pits within a 2-foot solid barrier buried 6 inches into the soil to exclude small mammals and reptiles, and line to prevent infiltration to groundwater.
- Reclaim and contour roads to pre-development conditions upon final reclamation.
- Restrict and monitor vehicular speed to reduce wildlife collision potential.
- Use high tensile or post and rail (wildlife friendly) design for any necessary fences and remove unnecessary fences to reduce wildlife entrapment hazards.
- Fence livestock out of newly reclaimed areas until reclamation becomes established. Fence construction should follow CDOW fencing guidelines and be durable to avoid wildlife entrapment. Once fences are no longer needed, remove fencing material and dispose of properly.

Livestock Management

- Require implementation of management tools such as fencing, stock ponds, and salt licks to manage livestock distribution as needed, and discourage grazing in unwanted areas such as riparian vegetation and sensitive wildlife habitat.
- Adjust livestock grazing in heavily used areas to allow native vegetation a period of recovery.
- Restore temporarily disturbed areas using native species, planting woody species, or use a biodegradable erosion-control fabric to enhance germination and seedling establishment.

- Drill-seed at a rate of Pure Live Seeds per square foot as needed to establish healthy vegetation (rate may be double for broadcast-seeding or hydroseeding) and be preceded by adequate site preparation, including decompaction of soil and control of annual or biennial weeds.
- Install fences around revegetated areas to exclude livestock for at least two full growing seasons.
- Use culverts or hardened crossings for use of roads that cross streams.
- Use erosion control devices around culverts as needed to reduce erosion and gulley formation.
- Construct fences and gates to ensure that livestock do not enter areas being protected for another resource that would be diminished by grazing or trampling.
- Construct alternative water sources to disperse livestock use and reduce dependence on natural streams and riparian corridors.

Noxious and Invasive Weed Management

- Rehabilitate disturbed sites quickly and effectively following interim or final rehabilitation guidelines as appropriate.
- Allow on supplementary livestock feed and revegetation mulches that are certified weed free.
- Clean vehicles regularly using water or air spray to reduce the chance of transporting weed seed from affected areas to unaffected areas.

Appendix B
Glenwood Springs Field Office Grazing Management Guidelines for Riparian Areas

Appendix B

GLENWOOD SPRINGS FIELD OFFICE GRAZING MANAGEMENT GUIDELINES FOR RIPARIAN AREAS

I. SUPPORTING DOCUMENTATION

Colorado Livestock Grazing Management Guidelines applicable to riparian areas:

1. Grazing Management practices promote plant health by providing for one or more of the following:
- periodic rest or deferment from grazing during critical growth periods;
- adequate recovery and regrowth periods;
- an opportunity (or opportunities) for seed dissemination and seedling establishment.

2. Grazing management practices address the kind, numbers, and class of livestock, season, duration, distribution, frequency and intensity of grazing use and livestock health.

3. Grazing management practices maintain sufficient residual vegetation on both uplands and riparian sites to protect the soil from wind and water erosion, to assist in maintaining appropriate soil infiltration, appropriate soil infiltration and permeability, and to buffer temperature extremes. In riparian areas, vegetation dissipates energy, captures sediment, recharges ground water, and contributes to stream stability.

The bolded sections are probably the most important for riparian zones.

Excerpts from BLM TR 1737-14 1997 Grazing Management for Riparian-Wetland Areas:

No single grazing management system has resulted in consistent recovery of degraded riparian areas. Many combinations of sites, resource condition, and impacts, as well as human perspectives, are involved. The grazing management system for an area should be tailored to the conditions, problems, potential, objectives, and livestock management considerations on a site-specific basis.

Ehrhart (in press) concluded that the common denominator among riparian areas that were functioning properly, or at least improving, in eastern Montana was continual involvement by the operator or manager. As long as there is control of livestock distribution and grazing intensity, the specific grazing system employed may not be important (Clary and Webster 1989).

Successful grazing management strategies for riparian areas can usually be achieved using a combination of options, including grazing "prescriptions" that:

- Limit grazing intensity, frequency and/or season of use, thereby providing sufficient rest to encourage plant vigor, regrowth, and energy storage and minimize compaction of soils.
- Control the timing of grazing to prevent damage to streambanks when they are most vulnerable to trampling.
- Ensure sufficient vegetation during periods of high flow to protect streambanks, dissipate energy, and trap sediments.

Proper distribution of livestock can be an effective and economical tool in managing riparian areas. In some areas that are degraded, rest may be required, especially where woody species are part of the management objective.

Due to the variation in riparian sites and management objectives, one standard utilization and/or residual vegetation target is not appropriate.

Utilization patterns relative to total forage distribution reveal that livestock distribution, coupled with timing, duration, and frequency of grazing are often the main problems. Most successful grazing strategies of "prescriptions also include additional practices or techniques that promote distribution of livestock…

Total stocking rate problems at the pasture, ranch, or allotment level are the exception rather than the rule in today's operations. The apparent overstocking of some areas while others are only moderately grazed or even ungrazed will not be solved by simply reducing numbers if other factors are not also changed. Reducing stocking rates may reduce the percentage of area in unsatisfactory condition, but the impacts around the foci of highly utilized areas (e.g., riparian areas, other waters, etc.) will remain the same until few, if any animals remain.

Sometimes exclusion fencing can be the most practical approach for initiating rapid riparian recovery or improving highly sensitive areas, or it can be a temporary measure for initiating recovery.

Using riparian pastures offers alternatives to eliminating livestock grazing and fencing riparian boundaries, which can be costly.

Frequent riding and herding can effectively control livestock distribution in some situations.

II. RECOMMENDED "RULE OF THUMB" GUIDELINES

In consideration of the above, the following Rules of Thumb/Guidelines (not to be confused as mandates) are recommended to meet resource objectives and achieve Land Health Standards:

- Avoid continuous season-long grazing strategies. Adopt grazing strategies that limit the duration of grazing use and allow ample regrowth periods.
- Place salt and supplemental feed in a manner that attracts livestock away from riparian areas. Avoid placement of salt and supplemental feed adjacent to riparian areas. Place at least 0.25 mile and preferably 0.5 mile from riparian areas and in locations that encourage use of uplands.
- Develop additional water sources in uplands to attract livestock away from riparian areas.
- Adopt frequent riding and/or herding requirements where appropriate in AMPs or terms and conditions of grazing permits.
- Avoid using streams as fenced pasture boundaries. Fences that are adjacent to streams or zig-zag across streams tend to concentrate livestock near the stream.
- Consider exclusion fencing where practical or riparian pasture fencing.
- Adopt utilization and/or residual vegetation targets in AMPs or terms and conditions of grazing permits.[1]
- Apply guidelines that limit streambank shearing and trampling to acceptable levels in AMPs or terms and conditions of grazing permits.
- Conduct prescribed burning or other land treatments in uplands to provide better forage to attract livestock away from riparian areas.

[1] GSFO has commonly used the following as a term and condition on grazing permits: "grazing in riparian areas by livestock will leave an average minimum 4-inch stubble height of herbaceous vegetation and will not exceed an average utilization of 40% of the current year's growth for browse species. Livestock will be moved to another portion of the allotment where utilization levels are still within acceptable limits or removed immediately from the allotment when the above utilization levels occur." A slightly older version of this term and condition used a 3-inch stubble height and 50% of the current year's growth for browse species. It is not known where either figure was derived; hence, there is reluctance to apply these in a land use plan amendment without supporting published research.

- Provide rest from livestock grazing whenever appropriate (e.g., some rest may be required for degraded riparian areas where woody species are part of the management objective).

Appendix C

Disturbed Site Reclamation Standards
Monitoring and Success Criteria

Appendix C

DISTURBED SITE RECLAMATION STANDARDS MONITORING AND SUCCESS CRITERIA

1.0 INTRODUCTION AND SUCCESS CRITERIA

The goal of the following reclamation standards and success criteria is to mitigate anticipated impacts to vegetation, soil and water resources from ground-disturbing activities by reestablishing a self-sustaining, diverse vegetation community composed of species native to the region in sufficient species density and diversity to closely approximate natural, undisturbed vegetation potential.

This Appendix supplements the discussion found in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (BLM 2006), commonly referred to as "The Gold Book. All ground-disturbing activities will be subject to these reclamation standards and monitoring requirements. These include resource improvements initiated by BLM, as well as permitted activities such as fluid and solid mineral development activities, including oil and gas development.

BLM is responsible for assuring compliance with monitoring requirements. Project proponents will be responsible for monitoring any reclamation that they are required to do, and will report the results annually or as otherwise determined by BLM. Projects must meet both interim and final reclamation objectives in order to retrieve any associated bonds, or for reclamation to be considered successful. For oil and gas development activities within the Federal Unit atop the plateau, five-year interim criteria must be met in order to have areas released from the total maximum disturbance area for the unit, or in order to move to the next development area. Interim reclamation objectives and success criteria have been split into short-term (two-year) and long-term (five-year) groupings. Two-year criteria must be met in two or fewer years, while five-year criteria must be met in five or fewer years. For example, five-year criteria may be met in a little as two years, but must be met within five years for reclamation to be considered successful.

1.1. Short-Term (Two Year) Interim Reclamation Objectives and Success Criteria

Interim reclamation refers to those actions taken immediately after cessation of ground-disturbing activities. Interim actions are typically expected to be taken to stabilize a portion of a site that is no longer undergoing disturbance while activities simultaneously continue to disturb other portions of the same area. For example, interim reclamation may be conducted in perimeter areas of a natural gas well site when the larger footprint required for the development is reduced in area to that necessary for production. The following interim reclamation success requirements will be used to determine success after two years (two complete growing seasons):

a. Regrade the site to pre-disturbance topography to the extent practicable, in order to minimize disturbance and lessen erosion potential.
b. Stabilize disturbed soil surface areas not subject to interim reclamation to reduce erosion and runoff to or below naturally occurring levels. This may be done through the use of native or sterile non-native seed, or application of a covering such as biodegradable matting or certified weed-free straw or hay mulch.
c. Promptly revegetate topsoil stockpiles to maintain soil microbe health and help prevent weeds. Native or non-persistent, sterile non-native grasses may be used to seed stockpiles.
d. Promptly revegetate all disturbed surfaces subject to interim reclamation using certified weed-free seed, per BLM policy, to establish and maintain a healthy and diverse community of species naturally occurring on the site and to provide for natural community succession.

Current Glenwood Springs Field Office policy is to use native species for short-term interim reclamation, unless an exception is granted. Exceptions may include, but are not limited to, the use of BLM-approved non-native grasses and forbs for soil stabilization and weed suppression.

e. Where revegetated sites are subject to increased risk of erosion due to slope, aspect, soil, or other factors, stabilize the soil and prevent loss of seeds or seedlings. This may be accomplished using biodegradable matting, weed-free straw or hay mulch, or other suitable methods.

f. Prevent or minimize establishment of noxious weeds and undesirable plants on the disturbed areas and expansion onto adjacent uninfected areas.

g. Restore wildlife habitat and/or livestock forage, consistent with land use objectives.

h. Reduce visual contrast to meet established visual resource management objectives in all reclaimed areas.

1.2. Long-Term (Five Year) Interim and Final Reclamation Objectives and Success Criteria

Final reclamation will occur when no more ground-disturbing activities are expected to occur. The following interim reclamation success requirements will be used to determine success after 5 years (five complete growing seasons):

a. Stabilize the disturbed soil surface to reduce erosion and runoff to or below natural background levels. Flow pattern development must not result in rills deeper than three inches, or spaced closer than on adjacent undisturbed hillsides. Activities must not contribute to formation of new gullies or to active downcutting or headcutting of pre-existing gullies. No slumping or subsidence will occur as a result of surface disturbing activities.

b. With the exception of active work areas, stabilize all disturbed soils that remain exposed, unprotected, or unreclaimed for longer than one month, as approved by BLM. This may be done through the use of native or sterile non-native seed or application of a covering such as biodegradable matting or weed-free straw or hay mulch.

c. Regrade the site to pre-disturbance topography to the extent practicable in order to minimize disturbance and lessen erosion potential.

d. Achieve or exceed the pre-disturbance cover and diversity of native species on the site. Total cover by seeded or naturally colonizing and desirable native herbaceous species plus seeded non-native forbs must be at least 80% of the total native herbaceous plant cover on the reference area.

e. State of Colorado A, B, or C listed noxious weeds or other undesirable plant species will be absent (including kochia and Russian-thistle), with an exception for cheatgrass. It may be necessary to treat adjacent infestations of noxious and undesirable species prior to disturbance. If cheatgrass is present adjacent to the disturbed area in overall concentrations of less than 50 percent vegetative cover, the percentage vegetative cover of cheatgrass on the reclaimed site will not exceed five percent. In areas where adjacent lands have greater than 50 percent cheatgrass cover, the percentage cover on reclaimed lands will not exceed 30 percent.

f. Restore visual quality, reduce visual contrast, and enhance aesthetic values to meet visual resource management objectives on all areas of surface disturbance.

2.0 RECLAMATION PLANS

Reclamation plans must be submitted for BLM review and approval prior to surface disturbing activities. Reclamation plans will be considered as COAs for oil and gas leases and reviewed and approved through activity or project specific planning for other resource management activities. Reclamation plans will address the following requirements in sufficient detail to demonstrate an understanding of the potential

reclamation site and activities required to achieve the stated success criteria. These plans will incorporate the following reclamation topics and fully develop appropriate site-specific BMPs for each permitted action and location.

2.1. Site-specific Baseline Information:

a. Pre-disturbance terrain and contour
b. Pre-disturbance land use
c. Seasonal weather patterns
d. Topsoil depth and other limitations to plant root growth
e. Vegetation type, dominant species cover, density, and productivity by strata

2.2. Reference Site Selection and Documentation:

a. Appropriate reference sites will be assessed, selected, and characterized following Ecological suite Inventory (ESI) methods and standards, or an approved equivalent system (see Attachment A for an example).
b. Reference sites will be approved by BLM prior to a permitted disturbance.

2.3. Site-specific Revegetation Plan:

a. Size of disturbed versus reclaimed area
b. Proposed surface finish and grades
c. Proposed topsoil handling and treatment
d. Proposed seed mix (seeding rate, species, and variety)/plant schedule (container size and off-center spacing)
e. Treatment of noxious and undesirable species
f. Proposed seeding/mulching techniques
g. Ongoing maintenance activities expected
h. Monitoring plan

2.4. Bond Agreement Information (if applicable), or Conditions for Future Activity

Bonds to be held against achievement of reclamation success criteria will be negotiated on a site-by-site basis. In general, the amount of a bond will be considered a percentage of the total reclamation costs for a project sufficient to ensure reclamation success. These costs will be demonstrated in the reclamation plan. Documentation of compliance with bonding requirements sufficient to assure reclamation will also be included as part of the approved reclamation plan.

Future associated development activities may be precluded until successful reclamation is achieved for a given area or project.

