Standards for Rangeland Health and Guidelines for Grazing Administration
Implementation Project: Allotment Assessment
for

Black Rock (4841) and Sullivan Canyon (4810)

I. INTRODUCTION

The Black Rock and Sullivan Canyon Allotment assessments were conducted in accordance with directions set forth in the Washington Office Instruction Memorandum No. 98-91 and Arizona State Instruction Memorandum No. 99-012 for implementation of Standards for Rangeland Health and Guidelines for Grazing Administration (Standards and Guides).

The purpose of Standards and Guides is to ensure the health of public rangelands. These standards help the Bureau of Land Management (BLM), rangeland users, and interested members of the public achieve a common understanding of acceptable resource conditions, and work together to implement that vision (see Appendix A for a copy of the Standards and Guidelines).

Arizona's Standards and Guides were developed by the BLM State Standards and Guides Team and the Arizona Resource Advisory Council (RAC), a state level council appointed by the Secretary of the Interior.

The Secretary of the Interior approved the Standards and Guides in April 1997. The Decision Record, signed by the BLM State Director (April 1997) provides for full implementation of the Standards and Guides in all Arizona Land Use Plans.

This assessment was conducted by an interdisciplinary assessment team (IAT) of resource specialists from:

- BLM.
- Natural Resource Conservation Service (NRCS).
- Arizona Game and Fish Department (AGFD).
- Mohave County Extension.

The IAT was assisted by the Rangeland Resource Team (RRT), a diverse group of local residents formed and appointed under the RAC charter (see Appendix B for a list of members on both teams). The RRT may provide informal advice to the BLM Authorized Officers regarding implementation of Standards and Guides, and "will have opportunities to raise any matter of concern with the resource advisory council and ... to provide information and options to the council for their consideration" as provided for by regulations at 43 CFR 1784.6-2(a)(2)(iv)(A).

The BLM/RAC Implementation Strategy for Arizona states that the RRT's primary role is to assist BLM managers in assuring the Standards and Guides are consistently applied and technically sound. The IAT analyzed all available information in cooperation with

the RRT. Based on field observations, team members determined whether rangeland conditions were meeting, progressing toward meeting, or not meeting the Standards for Rangeland Health.

The RRT, IAT, permittees and other interested parties were invited to attend an issue scoping meeting on September 10, 1998, and a field visit on September 24, 1998. At the conclusion of the field visit, the group determined the standards for rangeland health are being met. In cases where issues were identified, the group identified which resource uses needed to be addressed, and teams presented recommendations to improve resource conditions. After consultation with interested persons, permittees, and the IAT, the Authorized Officers will select the appropriate actions. The selected management actions will be analyzed through the National Environmental Policy Act (NEPA) process and a proposed decision will be issued.

II. GRAZING USE

A. Total Grazing Privileges

Blackrock Allotment	
Active Grazing Use	1,463 AUMs
Suspended Preference	1,404 AUMs
Total	2,867 AUMs
Sullivan Canyon Allotment	
Active Grazing Use	962 AUMs
Suspended Preference	1,241 AUMs
Total	2,203 AUMs

(Note: an AUM, or Animal Unit Month, is a unit of measurement indicating how much forage is eaten by a cow/calf pair in one month.)

B. Season(s) of Use

Blackrock Allotment	Year long
Sullivan Canyon Allotment	Year long

C. Kind and Class of Livestock

Blackrock Allotment	149 cattle
Sullivan Canyon Allotment	80 cattle

D. Percent Federal range[1]

Black Rock Allotment	82%
Sullivan Canyon Allotment	100%

[1] The percentage of public land use determined by the proportion of livestock forage available on public lands within the allotment compared to the total amount available from public lands, state lands, and those owned or controlled by the permittee or lessee

III. ALLOTMENT PROFILE

A. Description

Both Black Rock and Sullivan Canyon Allotments are located in the northwestern portion of the Arizona Strip, approximately 12 miles southwest of St. George, Utah.

The Black Rock Allotment extends from the Arizona-Utah state line on the north, to the top of Black Rock Mountain on the south. The allotment is bounded on the east by Wolfhole Mountain and on the west by the Mustang Spring and Sullivan Canyon Allotments. Elevation in this allotment ranges from 2,680 feet on the north to 7,067 feet on Black Rock Mountain. Topography ranges from flat desert, to foothills cut by large washes, to the steep slopes of Black Rock Mountain, a pine covered mountain. The mountainous part has several chained and seeded areas. Drainage patterns are well defined over the allotment, with all surface runoff draining north to the Virgin River.