3.0 RECLAMATION PRACTICES AND STANDARDS

The following practices and standards are to be applied simultaneously with all appropriate BMPs to all reclamation sites. Some standards are only appropriate for interim or final reclamation, while others will be used in either situation. Practices and standards are intended to provide direction and clarify the BLM's intent for reclamation activities. The intent of BLM's Resource Management Plan (RMP) process is to identify standards and objectives to be met on public lands. Specific methodologies are not considered to be activity or implementation level planning decisions and not RMP decisions. As such, practices are provided to clarify the BLM's intent for reclamation activities. The following list is not considered to be all-inclusive, but rather is presented to provide a sense of the minimum requirements that will be required to produce acceptable reclamation outcomes. Additional practices may be required,

practices may be withdrawn, or practices may be modified during activity, implementation, or project level planning; this may be done without future RMP decisions or amendments. Monitoring and adaptive management practices will be used to refine and clarify needed actions consistent with the goals and objectives of this plan. Reclamation practices and standards are listed below.

3.1. Interim Reclamation Practices and Standards

a. Limit surface disturbance to the minimum area necessary by avoiding development of roads, pipelines, and well pads on steep slopes; minimize the potential for surface disturbance through careful planning; grouping facilities to the extent possible; and sharing rights-of-way such as burying pipelines along roadways.

b. Stockpile topsoil when possible and prudent (i.e., not in areas of seleniferous or erosive soils, or in areas with noxious weed populations without pretreatment) following all topsoil salvage and storage BMPs; or if directed by BLM plan for salvage, direct-haul, and application (live handling) of topsoil from a disturbance site to a site undergoing concurrent revegetation. Promptly revegetate topsoil stockpiles to maintain soil microbe health and help prevent weeds. With BLM approval, native or non-persistent, sterile non-native grasses may be used to seed stockpiles.

c. Minimize the area necessary for construction activities; determine the minimal area needed to facilitate necessary activities, and initiate interim reclamation as quickly as practicable after construction.

d. Install silt fencing in areas in proximity to water features such as streams, ponds, and wetlands or in other situations where wind or water erosion may otherwise move sediments into sensitive or valuable surrounding habitat.

e. During interim reclamation, recontour the disturbed surface to blend with the surrounding terrain, spreading salvaged or stockpiled topsoil evenly on areas to be reclaimed, and revegetating with native plants.

f. Use seed mixes consisting of native, early-succession species, or species with ability to readily establish quickly in recently disturbed soil areas. Use non-native species (e.g., desirable non-native forbs or non-persistent, sterile non-native grasses) only where directed by the BLM. In areas subject to occasional vehicle travel, interim revegetation should include species selected to accommodate occasional activity such as vehicle travel, vehicle parking, or temporary staging areas.

g. Drill-seed the disturbed area with a seed mix of species native to the local area at a rate sufficient to achieve site stabilization and achieve desired cover based on reference sites (rate would be doubled for broadcast or hydroseeding where drill seeding is impracticable) following adequate soil preparation, including but not limited to removal of weeds and undesirable species, decompaction ("fluffing") of compacted soil, and harrowing to prepare the seedbed.

h. Stabilize soil, maximize moisture infiltration, and improve the chances for revegetation success through mulching or other techniques. Where mulch is used, it must be certified free of weeds and non-native grasses, and applied at a rate to achieve site stabilization and suppress establishment of undesirable species. If hydromulch is used it must be applied with a non-asphalt tackifier.

i. Eradicate or control State of Colorado Listed A-,B-, and C-listed noxious weeds and undesirable plant species within reclaimed areas. (See Section 1.2.e).

j. Install fencing to limit livestock grazing for a minimum of two growing seasons or until plants are sufficiently established to persist under some physical disturbance. Seeded species will be considered established when at least 50% of plants are producing seeds. Fencing will

be installed after dirtwork, grading, and seeding are completed and prior to livestock turnout on the allotment. The use of less palatable grasses and forbs or fencing will be used as approved by BLM to limit livestock presence along roadways, or other disturbed areas.

3.2. Long-Term (Five Year) Interim and Final Reclamation Practices and Standards

a. Remove all equipment, debris, and surface structures that are not necessary for the intended use of the site. Remaining structures will blend in to the extent possible with the surrounding terrain. Consider the use of natural features such as trees, rock formations, terrain, or berms to conceal roads, pipelines, and well pads. Paint structures a color that blends with the surrounding vegetation.

b. Recontour all disturbed areas to blend with the surrounding terrain to the extent practicable. Areas that have received heavy equipment use such as roads and well sites will be ripped to a depth sufficient to accommodate the establishment of native vegetation similar to the surrounding undisturbed area.

c. As soon as practicable, spread salvaged or stockpiled topsoil to a uniform depth across all disturbed areas. The surface must blend with the surrounding non-disturbed area. (A rough surface will accommodate broadcast seeding better than a smooth surface.)

d. Revegetate with native plant species similar in mix and kind to the appropriate reference plant community. The selection of species and installation method (seeding or planting) will depend on the attributes of the site and revegetation goals. As needed and directed by BLM, use a combination of seeding with grasses, forbs, and/or woody species and planting containerized nursery stock of shrubs and trees.

e. Drill seed the disturbed area with a seed mix of species native to the local area at a rate sufficient to achieve site stabilization and achieve desired cover based on reference sites (rate would be doubled for broadcast or hydroseeding where drill seeding is impracticable) following adequate soil preparation, including but not limited to removal of weeds and undesirables species, decompaction ("fluffing") of compacted soil, and harrowing to prepare the seedbed.

f. Seed disturbed areas in fall/early winter or late winter/spring (depending on elevation) to exploit elevated moisture normally available in winter and spring as an aid in germination and seedling establishment, unless a different seeding schedule is approved by BLM.

g. Use mulching where needed to stabilize soil, maximize moisture infiltration, and improve the chances for revegetation success. Mulch seeded areas with certified weed-free native hay or straw at a rate sufficient to achieve site stabilization and establish native species. If physical conditions preclude this, apply appropriate hydromulch with a non-asphalt tackifier.

h. Eradicate or control State of Colorado Listed A-,B-, and C-listed noxious weeds and undesirable plant species within reclaimed areas, and as necessary adjacent areas. (See Section 1.2.e).

i. When conditions warrant following successful noxious weed control, install containerized native shrubs and trees, if appropriate based on the surrounding plant community. Plantings of woody species should be, in natural-appearing groups at a spacing that approximates the structure of local plant communities.

j. Install fencing to limit livestock grazing for a minimum of two growing seasons or until plants are sufficiently established to persist under some physical disturbance. Seeded species will be considered established when at least 50% of plants are producing seeds. Fencing will be installed after dirtwork, grading, and seeding are completed and prior to livestock turnout on the allotment. The use of less palatable grasses and forbs or fencing may be required or approved by BLM to limit livestock presence along roadways, or other disturbed areas.

4.0 MONITORING

Annual monitoring and reporting of results will be required for all reclaimed areas. Monitoring will occur annually for either a minimum of five years or until performance standards are obtained, whichever is longer. Monitoring methods and reporting standards will be included in reclamation plans and approved by BLM prior to disturbance. Monitoring methods are outlined below. Project proponents will be responsible for monitoring any reclamation that they are required to do, and will report the results annually or as otherwise determined by BLM.

4.1. Methods

Monitoring methods will be approved as part of a site reclamation plan, prior to site disturbance. In general, methods must be used that will yield appropriate quantitative measures by which to address success criteria parameters against a reference site.

a. Plant species composition and cover will be sampled using either point intercept transect or plot sampling at a sufficiency to demonstrate statistical adequacy at the 85% level.
b. Woody species (tree and shrub) density and survivorship will be assessed using plot or belt transect sampling.
c. Fixed photo points (location to be determined and used during baseline conditions sampling).

4.2. Monitoring Reports

Reports of annual monitoring efforts will be submitted annually to BLM for approval. Each report will address the results of the monitoring in terms of each success criterion and compared to the same parameters for the reference site. Additionally, each report must address the following items:

a. Text and data to illustrate trends in terms of site conditions against each of the agreed-upon success criteria
b. Tabulated woody (tree and shrub species) containerized planting survivorship
c. Tabulated vegetation cover data for planted and seeded herbaceous species
d. Annotated photographs from fixed photo points illustrating conditions before and after mitigation activities are completed
e. A figure showing locations of fixed photo points and data sampling locations
f. A brief discussion of the overall mitigation success, incorporating monitoring data. Problem areas identified during the monitoring session will be discussed and adaptive management remediation activities will be recommended, as necessary.
g. A description of any adaptive management activities performed since the previous annual report for the site as well as planned actions to be taken if plant establishment efforts are sub-standard or completely fail. For these circumstances, the cause of failure must be stated and how corrective actions will mitigate these causes.

ATTACHMENT A:

Alternative Approach to ESI Reference Sites
Example of a Quantitative Success Sampling Assessment Tool

FLORISTIC QUALITY INDEX

I. Floristic Quality Indices (after Taft et al., 1997)

1. For the reference species list, assign an index based on the affinity to "natural areas". Individual species assignment range from 0-10 with "10" being considered the highest fidelity to natural areas. This index is termed the coefficient of conservatism (C). General categories for species assignments consist of the following:

X 0-1: Taxa that are adapted to severe disturbance, particularly anthropogenic. Disturbance occurs so frequently that often only brief periods are available for growth and reproduction. Generally considered ruderal species/opportunistic invaders.

X 2-3: Taxa within this category are associated with more stable, though degraded habitat. Generally considered ruderal-competitive species, found in a variety of habitats.

X 4-6: Taxa that have a high consistency of occurrence within a given community type and will include many dominant or matrix species for several habitats. Species will persist under moderate disturbance.

X 7-8: Taxa associated mostly with natural areas but can persist where the habitat has been somewhat degraded. Increases in the intensity or frequency of disturbance may result in reduction in population size, or taxa may be subject to local extirpation.

X 9-10: Taxa exhibiting a high degree of fidelity to a narrow range of synecological parameters. Species within this category are restricted to relatively intact natural areas.

Assignment of the "C" value should be based upon field experience of principal investigators (A-Team), consultation with local or regional plant ecologist/ taxonomists, description of habitat preferences in floristic manuals or published synecological or autecological studies. Values to be assigned should be considered in the context of the defined reference domain (geographic distribution) and range of variability (disturbance gradient) within the HGM subclass of interest.

2. Calculation of the Floristic Quality Index

X Determine the mean coefficient of conservatism ($\bar{C}$) by summarizing all coefficients in the inventory unit (reference site or sample within the reference site) and dividing by the number of taxa (N), or $\bar{C} = \Sigma C/N$.

X Multiply the mean coefficient of conservatism ($\bar{C}$) by the square root of the total number of taxa. The floristic quality index is then indicated by:

$FQI = \bar{C} (\sqrt{N})$

From:

Taft, J.B., G.S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. Floristic quality assessment in Illinois; a method for assessing vegetation integrity. Erigenia 15:3-95.

Appendix D

Glenwood Springs Field Office
Resource Monitoring Plan

Glenwood Springs Field Office

Resource Monitoring Plan

February 2006

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I. Introduction

Monitoring rangeland health and evaluating the effects of management practices is an essential part of wise land management. Monitoring is the orderly collection, analysis, and interpretation of resource data in order to evaluate progress in meeting management objectives and/or land health standards. The Glenwood Springs Field Office (GSFO) will conduct rangeland monitoring to determine the effects of specific management actions on resource conditions.

Management objectives established in land use plans, coordinated resource management plans, activity plans and land health assessments form the foundation for determining the level and intensity of monitoring studies required. When establishing objectives, they must be well defined, measurable and realistic in order for the results of monitoring studies to be useful.

A. Purpose

The purpose of this monitoring plan is to establish a clear, consistent approach to conducting monitoring studies in the Glenwood Springs Field Office. Rangeland monitoring should be designed to obtain required data to address one or more of the following concerns; *1) determine present condition of the allotment/landscape/watershed in relation to the Colorado Standards for Land Health (Appendix 1), 2) determine causes of problems in meeting land health standards or management objectives, 3) evaluate the relative success or failure of a given management practice in achieving the management objectives, and 4) assess changes in land health over time.*

The strategy incorporated into this monitoring plan includes the evaluation of impacts associated with livestock and big game grazing on public rangelands and does not address or identify methods used to determine impacts of other land uses such as mineral development, reclamation practices, recreational use levels or rights-of-way actions. Ocular assessments of the overall impacts of these and other land uses relative to the land health standards may be gathered during formal land health assessments and may be extremely valuable to land managers in making future allocation decisions, but methods used for evaluation are not brought forth in this effort.

The procedures identified in this plan outline a standard approach for monitoring, however, different or additional methods may be needed where values or management objectives dictate. Regardless of what methods are used on a particular study location the same method should be continued over the years for consistency, unless it can be demonstrated that the existing studies do not provide the necessary data to make sound, supportable management decisions.

B. Physical and Biological Environment

1. Location

   The Glenwood Springs Field Office is located in west central Colorado, primarily in Garfield and Eagle Counties, but also includes portions of Mesa, Pitkin, Rio Blanco and Routt Counties. Interstate 70 traverses through the middle of the administrative unit. The land ownership pattern is highly fragmented between private, state, and federal, with 566,042 acres (44%) being administered by the Bureau of Land Management.

2. Climate/Topography

   The climate of the GSFO is semi-arid and is greatly influenced by topography and elevation. The topography of the area varies from steep mountains and rolling foothill zones to gently sloping alluvial terraces and narrow valley floors. Elevations range from 5,000 feet near Debeque to 11,275 feet on Castle Peak. Total annual precipitation ranges from less than 12 inches to more than 30 inches depending on geographical locations and elevation. The majority of the precipitation received is in the form of snow during the winter months (November - March) or during thunderstorm events in the summer months.

3. Vegetation

   The GSFO administrative area lies primarily in the Southern Rocky Mountains and Utah High Plateaus Ecoregions. At the lower elevations, relatively low annual average precipitation has a direct bearing on overall forage productivity and potential natural communities. Vegetative communities include salt desert shrubs, sagebrush steppe, pinyon/juniper woodlands, oakbrush/mixed mountain shrubs, aspen, mixed conifers and badlands.

4. Wildlife

   The GSFO supports year-round habitat for mule deer and elk. Greater sage grouse habitat occurs throughout much of the public lands in Eagle and Routt Counties. Lynx denning and foraging habitat is found at the upper elevations of the Field Office and four linkage corridors have also been identified within the GSFO administrative area. Other wildlife species include mountain lion, black bear, turkey, bald and golden eagles, peregrine falcon, other raptors, bats, migratory songbirds, numerous small mammals, reptiles, and amphibians.

C. Grazing Administration

The Glenwood Springs Field Office administers grazing within 255 allotments, of which 58 are currently un-allotted due to terrain, lack of forage, lack of fencing or allocations for other resource uses. The allotments support a total of 46,505 permitted animal unit months (AUMs) for cattle, sheep and horses.

D. Coordination

Monitoring activities within designated allotment units, herd management areas or landscapes will include consultation, cooperation and coordination (CCC) with range users, the Colorado Division of Wildlife (DOW) and other interested parties, prior to, during the collection of, and through the evaluation period of any monitoring studies. The most important concept in the CCC objective is to develop trust, understanding and a sound working relationship between BLM, the range user, DOW and members of the interested public.

1. Wildlife
   Studies established in those specific allotments identified as possessing wildlife/livestock conflicts will require close coordination with and input from the Division of Wildlife. DOW personnel will assist in developing management objectives for the area and in the planning, implementation and analysis of the subject monitoring studies.

2. Permittees/Lessees
   The range user should be encouraged to share responsibility for selecting key areas, developing management objectives, making field observations and collecting on-the-ground data. The range user may also provide specific operational experience that may be lacking by the individual range management specialist. The following procedure is suggested to accomplish this element and ensure that all parties are in agreement.

   a. Review the case file on each specific allotment to determine historical use, present levels of grazing, distributional patterns, etc. prior to meeting with the range user. Discuss potential conflicts or issues in the office with other resource specialists who may have an interest in the allotment or data to support the need for management changes.

   b. Schedule an informal meeting with the range user in the field to discuss and better understand their operational procedures and allow the opportunity for them to show you the allotment, how the livestock normally use the allotment, their expectations of future grazing activities, etc.

   c. Introduce the concepts of Colorado Standards for Healthy Rangelands. Discuss with the range user any apparent failures in meeting the standards and some of the guidelines for livestock grazing that have been adopted to address the failures of the standards.

   d. Document the field visit and discussion as it pertains to grazing activities and encourage the range user to provide written documents involving their operational procedures, conflicts and philosophies.

   e. Continue to discuss and develop specific objectives and options that could be

implemented to ensure progress toward meeting the failed standard.

f. Identify key areas for monitoring studies to be established.

3. Interdisciplinary Staff

The use of an interdisciplinary team to set up and conduct monitoring within each allotment is a desirable process, but often becomes unfeasible based on budgetary constraints and other workload priorities of each specialist. Therefore, an interdisciplinary team should be used to monitor livestock grazing impacts in those allotments where the degree, amount, intensity and importance of the issues and resources involved are considered extremely high to the general public, field office and/or land users. Examples of such situations might be an allotment that involves lynx habitat, supports Colorado River cutthroat trout or a Special Status plant species, or allotments currently failing one or more of the Colorado Standards for Healthy Rangelands based on a formal Land Health Assessment.

On other allotments, an interdisciplinary team should be used to help identify key or critical areas and set management objectives for the allotment, but the rangeland management specialist responsible for the administration of that particular allotment should establish and complete most of the monitoring studies. This consolidates the effort to the individual with the most knowledge of the grazing management of the area, and ensures a central point of contact for proper consultation, coordination and communication throughout the process with the permittees, DOW and other affected parties.

II. Management Objectives

The goal for livestock grazing management as discussed in the Glenwood Springs 1984 RMP and amended following adoption of the Colorado Standards for Public Land Health relates to providing a target number of AUMs of livestock forage commensurate with meeting public land health standards. *Specific resource objectives will be developed for each allotment* and will be listed in the Monitoring Files for that allotment. These objectives should be fairly specific, simple, and measurable. The objectives should identify the most immediate responses that should occur as a result of a management action. Objectives should be attainable within an evaluation period and should not exceed two evaluation periods. The intensity of monitoring will vary depending on the objectives developed, as well as on the resource values, changes anticipated, and timeframes established.

In the absence of identified management objectives for an allotment, the monitoring established will be designed to determine whether current stocking rates are appropriate and whether the Colorado Land Health Standards are being met.

III. Establishing Priorities

A. Allotment Categorization

Due to limited funding and time constraints, BLM cannot intensively monitor the effectiveness of authorizations and management actions on all rangelands it administers. Therefore priorities need to be established on an allotment, watershed, wildlife habitat unit or landscape basis and efforts will be focused on those areas.

The following factors will be used in prioritizing allotments for monitoring:

1. Allotments in which a determination has been made that Standards are not being met as a result of a formal Land Health Assessment and monitoring is needed to determine causal factors.
2. Allotments which have undergone management changes to make progress toward meeting a Standard or move toward a management objective. Monitoring will be needed to determine if management actions taken are making significant progress toward meeting the management objectives and/or Land Health Standards.
3. Allotments with concerns regarding meeting Standards or Allotment Management Objectives based on prior monitoring, professional judgment, or public feedback.
4. Allotments due for Grazing Permit Renewal in the next few years. Gather data regarding use levels and resource conditions prior to developing the NEPA analysis for permit renewal. Level of monitoring intensity can be dictated by I, M, and C allotment categorization.
5. Allotments due for Land Health Assessments in the next few years. Establish studies to determine if resource problems exist so that consultation and coordination with the appropriate land users can be initiated prior to the Assessment being conducted.
6. I, M, C Allotment Categorization will be the basis for prioritizing all other allotments.

   GSFO categorized each of its allotments into one of three categories based on the BLM's Final Grazing Management Policy. These categories were:

   * "I" (Improve) – Manage the allotment to improve the currently unsatisfactory resource conditions. These allotments are generally given the highest priority for project development, monitoring emphasis, management plan development and public investment. ;
   * "M" (Maintain) – Manage the allotment to maintain currently satisfactory resource conditions;
   * "C" (Custodial) – Manage the allotment in a custodial manner, while protecting existing resource values.

The factors used in establishing allotment categories were range condition, present management, resource potential, resource conflicts, level of controversy and economic investment opportunity. In addition, the GSFO considered disposal

parcels, access problems, prospective livestock cuts, and office commitments. Based on these criteria and input from other agencies, there are 98 allotments classified under AI@, 41 as an AM@ and 119 managed as a AC@ category.

This categorization should be reviewed periodically to determine whether the category assigned to each allotment is still valid in light of new information or issues.

Stipulations that have been made part of a grazing authorization, such as utilization restrictions, would be classified as "compliance inspections" to ensure compliance with the authorization.
If budget or manpower restrictions impose a constraint on completing scheduled studies, the above priorities will determine which studies will be accomplished and which will not. These priorities will also dictate the intensity/frequency of the monitoring studies to be conducted. If the Field Office administrative area is experiencing a severe or prolonged drought, other immediate management priorities, such as conducting use supervision, may take precedence over that year's monitoring workload.

Refer to **Appendix A** for a listing of the current highest priority allotments. The list of highest priority allotments is subject to change as management objectives are achieved or as new issues arise.

B. Monitoring Intensity

The Glenwood Springs Field Office has been divided into three geographical areas with one area assigned to each Rangeland Management Specialist (RMS) for administration. Within each of these respective areas, the RMS, in coordination with other field office specialists, prioritizes the allotments based on the factors identified above. This prioritization forms the basis for determining the intensity of monitoring required, the type of studies necessary to address the issues, schedules for monitoring, and associated workload requirements. The issues identified by the field office specialists will determine which specialists, besides the RMS, need to be involved in monitoring and data collection.

The monitoring method, number of studies and frequency of data collection for each allotment will vary depending on the allotment prioritization, the resource values and identified conflicts, and the specific allotment objectives. In general, High Intensity monitoring will be conducted on those allotments identified in the High Intensity Allotment List in Appendix A. The remaining lower priority I and M category allotments will have moderate intensity studies performed to detect major changes in resource condition. "C" category allotments will receive low intensity monitoring efforts. However, for those High Intensity Allotments in which the permittee has agreed to implement livestock management changes to conform to the Grazing Management Guidelines and improve allotment conditions, less intensive monitoring may be required.

C. Short-term vs. Long-term Monitoring

Monitoring of management actions consists of both short-term and long-term monitoring. Short-term monitoring studies include those studies used to determine preliminary standards conformance, proper stocking levels, livestock distribution problems, and wildlife/livestock dietary overlap concerns. Short-term monitoring is also used to assure that the management actions outlined in Activity Plans are being followed. Results from this monitoring provide the basis for immediate adjustments in management actions.

Intensive, Short-term Monitoring

For allotments where resource concerns have been identified, where standards are not being met and causal factors have not been determined, where AMP development is being considered, or where stocking levels may be inappropriate, short-term, intensive monitoring will be conducted to obtain the information necessary to resolve the issues and implement changes in management, if necessary.

Studies for these determinations include rapid assessment, actual use, utilization, use pattern mapping, and climatic data. The minimum monitoring data that will be collected is: Actual Use (by direct counts or Actual Use forms), Utilization and Climate Data. Actual Use and Utilization studies will be conducted every year of the Intensive Monitoring period. Upon completion of the prescribed monitoring period, the data will be compiled and analyzed and an evaluation of the allotment completed. Wherever trend data is available, it will be included in the evaluation.

The evaluation will include narrative and graphical data, as appropriate. If adjustments in grazing management are needed to achieve rangeland health or meet management objectives, an environmental analysis will then be prepared and a decision issued. If the evaluation indicates no management changes are needed, this conclusion will be briefly documented and placed in the monitoring file.

Short-term, intensive monitoring should precede or at least coincide with all other studies. Short-term monitoring methods to be used within the Field Office are listed in Table 1 below.

Table 1

SHORT TERM MONITORING METHODS		
Method	Attribute Measured	Target Area
Actual Use	Record of animal numbers and pasture use dates	Entire allotment
Utilization Map	Utilization patterns, developed by general reconnaissance of the area	Entire allotment
Key Species Method	Utilization of key species	Key Areas

Cole Browse Method	Utilization of browse species	Key Areas (Big Game)
Residual Measurements (Stubble Height)	Height of vegetation remaining at end of grazing season	Riparian Areas
Professional Judgment	Documented observations	Entire Allotment

Long term Monitoring

Long-term trend monitoring is used to determine the effectiveness of the management actions in achieving the specific management objectives. These studies involve the collection of cover, density, frequency, and/or species composition of the plant community. The data is compared to an established baseline and analyzed over time to determine if the appropriate actions that were initiated are making progress toward meeting management objectives or rangeland health standards.

Long term monitoring includes both condition and trend studies. Condition studies are generally inventories such as Land Health Assessments and Ecological Site Inventories in which data will be collected on a one-time or infrequent basis to establish a *baseline* of current conditions.

Long-term trend studies generally require a period of five or more years before any conclusive results can be obtained. Quantitative and qualitative sampling and measuring techniques are used to measure changes in vegetation or physical attributes over time. These changes are compared to a baseline to determine whether the measured attribute is moving toward or away from the established management objectives (i.e. the trend).

Long term monitoring methods to be used in the Field Office are shown in Table 2.

Table 2

LONG TERM MONITORING METHODS		
Trend	Attribute Measured	Target Area
Daubenmire Cover Class	Canopy cover, ground cover, composition, frequency	Key Areas, Riparian Areas
Nested Frequency	Frequency, ground cover	Key Areas
Photo Plot (1m x 1m)	Ocular estimate of cover	Key Areas, Riparian Areas
Photo Point	Ocular assessment of cover, structure	Key Areas, Riparian Areas
Cole Browse Method	Age and form class of shrubs	Wildlife Key Areas
Condition	Attribute Measured	Target Area
Ecological Site Inventory	Composition of vegetation by weight (lbs of forage production/ac)	Area wide Key Areas

Land Health Assessment	Ocular assessment of composition, cover, age classes, soil stability	Area wide

Appendix B lists the general schedule in which the various monitoring studies will be conducted based on allotment prioritization. This schedule will remain flexible based on the specific needs of each allotment and on annual budget constraints. At the time each study is established, the frequency of re-reading will be determined based on the management objectives, current site conditions, the expected time frame for achieving the objectives, and/or the need for data for upcoming NEPA analysis (grazing permit renewals).

IV. Monitoring Concepts

Proper selection of study sites is critical to the success of any monitoring program. The stratification, key area, and key species concepts shall be used when selecting study sites to show the effects of current grazing management. The site selection process used and the management objectives for each site should be documented in the monitoring files.

A. Stratification

Stratification is a means of dividing an area of rangeland into smaller, more homogeneous units. Allotments, pastures, wildlife habitat areas, watershed units or other management areas may be divided into areas having similar characteristics. These may be areas having similar vegetation, soils, topography, or grazing use.

Some criteria that should be considered in stratifying an area are:

1. Vegetation Type. Each major vegetation type may be a separate stratum.

2. Range Site. Range sites with their specific potential plant associations and soil characteristics may be considered criteria for stratifying an area.

3. Present ecological status. The present ecological status of the range site may be used as a basis for stratification.

4. Soils and Topography. Differences in soils are usually expressed as differences in vegetation, but there may be instances where the soil and topography may be more significant than vegetation in stratifying such areas as fragile watersheds or rare plant habitat.

5. Grazing Systems. Areas subjected to similar grazing treatments may be considered in stratification.

6. Utilization Patterns. Grazing utilization patterns can play a key role in stratifying

an area as well as in locating key areas.

7. Suitability. Suitability of rangelands for use by different classes of livestock can also be used in stratifying rangelands.

8. Threatened, Endangered or Sensitive Species Habitat. In some cases, habitat for threatened, endangered, or sensitive species may be an important consideration in stratifying an area.

Topographic maps and aerial photographs may be very helpful aids in the stratification of a management unit. A stratified map of the allotment should be created and stored in the monitoring file.

B. Key Areas

Monitoring studies should be established in key areas. Key areas are indicator areas that reflect what is happening on a larger area as a result of on-the-ground management actions. Depending on the management objectives, a key area may be a representative sample of a large stratum, such as a pasture or allotment, or it may be a representative sample of a small stratum having important grazing value, such as a heavy use area around water, a riparian area, etc. An interdisciplinary team should be used to select these areas. Permittees, lessees, and other interested parties should be invited to participate as well. The criteria that were used in the selection of key areas or key species will be documented on the Study Location and Documentation Data Form **(Illustration 1)**.

1. Criteria for Selecting Key Areas.
   Proper selection of key areas is critical to the success of a monitoring program. Some criteria that should be considered in selecting a key area are listed below. A key area:
   a. Should be representative of the stratum in which it is located.
   b. Should be located within a single ecological site and present plant community.
   c. Should contain the key species or have the potential to produce the key species.
   d. Should be foraged by livestock or wildlife when the allotment or pasture is used. Small areas of natural concentration such as those immediately adjacent to salt, roads, or trails are usually not suitable key management areas because they reflect higher levels of use than representative for the stratum. Likewise, areas remote from water or having limited accessibility may be suitable as reference areas for comparison purposes, but should not be considered key management areas because they will not be affected by changes in grazing management.
   e. Should be capable of and likely to show response to management actions.
   f. May be selected to represent special or unique situations such as a riparian zone, special status species population or habitat, or heavily grazed area.

g. Should be changed when the pattern of use is significantly modified because of a change in season of use, kinds or class of animals, water supplies or other factors affecting distribution.

2. Number of Key Areas.
The number of key areas, which are selected to represent a particular stratum or range site, depends on the size of the stratum and on data needs, but may ultimately be limited by funding and personnel constraints. A minimum of one key area should be established in each pasture of each intensively managed allotment. More than one key area may be necessary in each pasture or allotment depending on the vegetation present and the objectives to be measured. For example, in a pasture or allotment containing a sagebrush/grass type and a riparian zone, one key area in each may be appropriate if there are different objectives for each area.

3. Objectives
Objectives should be developed so that they are specific to the key area. Monitoring studies can then be designed to determine if these objectives are being met.

C. Critical Areas

Critical areas are areas that should be evaluated separately from the remainder of a management unit because they contain special or unique values. Critical areas may include sage grouse nesting habitat, lynx winter foraging habitat, riparian areas, known populations of special status plants, etc. The ecologist, wildlife biologist or the range management specialist most closely involved with determining the objectives for those areas will generally monitor these areas.

D. Key Species

Key species are generally an important component of a plant community. Key species serve as indicators of change and may or may not be forage species. More than one key species may be selected for a stratum depending on management objectives and data needs. In some cases, problem plants or indicator species, (poisonous plants, species which increase with grazing, etc.) may be selected as key species.

The selection of key species depends on the plant species in the present community, the present ecological status and the potential natural community for the particular range site. Key species are typically an important component of the plant community.

More than one key species may be chosen for a particular key area. In areas where there is more than one period of use, several key species may be selected. For example, on an area with both spring and summer grazing use, a cool season plant

may be the key species during the spring, while a warm season plant may be the key species during the summer.

Key species may or may not be key forage species. For example, threatened, endangered, or sensitive plants that have no particular forage value may be selected as key species. If these species are particularly susceptible to grazing damage, management objectives and use levels may be established specific to these species regardless of use levels elsewhere on the allotment.

Normally, the key species selected should be present, or potentially so, on each key area. However, on depleted rangelands these species may be sparse or absent. If a key area does not contain any plants of the key species because of severe depletion, it may be necessary to conduct monitoring studies on other species that comprise the bulk of the forage and extrapolate the effects on the establishment of the key species.

The NRCS Range Site Descriptions will provide a list of those plant species which occur within the potential natural communities. These descriptions should be consulted when selecting key species that are absent or sparse within identified key areas.

V. Study Design and Analysis

A. Planning the Study

1. Choose sample sites
Stratify the allotment and choose one or more key areas for establishing the studies**.**

2. Establish Management Objectives
Objectives for an allotment or landscape should be based on indicators of land health standards and the potential of the range site or sites of concern. Objectives should be specific and measurable and should include a reasonable timeframe for achievement, generally within 5 to 10 years or one grazing cycle. Objectives are generally specific to key areas. Examples: Increase the canopy cover of bluebunch wheatgrass from 3% to 6%; or Provide 40% ground cover of desirable perennial species to protect the site from erosion.

3. Study Design
The number of points, quadrats or transects needed depends on the monitoring objectives and the variability of the samples. The frequency of data collection should be determined before studies are implemented.

Randomly select the starting point and the bearing of the transect within the study

area. If the examiner is unable to collect an adequate sample with this transect before leaving the ecological site, additional transects can be run from the same transect location stake at different, randomly-selected bearings. Alternatively, additional transects can be established in the key area with random starting points and bearings.

B. Statistical Considerations

1. Random or Systematic Sampling

Critical to valid monitoring study design is that the sample be drawn randomly from the population of interest. All of the statistical analysis techniques available are based on knowing the probability of selecting a particular sampling unit. If some type of random selection of sampling units is not incorporated into the study design, the probability of selection cannot be determined and no statistical inferences can be made about the population.

With linear study design, such as in utilization, stubble height or Daubenmire studies, systematic sampling is a very common technique. Data is collected along a transect at specified intervals. The starting point of the transect must be randomly selected. i.e. If the interval between observations is 5 paces, a number between 0 and 4 is randomly selected to represent the distance from the reference post or baseline to start making observations. Additional observations are made at 5-pace intervals from this starting point. This is a valid sampling technique, particularly useful for natural populations that are clumped or clustered in spatial distribution.

2. Confidence Intervals

The best way to judge how well a sample estimates the true population total is by calculating a Confidence Interval. The confidence interval is a range of values that is expected to include the true population size (or utilization or any other parameter) a given percentage of the time. Confidence intervals are set around an estimated average value to indicate that the true average of the population will occur within those limits a specified percentage of the time. Confidence intervals are the principal means of analyzing utilization data. For instructions on calculating confidence intervals, see the Interagency Technical Reference, *Planning for Monitoring*.

3. Sample Size Determination

An adequate sample is vital to the success of any successful monitoring effort. Adequacy relates to the ability of the observer to evaluate whether the management objective has been achieved. Depending upon how large a sample is taken and how variable the data is in the area sampled, the estimate from the sample may be very close to the true value or very far from it. The more narrow the confidence interval, the greater the precision of the data. (The width of the confidence interval is determined by the variability of the measurements.)

It makes little sense, for example, to set a management objective of increasing the density of a rare plant species by 20 percent when the monitoring design and sample size is unlikely to detect changes in density of less than 50 percent. Formulas for calculating sample sizes are given in the Technical Reference, *Planning for Monitoring*.

C. Study Documentation

Permanently mark the location of each study with a reference post (fence post) placed about 30 meters from the actual study location. Record the distance and bearing from the reference post to the study location.

Permanently mark the study location itself by means of driving rebar or angle iron stakes into the ground at the randomly selected starting point. Baseline studies require that both ends of the transect be permanently staked.

D. Data Analysis and Interpretation

Utilization and residue (stubble height) studies do not compare data differences between years, so significance tests are not ordinarily employed. The appropriate analysis of utilization data depends upon whether the management objective is written based on the average or median percentile utilization. Confidence intervals are then calculated around this average or median.

For stubble height data, the average should never be used as a measure of the central tendency. Because utilization data are often not normally distributed (i.e. some plants may be much taller than average and would skew the resulting average stubble height) using the average will not guarantee that the majority of stubble heights are close to the management objective. Using the median ensures that at least half of the plants measured meet or exceed whatever objective has been set. Other percentiles can also be used. For example, the objective could be that at least 60 percent of the plants be taller than 4 inches.

VI. Monitoring Studies

The types of studies selected depend on the issues of concern, the management objectives, the vegetative type, and budget and manpower. Once established, sampling methods should not be changed without justification. Changes should be made only after an evaluation of the data shows that the existing sampling method is not providing the necessary data. All changes in sampling methods should be documented and approved by an interdisciplinary team of resource specialists.

A. Actual Use

Actual use data is necessary to correlate utilization and trend data in determining stocking rates and grazing capacity. Only those permittees operating under an AMP with after-the-fact billing may be required to submit livestock actual use data. Actual use will be reported by the permittees to the Field Office within 15 days of the end of the grazing period. A copy of the Actual Use form is found in **Illustration 2**.

Where the range manager deems it necessary, alternative ways to gather or verify actual use data may be used, including counting livestock as they enter or leave the allotment or spot check counts while livestock are in each allotment.

B. Utilization

Utilization data will be used to measure the degree of grazing and browsing on specific areas of rangeland by livestock and wildlife. Utilization will be expressed as a percentage of the current year's production that has been consumed or destroyed. Residual measurement (stubble height) is the amount of forage material or stubble height remaining. Utilization data and residual measurements can be used: 1) to determine when livestock should be moved within a grazing allotment, 2) to identify livestock distribution patterns, 3) to correlate changes in rangeland trend or condition with degree of utilization, and 4) to estimate proper stocking levels when combined with other monitoring data.

Utilization data should not be used alone to determine stocking rates, but should also include actual use data, climatic information, ocular reconnaissance, and other pertinent information, such as trend data, where available.

Collecting Utilization Data and Stubble Height Measurements
A brief description of the concepts and techniques involved in each of the utilization study methods to be used in Glenwood Springs Field Office are discussed below. Utilization data will be collected in accordance with the Interagency Technical Reference Utilization Studies and Residual Measurements, 1734-3 and more detailed descriptions of each method are found therein.

1. Transect Location
   Utilization studies should be located within key areas. The starting point of the transect should be randomly located. The bearing and distance of the transect from the starting point should either be set by compass or directed toward a permanent, highly visible natural feature.

2. Observations
   Starting at the study location post, run the transect in the direction specified in the study folder. Observations are located at constant intervals along transects (generally every 5 steps unless the size of the key area or the distribution of key

species dictates otherwise). If the key species is not present at the selected interval, relocate the observation point to the nearest individual of that species within a 180 degree arc along the transect line. The next interval is measured from this relocated point.

Use pilot transects to determine the number of observation points needed. A larger number of observations tends to reduce inaccuracies in estimating utilization. As a general rule, continue until at least 20 plants of one or more key species have been recorded. If there are insufficient key plants present within the key area to make 20 observations of a single species, return to the reference post and run another transect with a different bearing. In the Comments section, note the lack of key species.

While conducting utilization transects, the observer should make notes regarding the general appearance of the range; i.e. overall vigor of vegetation, signs of concentrated use, and infestations of cheatgrass or other noxious weeds, etc.

3. Study Documentation
   GPS each study site and enter the data into GIS. Plot the data onto maps (preferably 1:24,000 scale), which will be maintained in the Monitoring Files.

4. Timing
   Livestock utilization should be documented generally within 5 days and no later than 10 days after the livestock have been removed from the allotment or pasture. If herbaceous dietary overlap between livestock and big game is a concern, conduct utilization studies both before and after the period of livestock use.

5. Frequency of Studies
   Utilization and residue studies may be conducted every year or as often as needed to satisfy the data requirements for evaluation of the management area. On allotments with AMPs or a grazing system, utilization should be conducted annually through one complete cycle of the grazing system, or for as long as necessary. It may be necessary to conduct utilization and residue studies annually until management objectives are achieved and maintained. After that, utilization may be conducted less frequently, or only when management actions, such as the class of livestock or season of use, changes.

6. Data Analysis
   Calculate confidence intervals around the estimate of average percent utilization for the Key Species Method and calculate confidence intervals around the median height for Stubble Height measurements.

1. Key Species Method (formerly the Modified Key Forage Plant Method)
The Key Species Method will be the primary method for determining utilization of herbaceous cover by livestock and wildlife throughout the field office.

Utilization studies are to be read no later than two weeks after livestock are removed from the allotment or pasture. Where there are both utilization transects and trend plots in an allotment or pasture, one utilization transect will always be run in the immediate vicinity of the trend plot. This provides site-specific grazing information for use in interpreting trend data. Other utilization transects may be run in other parts of the allotment or pasture as needed.

a. Sampling Process
Utilization levels are based on an ocular estimate of the amount of forage removed by weight on individual key species within a designated key area. At specified intervals along the pace transect, select the plant of the key species nearest the toe and estimate percent utilization by weight in one of seven utilization classes; 0-5%; 6-20%, 21-40%, 41-60%, 61-80%, 81-94%, and 95-100%. See **Illustration 3** for a copy of the Key Species Method form.

b. Utilization Cages
Utilization cages are useful for comparing grazed plants to ungrazed plants and will be established in key areas whenever possible. They also should be used if differences of opinion are occurring between the data collector and range user or in heavily utilized areas for comparison purposes. At the time when utilization studies are read, observe the growth of key species inside the cage and try to calculate the height of the various grass species with different percentages of current year's growth removed.

Current year's growth of key grass species within the cage may be clipped and weighed to determine the weights of the ungrazed grasses. The utilization cage will then be moved to another location within the key area. The weights of the ungrazed species will be compared to the weights of grazed key species clipped outside the utilization cage until the observer has calibrated his ocular estimations of percent utilization by weight removed. More detailed descriptions of how to calibrate ocular estimates is explained on p. 81-82 of TR 1734-3.

2. Residual Measurement (Stubble Height Method)
The concept of this method is to measure the height of herbage left ungrazed at any given time. Stubble height standards and measurements are especially useful in riparian areas where adequate stubble heights on streamside areas is needed at the end of the growing season for maintenance of plant vigor and streambank protection.

a. Sampling Process
At specified intervals, measure the stubble height of the key species nearest to the toe of the foot. Measurements should be in inches or centimeters of *leaf stubble* left. Do not include measurements of inflorescences. A copy of the

Stubble Height form is shown in **Illustration 4**.

3. Cole Browse Method (Big Game or Sage Grouse Habitat)

In some allotments with wildlife-livestock conflicts or some indication that browse utilization may be excessive, browse utilization transects will be run. If winter big game utilization is the primary concern, the study is to be done as early in the spring as possible and preferably, before livestock enter the allotment. If winter sheep or fall cattle utilization is the concern, the study should be done as soon after the livestock leave as possible.

The number of paces between points on the transect will be determined by the density of the browse species and will be noted on the study form. A photo should be taken from the start of the transect showing the orientation of the transect. This photo should be retaken every second time the transect is read.

Browse species should be included in the list of key species on big game winter ranges. The Cole Browse Method will be used to estimate utilization of browse species. This method provides data on age and form class, availability and hedging, estimated utilization, and growth and use indexes for key shrub species in the plant community.

Distinguishing current year's leader growth from last year's growth on sagebrush is often very difficult. The Cole Browse Method estimates the percent of available leaders that have been browsed and not the percent of growth removed. Therefore the Cole Browse Method, which estimates "percent of twigs browsed "rather than "percent of leader growth removed", is usually a more reliable estimate of utilization on sagebrush than other available methods. A minimum of 25 plants of each key browse species will be sampled. Utilization level will be an ocular estimate of the percent of twigs browsed.

Collecting Data on Browse Utilization

Utilization estimates should be made following livestock grazing and again following the season of use by big game. Estimate the percent of available leaders that have been browsed on each sample plant. Utilization is recorded in one of six classes: 0%, 1-10%, 11-40%, 41-60%, 61-90%, and 91-100% to record one of five classes of use. See Illustration 5 for a copy of the Cole Browse Method form.

Timing

Wildlife use should be conducted prior to May 15th or initiation of plant growth.

C. Utilization Mapping

Mapped utilization patterns can be used to stratify a management unit and delineate key areas. Utilization mapping can also be used to determine areas of under or over-utilization to help identify needed range improvements. Use pattern mapping is also

essential for tracking the impacts of range improvements and management changes.

1. Sampling Process
   The first step in conducting utilization studies is preparing a base map that shows the ecological sites or vegetation types and physical features such as fences, water, and roads. Mapping utilization patterns involves traversing the allotment to obtain a general concept of the use levels. When another use zone is observed, the boundary of the use zone is recorded on the map. Areas that do not have any of the key species should also be delineated. Unused areas suitable for grazing and areas of animal concentration should be delineated to help identify range improvements needed to change grazing use distribution.

D. Climatic Data

The principle objective for gathering climate data is to differentiate the influence of climatic factors on vegetative response from those due to management practices. Vegetative production and vigor varies based on precipitation received. Precipitation data should be used to adjust the current year's production and utilization results obtained.

One BLM-administered rain gauge is located along the Colorado River Road in the Horse Creek Allotment (08631). The gauge is read monthly. In addition, data will be gathered from NOAA weather stations across the Resource Area and used to estimate precipitation for each allotment in which studies are conducted.

Additional rain gauges may be established if it is determined that precipitation data from existing sources do not accurately reflect site-specific conditions.

E. Trend Studies

Trend studies measure changes in vegetative and ecological condition from an established baseline. Trend also indicates whether the rangeland is moving toward or away from its potential or toward or away from specific management objectives. Trend studies are the primary method of measuring the success or failure of management practices.

Trend is measured by noting changes in characteristics of vegetative communities such as composition, density, canopy and ground cover, production and frequency of the vegetation. The trend studies to be conducted in this Field Office include: 3 ft x 3 ft (or 1 m squared) photo plots, photo points, Daubenmire transects, nested frequency transects, and the Cole Browse Method. Other recognized methods may be used or added to monitor other resource concerns such as water quality but should not be done so without coordination between the resource specialists. While each method is discussed separately here, in actual practice, these methods should usually be considered in combination, so that a more accurate trend picture is obtained.

1. Photographs

Photographs are often very effective in illustrating resource values and conditions. Use close-up and/or general view photographs with all of the study methods. Comparing pictures of the same site taken over a period of years furnishes visual evidence of vegetation and soil changes.

a. Photo Plots

This method involves taking a close-up photograph of a permanently marked 3 ft x 3 ft or 1 m x 1 m plot and a general view photograph depicting the study site. Angle iron stakes or rebar are driven into the ground at the lower left and upper right hand corners of the plot. Paint the stakes with brightly colored spray paint to aid in relocation.

Whenever possible, photos should be taken toward the south or southwest. This will avoid shadows across the photo plot. The photo of the plot should be taken from directly above the plot. Comparing photographs of the same site taken over a period of years will furnish visual evidence of overall vegetation and soil changes. For low-intensity monitoring, photo points could be the primary monitoring tool, but generally photo points are used to supplement other trend studies. If photo plots are the sole source of information, qualitative evaluations can be made from these photographs to identify potential problems and the further need for specific monitoring. This study is to provide a long-term photographic record, save time and manpower, and still provide a qualitative assessment of gross changes.

1) Establishing Photo Plots

a) Photo plots should be located in key areas and should include at least one of the key species being studied.

b) Iron rebar stakes or angle-iron stakes are to be set in the upper right and lower left hand corners of the plot. Photos should be taken as close as possible to the peak growth period of the key forage species being studied.

c) The photo should be taken as close to the peak of growth of the key species as possible.

d) A reference post should be placed within 100 ft of the plot to permanently mark the location of the plot. Record the distance and bearing from the reference point to the plot.

2) Documenting the Study

a) The plot location should be recorded with a GPS unit and entered into GIS.

b) The study location should be documented on the Study Location and Documentation Data Form (Illustration 1).
c) Photos should be taken using a 28 mm lens and color film. Identification Labels (**Illustration 6**) should be placed next to the plot and included in the photograph.

3) Scheduling
Ideally photo plots should be recorded at the same time of year and at the peak of growth of the key species. For efficiency, photo plots should be recorded when trend studies are scheduled. If frequency transects are not scheduled, then the photo plot should be taken when utilization transects are read.

b. Photo Points (General View Photographs)
Photo points are general view photographs taken from a permanent reference point. When associated with a permanent transect, the photo point should be taken from one end of the transect. When not associated with a permanent transect, the location of the photo point should be GPSed and the photo should include a reference point in the foreground (a fence post or fenceline, etc.).

The Photo Identification Label is placed in an upright position so that it will be visible in the foreground of the photo. Photographs taken from photo points should be brought to the field to assist in relocating the photo point and to ensure that the same photograph is retaken (bearing, amount of skyline, etc.)

2. Nested Frequency Transects

In the 1980's and 1990's, GSFO established nested frequency transects on several of the high priority allotments. The nested frequency study method was used because it is easy to conduct and is subject to less reader bias than some of the other methods, since it involves only the ability to accurately determine ground cover, and to identify individual species and determine whether they occur in the plot or not. However, with the advent of the Colorado Standards for Public Land Health and the associated indicators for each standard, it became apparent that the nested frequency method alone does not correlate well with many of the specific indicators of standards. Other studies such as the Daubenmire or the Line Intercept method, provide more direct feedback concerning Standards 1 and 3. Therefore, when new studies are established, GSFO will utilize the Daubenmire Method with the ground cover method. Where nested frequency transects have been established previously, these will be re-read at the next scheduled evaluation period and will then be replaced with Daubenmire transects.

Nested Frequency transects will continue to be conducted only where: 1) it is determined that the Daubenmire Method will not furnish the necessary data to

determine whether management objectives or land health standards are being met, or 2) It is desirable to continue to conduct Nested Frequency transects in conjunction with Daubenmire transects to maintain continuity in data collection. Other trend study methods will be conducted only when it is determined that the Daubenmire Method will not provide the necessary data to determine if management objectives are being met.

All transects should be established in key areas. In some cases, it may be necessary to disregard existing studies that are not representative. If a study was set up in an area that does not meet the criteria for a key area, the information being collected may not be useful during an evaluation. In this case, there may be a need to reestablish the study. Written documentation for re-establishment and/or the reasons for no longer collecting data at an established study location shall be placed in the appropriate study file. The Nested Frequency form is shown in **Illustration 7**.

3. Daubenmire Transect

The Daubenmire Method consists of systematically placing a 20 x 50 cm rectangular frame along a permanently marked baseline transect. General view photographs should be taken each time the transect is read. Land health indicators measured by this method are canopy cover, ground cover and species composition.

Daubenmire trend transects should be established adjacent to a 3 ft x 3 ft (1m x 1m) photo plot. This should also be an area where utilization data is being collected. If possible, the transect should be located directly south of the photo plot so that aspect photos of the plot would also depict the transect. A photo point of the transect should be taken each time the transect is read.

a. Establishing Studies.
   1) Randomly locate the transect within the study area.
   2) Permanently locate the baseline by means of two rebar posts, usually placed 100 ft apart. (A longer transect or additional transects may be used if the variability in vegetative characteristics warrants more plots.) Stretch a 100 ft tape between the stakes as close to the ground as possible.
   3) Place a reference fence post within 100 feet of the transect and record the distance and bearing from the reference post to the starting point of the transect.
   4) GPS the starting point of the transect and enter it into GIS.

b. Running the Transect and Recording Information
   1) Sampling Process
      In general, 50 frames are measured along the baseline, but this number may vary depending on the variability of the site and the coefficient of

variation measured during the pilot study. The Daubenmire frames are divided into six (6) classes. The frames are placed on the right hand side of a 100-foot tape with the lower left hand corner of the frame aligned with the 2-foot mark on the tape and read at each 2-foot interval along the tape. Percent canopy coverage of each species is recorded within one of six classes: (1-5%, 5-25%, 26-50%, 51-75%, 76-95%, and 96-100%). A copy of the Daubenmire Cover Class form is found in **Illustration 8**.

Canopies extending over the quadrat are estimated even if the plants are not rooted in the quadrat. In addition, ground cover is recorded at each of the four corners of the frame using a pin flag or other finely honed point. If the point is not small enough, basal coverage will be greatly overestimated. A narrative will accompany the trend data describing the observed range condition and trend indicators.

c. Timing of Studies
Ideally, Daubenmire transects should be read at the peak of the growing season in rested pastures. However, for those allotments or pastures that are grazed each year during the growing season, transects should be read at the same time of year so that cover comparisons between years will reflect the same degree of grazing use.

4. Big Game Habitat Monitoring (Browse Monitoring)

As discussed previously in the Utilization monitoring section, big game habitat monitoring will consist of the Cole Browse Method.

This method records estimates of the age and form class of shrubs and the degree of hedging.

Form Class measures the availability of the plant for browsing and the degree of hedging. Form classes fall into one of eight categories ranging from "all available, little or no hedging" to "dead". Age Class data reflects the establishment, survival and decadence of key browse plants. Plants are recorded as seedlings, young, mature, or decadent. See the Cole Modified Browse Form for a complete description of the age and form classes. Numerous Cole Browse Method transects have been established throughout the Field Office. The locations of these transects are plotted in GIS and are found in **T:\gisdata\gsfo\wildlife\browse transects**. These transects will be read when other trend studies in the pasture or allotment are scheduled to be read.

5. Riparian Habitat Monitoring

Riparian areas are critical habitats for the majority of Colorado's aquatic and terrestrial wildlife. Livestock are attracted to riparian areas for the water, shade,

gentle gradients and succulent vegetation found there. Often, particularly during the warmer months of the year, these riparian areas can be concentration points for livestock. Riparian studies are necessary to insure that management practices leading to proper use of the rest of the allotment are not inadvertently degrading the riparian areas.

Riparian monitoring techniques will depend on the resource objectives for the riparian area. Generally, changes in riparian vegetation attributes will be documented through the use of riparian photo points. Photo points would subjectively show the health and trend of the riparian vegetation but would yield no measurable, objective data. Any other study initiated in a riparian area will have to be tailored to meet an identified concern.

Riparian areas to be monitored will be prioritized based on the results of Riparian PFC assessments. Generally, those riparian areas rated Functioning-at-Risk or "Nonfunctioning" will receive the highest priority for monitoring. Specific objectives for management and monitoring on the highest priority riparian areas will be developed. Riparian photo points or other monitoring techniques will be established based on the specific objectives for the area.

a. Riparian Photo Plots/Points
   The Riparian Photo monitoring will consist of both close-up and general view photos. One close-up photo will be taken looking directly down at a 3 ft x 3 ft or 1m x 1m photo plot permanently staked with rebar or angle iron. Standing in the same location, general view photographs will be taken in three directions, looking directly across the stream, looking upstream and looking downstream.

b. Frequency
   On high-intensity allotments, riparian monitoring photos or transects will be done every 3-5 years. More frequent readings may be necessary particularly if predicted changes are occurring at an accelerated rate which may result in deterioration of identified key areas within the 5 year period.

6. Special Status Plants Population Monitoring

Threatened, endangered and proposed species are protected by the Endangered Species Act. In addition, BLM national policy directs State Directors to afford protection to federal candidate and BLM Sensitive species (BLM 6840 Manual). The policy directs BLM to inventory and monitor these species, develop management plans that include specific habitat and population management objectives designed to recover the species, and ensure that BLM activities are carried out in a manner consistent with the objectives for those species.

There are currently six special status plant species known to occur within the

Glenwood Springs administrative area. The plants and their current status are listed below:

a. *Sclerocactus glaucus* (Uinta Basin hookless cactus) – Threatened
b. *Penstemon debilis* (Parachute penstemon) – Federal Candidate
c. *Phacelia scopulina var. submutica* (Debeque phacelia) – Candidate
d. *Astragalus debequaeus* (Debeque milkvetch) – BLM Sensitive
e. *Mentzelia argillosa* (Southwest stickleaf) – BLM Sensitive
f. *Penstemon harringtonii* (Harrington's penstemon) – BLM Sensitive

The first five species are found only in the westernmost portion of the Resource Area (west of Rifle) and therefore, only management actions in those allotments west of Rifle have the potential to affect these species. *Penstemon harringtonii*, occurs in the sagebrush steppe between 6,800 feet and 9,200 feet in elevation. This species appears to be concentrated in Eagle County but outlying populations have been found south of Rifle in the Beaver Creek watershed and in the Roaring Fork watershed south of Glenwood Springs.

In 1988, an extensive inventory for *Sclerocactus glaucus* was conducted within potential habitat in the area surrounding Debeque, Colorado. This inventory expanded a previous inventory conducted in the area north and east of Debeque in 1985. All populations found were mapped and counted. In addition, data regarding age class and condition were recorded. In 1993, all populations within the Glenwood Springs Field Office were resurveyed and population size, age class and condition were recorded. In 2001, a representative sample of these populations was reinventoried.

Long-term monitoring studies have been established on two populations of *Penstemon harringtonii* in Eagle County. One study lies within the Blowout AMP Allotment (08643), the other is within the North Bellyache Allotment (08712). Macroplots were established at each study site. The macroplots were further divided into belt transects and quadrats were run at randomly selected locations along the belt transects. Within each quadrat, all the *Penstemon harringtonii* plants were counted and the coordinates of their locations were recorded. These monitoring plots were established in 1995 and will be read annually for at least ten years. This monitoring method allows the documentation of changes in population size and distribution through time. The study design. layout, and data forms are maintained by the Denver Botanic Gardens. Annual reports are sent to GSFO and are filed in the Special Status Plants folders.

There are two populations of *Penstemon debilis* within the Glenwood Springs Field Office. One of the populations has been counted over a period of years, but no formal long-term monitoring of the population or habitat has been conducted. In 2003, a complete count should be made of both populations. Other data will also be collected, such as the number of rosettes per cluster, percent of plants that

flowered or set fruit, evidence of recruitment, disease or herbivory, etc.

Representative populations of each special status plant species within the Field Office should be monitored at least every 5 years to detect changes in population trends. The monitoring techniques chosen will depend on the life history, density, and areal extent of the population of interest, and on the population management objectives. For special status species in which habitat needs are known, monitoring may include assessments of the habitat condition. If trends are declining, additional studies may be needed to determine the cause of the decline. If livestock grazing is determined to be a significant contributing factor in the declining population size or other parameters (i.e. failure to meet Colorado Standard 4), appropriate action must be taken prior to the next grazing season as stated in 43 CFR 4180.

7. Vegetation Treatments

Vegetative treatments are designed to meet specific management objectives for an area, and usually involve decreasing production of one or more species and increasing the production of more desirable species. Monitoring studies verify the success or failure of the treatment in achieving the management objective and may provide valuable lessons for future treatment plans.

a. Factors to Consider

1) Before and After Studies

Ideally, studies are established prior to implementing a vegetative treatment and then are repeated for a number of years following the treatment. However, with prescribed burning it is often difficult to predict which parts of the project area will burn and with any vegetative treatment it is generally impossible to predict which parts of the proposed treatment will later be representative of the whole treatment.

2) Paired Plot Studies

The use of paired plots established both inside and outside of the treatment area to evaluate the success of treatments is subject to bias from several sources:

* The treated area often covers all of the best soils and gradients in the immediate area. Areas not treated are often stony, steep, or have shallow soils. This makes finding an area representative of what the treatment area was like before it was treated difficult.
* The area surrounding the treated area sometimes benefits from the treatment. Aerial seeding can spread seed into the surrounding area. A shift of grazing and browsing to the treated area can decrease utilization in the surrounding areas. Conversely, if the areas surrounding a treatment are used as loafing areas, their utilization can increase.

b. Methodology
The specific study methods used to monitor treatment areas can vary considerably with the treatment, the area to be treated, and the objectives of the treatment. In general, the best study methods would combine before/after and paired plot studies.

Using ocular reconnaissance, select an area outside of the treatment area that is similar to the present production within the proposed treatment area. The selected non-treatment area should then have a pilot study established with an intensive, site-specific method. After the treatment has reached full production, an average site on it can be selected for a comparison study plot.

The specific studies to be used will depend on the site specific conditions and the objectives.

VII. Allotment Evaluations

The end result of any monitoring effort is a periodic evaluation of an allotment and its management objectives. Sound, believable studies data is often the only justifiable reason for changing present management. A correct and accurate interpretation of that data will heavily influence any decision for change and will often indicate possible solutions for problems identified by the data.

Allotment evaluations will consist of analyzing changes in trend over time and the reasons for these changes. These evaluations will be in a narrative and graphical form and will include data from trend analysis, utilization studies, climatic data, actual use information and field observations by BLM staff, range users, and other interested parties.
The final evaluation will determine if the management system on each allotment is achieving or making significant progress toward achieving the management objectives. If the objectives are not being met, a determination as to the validity of the objectives will be made. If the objectives are valid, changes in management based on the data gathered will be discussed.

The **Evaluation Period** for each allotment will be determined at the time the monitoring studies are established. The evaluation timeframe will vary by allotment and will depend on a number of factors including the allotment prioritization, the severity and complexity of issues involved, the period of time in which resource changes are expected to occur, the grazing permit renewal schedule, and staff time constraints. The specific studies established, the intervals at which studies will be reread and the year the allotment will be evaluated will be entered into the Monitoring Spreadsheet on the computer's shared drive at **S:\Rangeland Monitoring**. Generally, the high priority Category I and M allotments will have an evaluation every 6-8 years. Low priority Category I and M allotments will be evaluated every 8-10 years. Category C allotments will be evaluated

on an as needed basis. More frequent evaluations can be done if interim data gathering or land health assessments indicate significant problems may be occurring.

VIII. Range Condition Assessments (Inventories)

The Federal Land Policy and Management Act (FLPMA) of 1976 and The Public Rangelands Improvement Act (PRIA) of 1978 require that rangelands be inventoried to compare existing range conditions against the potential for the site. This may be done by determining the similarity of the present vegetation to the potential natural community for the site or the desired plant community as established through management objectives.

In addition to monitoring, inventories will be conducted to provide current information on ecological condition relative to the Colorado Land Health Standards and ecological status relative to the site potential. Condition assessments are designed to reflect ecological condition at a single point in time and are not intended to replace monitoring of changes over time. Two types of condition assessments are proposed for the Glenwood Springs Field Office. These are Ecological Site Inventory and Land Health Assessments.

A. Ecological Site Inventory (ESI) TR 1734-7, Ecological Site Inventory

ESI is the BLM standard vegetation inventory technique. The methodology is presented in Tech Reference 1734-7, Ecological Site Inventory. By comparing the species composition by weight of the present plant community with the expected composition at ecological climax, a relative rating of present condition is obtained. The information is used to help develop appropriate management objectives for an area.

Objectives: 1) To provide a quantitative basis for predicting the extent and direction of changes that can result in the plant community as a result of specific management actions; 2) To supplement trend information by confirming the direction and magnitude of change in ecological condition over time; 3) To assist the land manager in developing appropriate management objectives for an area.

Range condition will be monitored on an allotment basis. Ecological status will be determined when trend studies are established. Key areas will be reassessed only if the analysis of trend data indicates a significant change has occurred.

B. Land Health Assessments (TR 1734-6, Interpreting Indicators of Rangeland Health)

1. Objective
   The primary purpose of conducting formal Land Health Assessments is to

qualitatively determine whether a management unit (allotment, watershed, or other area) is currently achieving the Colorado Standards for Public Land Health and conforming to the Guidelines for Livestock Grazing.

2. Schedule
   The Glenwood Springs Field Office is in the ongoing process of completing formal Land Health Assessments on all public lands within the Field Office. These assessments are done on a landscape basis to address issues and management practices at a landscape scale. The Field Office has been divided into 13 Landscape Units. Each year a formal Land Health Assessment is conducted on one of these landscape units. The assessment of any specific landscape may be conducted before, after or during the monitoring process described above.

3. Assessment Procedure
   Glenwood Springs Field Office has been utilizing and will continue to utilize an Interdisciplinary Team approach. Team members should represent a cross section of skills and knowledge related to the physical and biological aspects of the resource area. Team members should also be familiar with the Colorado Standards and associated indicators. Non-BLM members representing user groups, organizations, or other interested publics are encouraged to be a part of the team.

   The assessment of public land health may involve varying intensities and scales. The use of existing data, such as soil and vegetation inventory and mapping, rangeland monitoring, riparian proper functioning condition (PFC) assessments, water quality data, soil erosion data, T&E species data, and wildlife habitat and population data, is encouraged. If insufficient information exists, further data collection, including the BLM's rapid assessment procedure, and monitoring, may be necessary. In the case of a formal rapid assessment, the ID team collects and uses qualitative information to better understand and determine the landscape potential, capability, condition, and trends being influenced by current management.

   a. Establishing Baseline Studies
      Before conducting a formal assessment it is useful to gather data on existing conditions and trends. Where no monitoring studies exist, it may be useful to establish and read baseline transects prior to conducting the assessment to provide data on existing conditions (canopy cover, ground cover, age classes, etc). This data can be useful for comparisons with reference sites. Where formal monitoring studies already exist it may be useful to reread these studies to determine general trends. This information may be incorporated into the land health assessment.

   b. Determining Potential and Capability

Each ecological site must be evaluated relative to areas of similar potential when observing the standards and indicators. For this reason, it is extremely helpful to locate "reference sites" of the same ecological site for comparison purposes. Reference areas are areas of similar geology, climate, landform, ecological site and socio-economic condition which approach the site potential or are in the range of natural variability for a functioning site.

In some areas the potential of the site has been permanently or temporarily altered by past human activity. In these circumstances, a site should be observed relative to its existing potential rather than its historic potential. This does not refer to ongoing activities affecting public land health. When socioeconomic factors outside the jurisdiction of the BLM affect the potential of a site, the basis for observing the standards and indicators is called the capability of the site. The authorized officer must determine if the standards and indicators are going to be evaluated in comparison with the natural potential or some other capability. If the authorized officer determines the need to measure the standards against a capability other than the natural potential, that capability must be described and documented.

c. Setting Goals and Objectives
Another aspect of the assessment process may involve setting goals, objectives, and desired future conditions where they do not exist. This will include the desired condition from a social/economic aspect as well as from a biological and ecological position. Where goals, objectives and desired future conditions have not been established for appropriate landscape situations, the ID team should do so in conjunction with the existing objectives established if monitoring studies have been initiated. Finding and using reference areas for comparison purposes is very useful in setting realistic goals and objectives. These areas provide clues as to site potential and health.

4. Methodology
The method used in the GSFO consists of a combination of BLM's riparian proper functioning condition assessment technique to address Standard 2, Vegetative Cover and Dominant Species estimates, a Biological and Physical Indicators form based on the Technical Reference, Interpreting Indicators of Land Health to address Standards 1 & 3, and water quality testing to address Standard 5. Where special status species populations or habitat are known to exist within the site being assessed, additional data is collected to address these species. A Rangeland Health Site Documentation Worksheet is also completed to record the location of the assessment and other relevant site features. The upland health assessment procedure is described in the Interagency Technical Reference 1734-6, Interpreting Indicators of Rangeland Health. The use of the Riparian PFC forms is fully described in BLM Tech References 1737-9, Process for Assessing Proper Functioning Condition (for lotic riparian areas) and 1737-11, Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas.

5. Evaluation
   A number of possible outcomes can result from the assessment process. These include:

   a. Standards are being met - "Healthy". The area or allotment meets the standards and conforms to the guidelines or is making significant progress toward meeting the standards. Review the existing terms and conditions to ensure that they will provide for continued achievement of or progress towards the standards and guidelines. Continue or initiate monitoring activities that will provide assurance that the area continues to meet or make significant progress towards meeting the standards.

   b. Standards are not being met - The area is either "At Risk" or "Non-functional". The Interdisciplinary team must determine if grazing is a significant factor in failing to meet the standards. Review the best resource information available, such as quantitative data from monitoring and inventories, qualitative information, professional knowledge, and knowledge provided by public land users and others. If inadequate information is available to determine whether current livestock grazing is a significant factor in failing to meet the standards, initiate action to gather the information needed to make the determination. Identify solutions and implement appropriate actions to make progress toward achieving land health. Although 4180 Regulations require the Authorized Officer to take appropriate action to ensure significant progress towards meeting the standards, in general, funding for new range developments or vegetation treatments will focus on "At-risk" sites. These are sites where the ecological condition has not crossed an ecological threshold beyond which intensive, active management input is required to restore land health. Identify what monitoring will be done to determine progress towards achieving land health.

   c. Don't know if standards are being met - continue with existing monitoring or implement additional monitoring to focus on attributes/ indicators in question. Evaluate for trend towards or away from achieving land health.

The primary focus of future management actions and ongoing monitoring will be on "at-risk" landscapes. Healthy areas will need monitoring, albeit at a less intensive level, to ensure conditions don't deteriorate. Unhealthy areas are lower priority than At Risk areas because they generally will require a greater investment of time, money and human resources to restore to health than an At Risk area. Greatest benefits for the least cost can be expected in the At Risk category.

6. Determining Causes
   Determine the relationship between existing land uses and the failure to meet the standards. Causes of failing to meet standards can be determined through a combination of data sources, including utilization studies (transects), grazing

exclosures, climate data, aerial photos, and other background information about the area being assessed (i.e. water diversions, recent storm events or other major disturbance factors, upland and/or upstream conditions and uses). Once the cause or causes have been determined, monitoring information would be used to plan appropriate projects, modify uses or take other necessary management actions designed to make significant progress toward meeting the standards.

IX. Study File Organization

Locations of all studies will also be documented through the use of a GPS unit and the data entered into GIS (**T:\gisdata\gsfo\range\studies locations**).

Monitoring data will be kept in two six-way file folders; one for short-term monitoring studies and the other for long-term monitoring studies. The organization of studies data will be as follows:

File 1. Short-term Studies

1. Allotment Information (Maps showing land status, pastures, range improvements, and studies locations and Study Location and Documentation Data Forms)
2. Use Supervision Forms
3. Actual Use Records or Certificates of Livestock Count
4. Utilization Pattern Mapping
5. Utilization forms (Key Species and Cole Browse)
6. Climate Data

File 2. Long-term Studies

1. Allotment Map (showing studies locations and Ecological Sites) and Study Location and Documentation Data Forms
2. Allotment Management Plans (if no plans exist, then Allotment Management objectives and Description of authorized grazing use, # AUMS, period of use, etc.)
3. Trend Studies Forms
4. Trend Photos
5. Allotment Evaluations
6. Miscellaneous (PFC forms, etc)

APPENDIX A

High Intensity Allotments

Allotment Name	Allotment Number	Mgt Category	Issues/Concerns	Existing Studies
Rifle Unit				
Alkali Creek Common	08130	I	Stds 1,3,5, season of use	3 FT, 3 P,
Brush Creek Common	18012	I	Season of use, forage availability	No data
Clough-Alber	18909	I	Riparian cond, CRCT, season of use	4 P, 2 RP, 1 FT?
East Fork Common	18910	I	Riparian cond, CRCT	9 P, 5 FT,
Hogback Common	18026	I	Stds 1, 3, stocking level, livestock distribution, season	3 P, 3 FT,

			of use	
Hubbard Mesa	18903	I	Stds 1,2,3,5, season of use, stocking level	3 P, 3 FT, 8 CB
Webster Park	18902	I	Season of use, Stds 1,3, forage availability, % federal range	1 P, 1 CB,
Simpson & Nichols	18022	M	Season of use, Std 3, livestock distribution	
Eagle Unit				
Deer Pen	08616	I	Sagegrouse habitat, P/J encroachment, old age class sagebrush	2 P,
E Hardscrabble	08502	I	Riparian cond, livestock distribution	6 P, 3 RP, 1 CB,
Greenhorn	08641	I	Sagegrouse habitat, P/J encroachment, old age class sagebrush	4 P,
Luark	08672	I	Allotment bdry adj, stocking levels	1 P, 1 CB,
Piskey	08606	I	Stds, low pern grass prod, P/J encroachment, old age sage	2 P,
Spring Creek	08614	I	Allotment bdry adj, stocking levels	1 CB
Upper Cottonwood	08639	I	P/J encroachment, old age sage, season	1 P,
W Hardscrabble Com	08504	I	Riparian cond, livestock distribution,	5 P, 1 FT, 3 RP, 2 CB
Bull Gulch Com	08625	M	Season of Use, P/J encroach, old age sage, lack of water (distribution)	
Catamount Common	08619	M	Season of Use	
West Castle	08620	M	Season of use,	

			Riparian, livestock distrib	
Roaring Fork/South Eagle Unit				
South Canyon	08217	I	Trespass, Stocking levels and/or distrib	1 P,
Blowout AMP	08643	I	OHV use, livestock distrib	8 P, 1 FT,
Prince Creek	08341	I	Riparian, livestock distrib	3 P, 1 CB,
Vulcan AMP	08213	I	Livestock distr, utilization	2 P, IMP cover & util obj
Crown Com	08334	I	Livestock distr, utilization	P
Upper Garfield Com	08222	I	Riparian, Livestock distr, utilization	2 DT, P, 1 CB,

P = photo plot/point
RP = Riparian photo point
FT = Nested Frequency transect
CB = Cole Browse transect
DT = Daubenmire transect

APPENDIX B

MONITORING SCHEDULE				
Monitoring	Study	Intensity		
		High Priority (”I”)	Mid Priority (some “I” and “M”)	Low Priority (“C”)
Short Term Monitoring	Actual Use	Actual Use forms and/or Actual Counts; Annually	Actual Counts as needed	None
	Utilization Map	Annually, until use patterns are established	None	None
	Key Species	Annually on key areas	Every 3 years	None
	Cole Browse	Twice annually on conflict areas	Annually on conflict areas	None

	Stubble Height	Annually on riparian areas of concern	Every 3 years	None
Long Term Monitoring	Daubenmire Cover Class	Every 6 years	Every 8 years	None
	Nested Frequency	Every 6 years or once before replaced	Every 8 years or once before replaced	None
	Photo Plot	Every 6 years	Every 8 years	Every 10 years
	Photo Point	Every 6 years	Every 8 years	Every 10 years
	Riparian Photo Points	Every 4 years	Every 6 years	Every 10 years
	Stream Cross-Sections	As needed	Every 10-13 years with LHA	None
Condition	Ecological Site Inventory	As funds allow; One time landscape or allotment inventory Reread key areas as trend indicates	As funds allow; One time landscape or allotment inventory Reread key areas as trend indicates	None
	Land Health Assessment LHA	Once as baseline 10 to13 years	Once as baseline 10 to 13 years	Once as baseline 10 to 13 years

Study Location & Documentation Data

Study Method					Study Number	
Allotment Name & Number				Pasture		
District			Resource Area			
Ecological Site			Plant Community			
Date Established	Established by (Name)			Map Reference		
Elevation	Slope	Exposure		Aerial Photo Reference		
Township Range Section 1/4 1/4 1/4 Location				Scale: ____ inches equals one mile		
Key Species 1 2 3						
Distance and bearing between reference post or reference point and the transect location stake, beginning of transect, or plot						
Distance and bearing between location stake and bearing stake						
Transect Bearing	Vertical Distance Between Ground & Aligned Tape					
Length of Transect	Plot/Frame Size					
Sampling Interval	Total Number of Samples					

Notes (Description of study location, diagram of transect/plot layout, description of photo points, etc. If more space is needed, use reverse side or another page.)

Note: Depending on the study method, fill in the blocks that apply when a study is established. This documentation enables the examiners to conduct follow-up studies in a consistant manner to provide comparable data for analysis, interpretation, and evaluation.

Form 4130-5
(November 2004)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 1004-0051
Expires: August 31, 2007

ACTUAL GRAZING USE REPORT

Dear Grazing Operator:

In accordance with the terms and conditions of the permit or lease which authorizes your grazing use, please complete this form and return to the Field Office within 15 days after completing your authorized grazing use (43 CFR 4130.3-2(d)). This information, along with other studies data, is needed to evaluate the effectiveness of present management. Use a separate line for every day that you either turn livestock in or take livestock out of an allotment or pasture. Your cooperation in providing accurate information will be appreciated.

Allotment

FOR BUREAU OF LAND MANAGEMENT (BLM) USE ONLY

ACTUAL GRAZING USE				CALCULATION OF AUM'S GRAZING USE				
PASTURE	DATE *(Mo., Day, Yr.)*	NUMBER AND KIND OR CLASS OF LIVESTOCK		NO. AND KIND OF LIVE-STOCK	GRAZING PERIOD		% PL USE	AUM'S
		TURNED IN	TAKEN OUT		BEGIN	END		

I CERTIFY That this is a complete and accurate report of my grazing use.

Signature of Permittee/Leassee | Date

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

(Continued on page 2)

Remarks *(Include other information such as death losses, disease, and unauthorized use by strays.):*

NOTICES

The Privacy Act of 1974 and the regulations in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this permit.

AUTHORITY: Taylor Grazing Act, 43 U.S.C. 315, 316; Federal Land Policy and Management Act, 43 U.S.C. 1701; and Public Rangelands Improvement Act of 1978, 43 U.S.C. 1901, and 43 U.S.C. 1181d.

PRINCIPAL PURPOSE: Information will be used to document the actual amount of livestock grazing use on the public lands to calculate your billing, and to help evaluate the effectiveness of management actions in meeting resource management objectives.

ROUTINE USES: (1) This information is being collected to gather and document the actual amount of livestock grazing use on the public lands. (2) This information will be used to calculate your billing and to help evaluate the effectiveness of management actions in meeting resource management objectives. (3) Documentation for public information of the grazing use made on public lands. (4) Information from the record and/or the record will be transferred to appropriate Federal, State, local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecutions.

EFFECT OF NOT PROVIDING INFORMATION: Disclosure of the information is required to obtain a benefit in accordance with Sections 3 and 15 of the Taylor Grazing Act, Section 11 of the Alaska Grazing Act, Section 12 of the Reindeer Act, and Section 302 of the Federal Land Policy and Management Act.

The Paperwork Reduction Act of 1995 requires us to inform you that:
BLM collects this information to document the purpose, need, and other information for grazing use on the public lands.
Response to this request is required to obtain a benefit.
BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average 25 minutes per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004- 0051), Bureau Information Collection Clearance Officer (WO-630), 1849 C Street, N.W., Washington, D.C. 20240.

Key Species

Study Number	Date	Examiner

Allotment Name & Number	Pasture

Kind and/or Class of Animal	Period of Use

Class Interval	Int Mid (M)	Key Species: Dot Count	Key Species: No. By Class (C)	Key Species: No. X Midmt. (C)(M)	Key Species: Dot Count	Key Species: No. By Class (C)	Key Species: No. X Midpt. (C)(M)
0-5%	2.5						
6-20%	13						
21-40%	30						
41-60%	50						
61-80%	70						
81-94%	88						
95-100%	97.5						
		Totals			Totals		
Avg. Util. $= \frac{\Sigma(CM)^*}{\Sigma C}$		_____ =			_____ =		

(a) (0-5%). The key species show no evidence of grazing use or negligible use.

(b) (6-20%). The key species has the appearance of very light grazing. Plants may be topped or slightly used. Current seedstalks and young plants are little disturbed.

(c) (21-40%). The key species may be topped, skimmed, or grazed in patches. Between 60 and 80 percent of current seedstalks remain intact. Most young plants are undamaged.

(d) (41-60%). Half of the available forage (by weight) on key species appears to have been utilized. Fifteen to 25 percent of current seedstalks remain intact.

(e) (61-80%). More than half of the available forage on key species appears to have been utilized. Less than 10 percent of the current seedstalks remain. Shoots of rhizomatous grasses are missing.

(f) (81-94%). The key species appear to have been heavily utilized and there are indications of repeated use. There is no evidence of reproduction or current seedstalks.

(g) (95-100%). The key species appears to have been completely utilized. The remaining stubble is utilized to the soil surface.

Notes (use other side or another page, if necessary)

* Where C = The number of observations within each class interval (C column), M = the class interval midpoint (M column), and Σ = the summation symbol.

Stubble Height

Study Number	Date	Examiner

Allotment Name & Number	Pasture

	1	2	3	4	5	6
Site (or)						
Species						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
Total						
Average						

(Record averages on back of form.)

Stubble Height Summary

Species	Total Stubble Height	Number of Plants	Average Stubble Height
Totals			

Notes:

Cole Browse

Study Number	Date	Examiner

Allotment Name & Number	Pasture

Key Species	Kind and/or Class of Animal	Period of Use

Pl No	Form Class								Age Class				Leader Use -%
	1	2	3	4	5	6	7	8	S	Y	M	D	
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													

Pl No	Form Class								Age Class				Leader Use -%
	1	2	3	4	5	6	7	8	S	Y	M	D	
26													
27													
28													
29													
30													
31													
32													
33													
34													
35													
36													
37													
38													
39													
40													
41													
42													
43													
44													
45													
46													
47													
48													
49													
50													

Tot. % Form Classes

____ ____ 1 - All available, Little or no hedging
____ ____ 2 - All available, Moderately hedged
____ ____ 3 - All available, Severely Hedged
____ ____ 4 - Partially available, Little or no hedging
____ ____ 5 - Partially available, Moderately hedged
____ ____ 6 - Partially available, Severely Hedged
Subtotal

____ ____ 7 - Unavailable
____ ____ 8 - Dead
Total

Average Leader Length		Use Index	

Tot. % Age Classes

Total

____ ____ S - Seedling, < 1/8" diam.
____ ____ Y - Young, 1/8" to 1/2" diam.
____ ____ M - Mature, > 1/2" diam.
____ ____ D - Decadent, 50% or more dead
____ ____ Total

Leader Use Class	Value
0%	0%
1-10%	5%
11-40%	25%
41-60%	50%
61-90%	75%
91-100%	95%

Average Leader Use

Pl No	Leader Length 1	2	3	4	5	6	7	8	9	10	Total Length	No Ldrs Meas.
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
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37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
										Totals		

Notes (use another page, if necessary)

Total Length / No Leaders Meas. = Average Leader Length

_____ =

Illustration 2 *page 2*

DATE _____

NO. _____

R.A. _____

ALLOT. _____

PAST. _____

NESTED PLOT FREQUENCY WORKSHEET

UTM: ZONE_____ X_____ Y_____ ALLOTMENT_____ NO. QUADRATS_____

STUDY NUMBER_____ LOCATION_____ OBSERVER_____ DATE_____

Frame Size Legend 1 = 6" x 6" , 2 = 12" x 12" , 3 = 12" x 24" , 4 = 24" x 24"

Species	BELT NUMBER 1/2	3/4	5/6	7/8	9/10	FREQ/PLOT SIZE 1	2	3	4	
ANNUALS										
SEEDLING										
COVER BASAL VEG						COVER SUM B.V.				
Overstory Veg						OSV				
BARE SOIL						Bare				
LITTER						Lit				
ROCK						Rck				
MICRO CRUST						MBC				

NOTES: Indicate here if you recorded all veg. or just key species. Put additional remarks on reverse. No. %

1. Don't record annuals (only live perennials) 2. Only record overstory if have no basal hit on veg. (only live perennials)

Daubenmire

Page ____ of ____

Study Number	Date	Examiner	Allotment Name & Number	Pasture

Transect Number and Location	Number of Quadrats

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50

Daubenmire Summary

Page ____ of ____

Study Number	Date	Examiner	Allotment Name & Number	Pasture

Study Location	Number of Quadrats

Cover Class	Mid-Point	Species		Species		Species		Species		Species		Species		Species		Species		Species		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5																						
2 5-25%	15																						
3 26-50%	37.5																						
4 51-75%	62.5																						
5 76-95%	85																						
6 96-100%	97.5																						
Total canopy																							
Number of Samples																							
% canopy cover																							
Species composition																							
Frequency																							

Illustration 10

Evaluation Sheet (Front)

Aerial Photo:_____

Management Unit:_____ State:_____ Office:_____ Range/Ecol. Site Code:_____
(Allotment or pasture)

Ecological Site Name:_____ Soil Map Unit/Component Name:_____

Observers:_____ Date:_____

Location (description):_____

T. ____ R. _____ or _____N. Lat. Or UTM E_____m Position by GPS? Y / N
UTM Zone___, Datum___

Sec. _____, _____ _____W. Long. N_____m Photos taken? Y / N

Size of evaluation area:_____

Composition (Indicators 10 and 12) based on:__Annual Production, __Cover Produced During Current Year or __Biomass

---

Soil/site verification:

Range/Ecol. Site Descr., Soil Surv., and/or Ecol. Ref. Area:
Surface texture _____
Depth: very shallow __, shallow __, moderate __, deep __
Type and depth of diagnostic horizons:
1. _____ 3. _____
2. _____ 4. _____
Surf. Efferv.: none __, v. slight __, slight __, strong __, violent __

Evaluation Area:
Surface texture _____
Depth: very shallow __, shallow __, moderate __, deep __
Type and depth of diagnostic horizons:
1. _____ 3. _____
2. _____ 4. _____
Surf. Efferv.: none __, v. slight __, slight __, strong __, violent __

Parent material _____ Slope _____% Elevation _____ft.

Topographic position _____ Aspect _____

Average annual precipitation _____inches

Seasonal distribution _____

Recent weather (last 2 years) (1) drought _____, (2) normal _____, or (3) wet _____.

Wildlife use, livestock use (intensity and season of allotted use), and recent disturbances:

_____
_____
_____
_____

Off-site influences on evaluation area:

_____
_____
_____
_____

Criteria used to select this particular evaluation area as REPRESENTATIVE (specific info. and factors considered; degree of "representativeness")

_____
_____
_____
_____

Other remarks (continue on back if necessary)

_____
_____
_____
_____

Reference: (1) Reference Sheet:_____; Author:_____; Creation Date:_____
or (2) Other (e.g., name and date of ecological site description; locations of ecological reference area(s))_____

Evaluation Sheet (Back)

Departure from Expected	**Code**	**Instructions for Evaluation Sheet, Page 2**
None to Slight Slight to Moderate Moderate Moderate to Extreme Extreme to Total	N-S S-M M M-E E-T	(1) Assign 17 indicator ratings. If indicator not present, rate None to Slight. (2) In the three grids below, write the indicator number in the appropriate column for each indicator that is applicable to the attribute. (3) Assign overall rating for each attribute based on preponderance of evidence. (4) Justify each attribute rating in writing.

Indicator	**Rating**	**Comments**
1. Rills	S H	
2. Water-flow Patterns	S H	
3. Pedestals and/or terracettes	S H	
4. Bare ground _____%	S H	
5. Gullies	S H	
6. Wind-scoured, blowouts, and/or deposition areas	S	
7. Litter movement	S	
8. Soil surface resistance to erosion	S H B	
9. Soil surface loss or degradation	S H B	
10. Plant community composition and distribution relative to infiltration	H	
11. Compaction layer	S H B	
12. Functional/structional groups	B	
13. Plant mortality/decadence	B	
14. Litter amount	H B	
15. Annual production	B	
16. Invasive plants	B	
17. Reproductive capability of perennial plants	B	

E-T	M-E	M	S-M	N-S

Attribute Rating Justification
Soil & Site Stability:

S (10 indicators):
Soil & Site Stability
Rating: _____

E-T	M-E	M	S-M	N-S

Attribute Rating Justification
Hydrologic Function:

H (10 indicators):
Hydrologic Function
Rating: _____

E-T	M-E	M	S-M	N-S

Attribute Rating Justification
Biotic Integrity:

B (9 indicators):
Biotic Integrity
Rating: _____

Reference Sheet

Author(s)/participant(s): _____

Contact for lead author: _____

Date: _____ **MLRA:** _____ **Sub-MLRA:** _____ **Ecological Site:** _____ This *must* be verified based on soils and climate (see Ecological Site Description). Current plant community *cannot* be used to identify the ecological site.

Composition (Indicators 10 and 12) based on: __Annual Production, __Foliar Cover, __Biomass

Indicators. For each indicator, describe the potential for the site. Where possible, (1) use numbers, (2) include expected range of values for above- and below-average years and natural disturbance regimes for **each** community within the reference state, when appropriate and (3) cite data. Continue descriptions on separate sheet.

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are **not** bare ground):

5. Number of gullies and erosion associated with gullies:

6. Extent of wind scoured, blowouts and/or depositional areas:

7. Amount of litter movement (describe size and distance expected to travel):

8. Soil surface (top few mm) resistance to erosion (stability values are averages – most sites will show a range of values):

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):

10. Effect of plant community composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):

12. Functional/Structural Groups (list in order of descending dominance by above-ground production or live foliar cover (specify) using symbols: >>, >, = to indicate much greater than, greater than, and equal to; place dominants, subdominants and "others" on separate lines):
    Dominants:
    Sub-dominants:
    Other:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):

14. Average percent litter cover (_____%) and depth (_____ inches).

15. Expected annual production (this is TOTAL above-ground production, not just forage production):
_____ - _____ lbs./acre or kg/ha (choose one)

16. Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site.:

17. Perennial plant reproductive capability:

Functional/Structural Groups Sheet

State _____ **Office** _____ **Ecological Site** _____ **Site ID** _____

Observers _____ **Date** _____

Functional/Structural Groups			**Species List for Functional/Structural Groups**
Name	Potential[1]	Actual[2]	Plant Names
Noxious Weeds			
Invasive Plants			
Biological Crust[3]			

Indicate whether each "structural/functional group" is a Dominant (D) (roughly 40-100 % composition), **a Sub-dominant (S)** (roughly 10-40% composition) **a Minor Component (M)** (roughly 2-10% composition), or **a Trace Component (T)** (<2% composition) based on weight or cover composition in the area of interest (e.g., "Actual[2]" column) relative to the "Potential[1]" column derived from information found in the ecological site/description and/or at the ecological reference area.

Biological Crust[3] dominance is evaluated solely on cover, not composition by weight.

Evaluation Matrix

State _____ **Office** _____ **Ecological Site** _____ **Site ID** _____

Authors _____ **Revision Date** _____

Departure from Reference Sheet

Indicator*	Extreme to Total	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
1. Rills _____					Reference Sheet: ____
Generic Descriptor	Rill formation is severe and well defined throughout most of the site.	Rill formation is moderately active and well defined throughout most of the site.	Active rill formation is slight at infrequent intervals; mostly in exposed areas.	No recent formation of rills; old rills have blunted or muted features.	Current or past formation of rills as expected for the site.
2. Water Flow Patterns _____					Reference Sheet: ____
Generic Descriptor	Water flow patterns extensive and numerous; unstable with active erosion; usually connected.	Water flow patterns more numerous and extensive than expected; deposition and cut areas common; occasionally connected.	Number and length of water flow patterns nearly match what is expected for the site; erosion is minor with some instability and deposition.	Number and length of water flow patterns match what is expected for the site; some evidence of minor erosion. Flow patterns are stable and short.	Matches what is expected for the site; minimal evidence of past or current soil deposition or erosion.
3. Pedestals and/or Terracettes _____					Reference Sheet: ____
Generic Descriptor	Abundant active pedestalling and numerous terracettes. Many rocks and plants are pedestaled; exposed plant roots are common.	Moderate active pedestalling; terracettes common. Some rocks and plants are pedestaled with occasional exposed roots.	Slight active pedestalling; most pedestals are in flow paths and interspaces and/or on exposed slopes. Occasional terracettes present.	Active pedestalling or terracette formation is rare; some evidence of past pedestal formation, especially in water flow patterns on exposed slopes.	Current or past evidence of pedestaled plants or rocks as expected for the site. Terracettes absent or uncommon.

* Descriptions for each indicator should be more specific than those listed in the Generic Descriptors, if possible, and refer to the criteria included in the None to Slight description, which is based on the Reference Sheet (Appendix 1).

Indicator*	Extreme to Total	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
4. Bare Ground					Reference Sheet:
Generic Descriptor	Much higher than expected for the site. Bare areas are large and generally connected.	Moderate to much higher than expected for the site. Bare areas are large and occasionally connected.	Moderately higher than expected for the site. Bare areas are of moderate size and sporadically connected.	Slightly to moderately higher than expected for the site. Bare areas are small and rarely connected.	Amount and size of bare areas match that expected for the site.
5. Gullies					Reference Sheet:
Generic Descriptor	Common with indications of active erosion and downcutting; vegetation is infrequent on slopes and/or bed. Nickpoints and headcuts are numerous and active.	Moderate in number to common with indications of active erosion; vegetation is intermittent on slopes and/or bed. Headcuts are active; down-cutting is not apparent.	Moderate in number with indications of active erosion; vegetation is intermittent on slopes and/or bed. Occasional headcuts may be present.	Uncommon, vegetation is stabilizing the bed and slopes; no signs of active headcuts, nickpoints, or bed erosion.	Match what is expected for the site; drainages are represented as natural stable channels; vegetation common and no signs of erosion.
6. Wind Scoured, Blowout, and/or Depositional Areas					Reference Sheet:
Generic Descriptor	Extensive.	Common.	Occasionally present.	Infrequent and few.	Match what is expected for the site.

* Descriptions for each indicator should be more specific than those listed in the Generic Descriptors, if possible, and refer to the criteria included in the None to Slight description, which is based on the Reference Sheet (Appendix 1).

Departure from Reference Sheet

Indicator*	Extreme to Total	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
7. Litter Movement (wind or water) _____					Reference Sheet: _____
Generic Descriptor	Extreme; concentrated around obstructions. Most size classes of litter have been displaced.	Moderate to extreme; loosely concentrated near obstructions. Moderate to small size classes of litter have been displaced.	Moderate movement of smaller size classes in scattered concentrations around obstructions and in depressions.	Slightly to moderately more than expected for the site with only small size classes of litter being displaced.	Matches that expected for the site with a fairly uniform distribution of litter.
8. Soil Surface Resistance to Erosion _____					Reference Sheet: _____
Generic Descriptor	Extremely reduced throughout the site. Biological stabilization agents including organic matter and biological crusts virtually absent.	Significantly reduced in most plant canopy interspaces and moderately reduced beneath plant canopies. Stabilizing agents present only in isolated patches.	Significantly reduced in at least half of the plant canopy interspaces, or moderately reduced throughout the site.	Some reduction in soil surface stability in plant interspaces or slight reduction throughout the site. Stabilizing agents reduced below expected.	Matches that expected for the site. Surface soil is stabilized by organic matter decomposition products and/or a biological crust.
9. Soil Surface Loss or Degradation _____					Reference Sheet: _____
Generic Descriptor	Soil surface horizon absent. Soil structure near surface is similar to, or more degraded, than that in subsurface horizons. No distinguishable difference in subsurface organic matter content.	Soil loss or degradation severe throughout site. Minimal differences in soil organic matter content and structure of surface and subsurface layers.	Moderate soil loss or degradation in plant interspaces with some degradation beneath plant canopies. Soil structure is degraded and soil organic matter content is significantly reduced.	Some soil loss has occurred and/or soil structure shows signs of degradation, especially in plant interspaces.	Soil surface horizon intact. Soil structure and organic matter content match that expected for site.

* Descriptions for each indicator should be more specific than those listed in the Generic Descriptors, if possible, and refer to the criteria included in the None to Slight description, which is based on the Reference Sheet (Appendix 1).

Indicator*	Extreme to Total	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
10. Plant Community Composition and Distribution Relative to Infiltration and Runoff					Reference Sheet:
Generic Descriptor	Infiltration is severely decreased due to adverse changes in plant community composition and/ or distribution. Adverse plant cover changes have occurred.	Infiltration is greatly decreased due to adverse changes in plant community composition and/ or distribution. Detrimental plant cover changes have occurred.	Infiltration is moderately reduced due to adverse changes in plant community composition and/or distribution. Plant cover changes negatively affect infiltration.	Infiltration is slightly to moderately affected by minor changes in plant community composition and/or distribution. Plant cover changes have only a minor effect on infiltration.	Infiltration and runoff are not affected by any changes in plant community composition and distribution. Any changes in infiltration and runoff can be attributed to other factors (e.g. compaction).
11. Compaction Layer (below soil surface)					Reference Sheet:
Generic Descriptor	Extensive; severely restricts water movement and root penetration.	Widespread; greatly restricts water movement and root penetration.	Moderately wide-spread, moderately restricts water movement and root penetration.	Rarely present or is thin and weakly restrictive to water movement and root penetration.	Matches that expected for the site; none to minimal, not restrictive to water movement and root penetration.

* Descriptions for each indicator should be more specific than those listed in the Generic Descriptors, if possible, and refer to the criteria included in the None to Slight description, which is based on the Reference Sheet (Appendix 1).

Indicator*	Extreme to Total	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
12. Functional/ Structural Groups (F/S Groups) See Functional/ Structural Groups Worksheet					Reference Sheet:
Generic Descriptor	Number of F/S groups greatly reduced **and/or** Relative dominance of F/S groups has been dramatically altered **and/or** Number of species within F/S groups dramatically reduced.	Number of F/S groups reduced **and/or** One dominant group and/or one or more sub-dominate group replaced by F/S groups not expected for the site **and/or** Number of species within F/S groups significantly reduced.	Number of F/S groups moderately reduced **and/or** One or more sub-dominant F/S groups replaced by F/S groups not expected for the site **and/or** Number of species within F/S groups moderately reduced.	Number of F/S groups slightly reduced **and/or** Relative dominance of F/S groups has been modified from that expected for the site **and/or** number of species within F/S slightly reduced.	F/S groups and number of species in each group closely match that expected for the site.
13. Plant Mortality/ Decadence					Reference Sheet:
Generic Descriptor	Dead and/or decadent plants are common.	Dead plants and/or decadent plants are somewhat common.	Some dead and/or decadent plants are present.	Slight plant mortality and/or decadence.	Plant mortality and decadence match that expected for the site.
14. Litter Amount					Reference Sheet:
Generic Descriptor	Largely absent or dominant relative to site potential and weather.	Greatly reduced or increased relative to site potential and weather.	Moderately more or less relative to site potential and weather.	Slightly more or less relative to site potential and weather.	Amount is what is expected for the site potential and weather.

* Descriptions for each indicator should be more specific than those listed in the Generic Descriptors, if possible, and refer to the criteria included in the None to Slight description, which is based on the Reference Sheet (Appendix 1).

Indicator*	Extreme to Total	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
15. Annual Production					Reference Sheet:
Generic Descriptor	Less than 20% of potential production for the site based on recent weather.	20-40% of potential production for the site based on recent weather.	40-60% of potential production for the site based on recent weather.	60-80% of potential production for the site based on recent weather.	Exceeds 80% of potential production for the site based on recent weather.
16. Invasive Plants					Reference Sheet:
Generic Descriptor	Dominate the site.	Common throughout the site.	Scattered throughout the site.	Present primarily in disturbed areas within the site.	If present, composition of invasive species, matches that expected for the site.
17.Reproductive Capability of Perennial Plants (native or seeded)					Reference Sheet:
Generic Descriptor	Capability to produce seed or vegetative tillers is severely reduced relative to recent climatic conditions.	Capability to produce seed or vegetative tillers is greatly reduced relative to recent climatic conditions	Capability to produce seed or vegetative tillers is moderately reduced relative to recent climatic conditions.	Capability to produce seed or vegetative tillers is slightly reduced relative to recent climatic conditions.	Capability to produce seed or vegetative tillers is not reduced relative to recent climatic conditions.

* Descriptions for each indicator should be more specific than those listed in the Generic Descriptors, if possible, and refer to the criteria included in the None to Slight description, which is based on the Reference Sheet (Appendix 1).

Standard Checklist

Name of Riparian-Wetland Area:_____

Date:_____ Segment/Reach ID: _____

Miles:_____ Acres:_____

ID Team Observers: _____

Yes	No	N/A	HYDROLOGY
			1) Floodplain above bankfull is inundated in “relatively frequent” events
			2) Where beaver dams are present they are active and stable
			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
			4) Riparian-wetland area is widening or has achieved potential extent
			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
			6) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
			7) There is diverse composition of riparian-wetland vegetation (for maintenance/recovery)
			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-streamflow events
			10) Riparian-wetland plants exhibit high vigor
			11) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows
			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION/DEPOSITION
			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy
			14) Point bars are revegetating with riparian-wetland vegetation
			15) Lateral stream movement is associated with natural sinuosity
			16) System is vertically stable
			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1998)

Remarks

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Summary Determination

Functional Rating:

Proper Functioning Condition	_____
Functional—At Risk	_____
Nonfunctional	_____
Unknown	_____

Trend for Functional—At Risk:

Upward	_____
Downward	_____
Not Apparent	_____

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes	___
No	___

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions
___ Channelization ___ Road encroachment ___ Oil field water discharge
___ Augmented flows ___ Other (specify)_____

Appendix E
BLM Colorado Standards for Public Land Health
Guidelines for Livestock Management

F-1. Standards for Public Land Health in Colorado

Standards for Public Land Health describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. The Secretary of the Interior approved BLM Colorado's Standards for Public Land Health and Guidelines for Livestock Management (see F-2, below) on February 3, 1997.

Standard 1: *Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, landform, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.*

Indicators:

- Expression of rills and soil pedestals are minimal.
- Evidence of actively eroding gullies (incised channels) is minimal.
- Canopy and ground cover are appropriate.
- There is litter accumulating in place and is not sorted by normal overland water flow.
- There is appropriate organic matter in soil.
- There is diversity of plant species with a variety of root depths.
- Upland swales have vegetation cover or density greater than that of adjacent uplands.
- There are vigorous, desirable plants.

Standard 2: *Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbance such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment, and provides forage, habitat, and bio-diversity. Water quality is improved or maintained. Stable soils store and release water slowly.*

Indicators:

- Vegetation is dominated by an appropriate mix of native or desirable introduced species.
- Vigorous, desirable plants are present.
- There is vegetation with diverse age class structure, appropriate vertical structure, and adequate composition, cover, and density.
- Streambank vegetation is present and is comprised of species and communities that have root systems capable of withstanding high streamflow events.
- Plant species present indicate maintenance of riparian moisture characteristics.
- Stream is in balance with the water and sediment being supplied by the watershed (e.g., no headcutting and no excessive erosion or deposition).
- Vegetation and free water indicate high water tables.
- Vegetation colonizes point bars with a range of age classes and successional stages.
- An active floodplain is present.
- Residual floodplain vegetation is available to capture and retain sediment and dissipate flood energies.

- Stream channels with size and meander pattern appropriate for the stream's position in the landscape, and parent materials.
- Woody debris contributes to the character of the stream channel morphology.

Standard 3: *Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the potential for the species and habitat. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes.*

Indicators:

- Noxious weeds and undesirable species are minimal in the overall plant community.
- Native plant and animal communities are spatially distributed across the landscape with a density, composition, and frequency of species suitable to ensure reproductive capability and sustainability.
- Plants and animals are present in mixed age classes sufficient to sustain recruitment and mortality fluctuations.
- Landscapes exhibit connectivity of habitat or presence of corridors to prevent habitat fragmentation.
- Photosynthetic activity is evident throughout the growing season.
- Diversity and density of plant and animal species are in balance with habitat/landscape potential and exhibit resilience to human activities.
- Appropriate plant litter accumulates and is evenly distributed across the landscape.
- Landscapes composed of several plant communities that may be in a variety of successional stages and patterns.

Standard 4: *Special status, threatened and endangered species (Federal and State), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.*

Indicators:

- All the indicators associated with the plant and animal communities standard apply.
- Suitable habitat supports stable and increasing populations of endemic and protected species.
- Suitable habitat is available for recovery of endemic and protected species.

Standard 5: *The water quality of all water bodies, including ground water where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado. Water Quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under State law as found in (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act.*

Indicators:

- Appropriate populations of macro invertebrates, vertebrates, and algae are present.
- Surface and ground waters only contain substances (e.g. sediment, scum, floating debris, odor, heavy metal precipitates on channel substrate) attributable to humans within the

amounts, concentrations, or combinations as directed by the Water Quality Standards established by the State of Colorado (5 CCR 1002-8).

F-2. BLM Guidelines for Livestock Grazing Management in Colorado

Guidelines are the management tools, methods, strategies, and techniques (e.g., best management practices) designed to maintain or achieve healthy public lands as defined by the standards. In response to public concern about management of livestock grazing on western public lands, BLM began developing new regulations for livestock grazing administration. The Secretary of the Interior approved BLM Colorado's Standards for Public Land Health (see F-1, above) and Guidelines for Livestock Management on February 3, 1997.

1. Grazing management practices promote plant health by providing for one or more of the following:

- periodic rest or deferment from grazing during critical growth periods;
- adequate recovery and regrowth periods;
- opportunity for seed dissemination and seedling establishment.

2. Grazing management practices address the kind, numbers, and class of livestock; the season, duration, distribution, frequency, and intensity of grazing use; and livestock health.

3. Grazing management practices maintain sufficient residual vegetation on both upland and riparian sites to protect the soil from wind and water erosion to assist in maintaining appropriate soil infiltration and permeability and to buffer temperature extremes. In riparian areas, vegetation dissipates energy, captures sediment, recharges ground water, and contributes to stream stability.

4. Native plant species and natural revegetation are emphasized in the support of sustaining ecological functions and site integrity. Where reseeding is required on land treatment efforts, emphasis will be placed on using native plant species. Seeding of non-native plant species will be considered based on local goals, native seed availability and cost, persistence of non-native plants and annuals/noxious weeds on the site, and composition of non-natives in the seed mix.

5. Range improvement projects are designed consistent with overall ecological functions and processes with minimum adverse impacts to other resources or uses of riparian/wetland and upland sites.

6. Grazing management will occur in a manner that does not encourage the establishment or spread of noxious weeds. In addition to mechanical, chemical, and biological methods of weed control, livestock may be used where feasible as a tool to inhibit or stop the spread of noxious weeds.

7. Natural occurrences such as fire, drought, flooding, and prescribed land treatments should be combined with livestock management practices to move toward the sustainability of biological diversity across the landscape, including the maintenance, restoration, or enhancement of habitat to promote and assist the recovery and conservation of threatened, endangered, or other special status species, by helping to provide natural vegetation patterns, a mosaic of successional stages, and vegetation corridors, thus minimizing habitat fragmentation.

8. Colorado Best Management Practices (BMPs) and other scientifically developed practices that enhance land and water quality should be used in the development of activity plans prepared for land use.