The Sullivan Canyon Allotment includes all of Sullivan Canyon, the west portion of Black Rock Mountain, and some country lying east of Sullivan Canyon. Elevation ranges from 2,700 feet at the lower end of Sullivan Canyon to 7,375 feet on Black Rock Mountain. Topography of the area is generally rough. Sullivan Canyon drains north into the Virgin River. Steep-walled side canyons join Sullivan Canyon at various places. There are numerous natural barriers for livestock. Some side slopes are not grazeable by livestock because of their steepness.

Both allotments are categorized as "improve" (I) allotments, which means that one or more of the following exists:

a) Present range condition is unsatisfactory;
b) The allotments have high to moderate resource production potential and are producing at low to moderate levels;
c) Serious resource-use conflicts/controversy exists;
d) Opportunities exist for positive economic return from public investments;
e) Present management appears unsatisfactory.

B. Acreage

Blackrock Allotment

- 32,497 acres of Federal land
- 3,540 acres of state land
- 590 acres of private land

Sullivan Canyon Allotment

- 25,302 acres of Federal land
- 0 acres of state land
- 0 acres of private land

C. Objectives

1. Land Use Plan Objectives

Arizona Strip Field Office Resource Management Plan (RMP) and **Grand Canyon – Parashant National Monument Resource Management Plan**
(Text in **BOLD** type is the difference(s) in Grand Canyon-Parashant National Monument objectives from those in the Arizona Strip Field Office RMP)

Water

DFC-RP-06
All surface water will meet, or be improving towards, Arizona State water quality standards.

DFC-WS-03
Surface water availability at seeps and springs will be appropriate for the soil type, climate, and landform.

Watershed/Soil Stability

DFC-VM-03 and **DFC-VM-04**
Vegetative communities will provide sufficient plant cover and litter accumulation to protect soils from wind and water erosion and enhance nutrient cycling and productivity, even during drought years.

DFC-WS-06
The natural hydrologic functions of all watersheds will be intact.

DFC-WS-07
Soils will exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform.

DFC-WS-08
Physical soil crusts will show an increase in organic cover including cryptobiotic colonies, moving them towards being organic crusts.

Ecological Processes

DFC-VM-04 and **DFC-VM-05**
Ecological processes and functions will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Standards for Rangeland Health.

DFC-RP-02
Riparian areas will be protected, enhanced, and/or restored by allowing tools that

are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Arizona Standards for Rangeland Health.

DFC-RP-03
Ecological functions and processes will be intact with vegetative species composition and cover appropriate to the site.

DFC-WS-04
Ecological functions and processes will be intact at all seeps and springs.

DFC-WF-01
Ecological conditions will be within the range of natural variability and will be functional for dependant animal species.

DFC-WF-11 and **DFC-WF-12**
The natural biological diversity of fish, wildlife, and plant species will be maintained or, where necessary and feasible, restored throughout the Arizona Strip FO **(Monument)**. Habitats will be managed on an ecosystem basis, ensuring that all parts of the ecosystem and natural processes are functional.

Invasive Plants

DFC-VM-05 and **DFC-VM-06**
Invasive plant species will be contained, controlled, or eliminated and native species restored to meet desired plant community (DPC) objectives.

DFC-VM-38
Management of Mohave-Great Basin Transition Ecological Zone plant communities will focus on removing invasive non-native plants, especially cheatgrass, Sahara mustard, and red brome, and preventing habitat degradation due to wildfire.

DFC-RP-11
Invasive plants and animals such as tamarisk, Russian olive, and brown-headed cowbird will be reduced or eliminated.

No Net Loss

DFC-VM-28 and **DFC-VM-32**
There will be no net loss of acres of Mohave Desert plant communities (i.e., long-term or permanent removal from the landscape). A no net loss objective will not preclude restoration, rehabilitation, or related management actions.

DFC-VM-42
There will be no net loss of acres of Interior Chaparral plant communities (i.e., long-term or permanent removal from the landscape). A no net loss

objective will not preclude restoration, rehabilitation, or related management actions.

Livestock Grazing

DFC-GM-02
Livestock use and associated management practices will be conducted in a manner consistent with other resource needs and objectives to ensure that the health of rangeland resources is preserved or improved so that they are productive for all rangeland values. Where needed, public rangeland ecosystems will be improved to meet objectives.

DFC-GM-04
Monument values will be maintained, protected, and improved.

Desired Plant Communities

DFC-GM-01
Healthy, sustainable rangeland ecosystems will be maintained or improved to meet Arizona's Standards for Rangeland Health, and produce a wide range of public values such as wildlife habitat, livestock forage, recreation opportunities, clean water, and functional watersheds.

DFC-VM-02 and **DFC-VM-03**
Native vegetative communities will be protected. A mosaic of native perennial and non-invasive annual vegetative communities will be present across the landscape with diversity of species, canopy, density, and age class reflecting its local ecological site potential and naturally occurring habitat conditions.

DFC-VM-21 and **DFC-VM-25**
Healthy, diverse woodland communities will consist of a mosaic of trees, shrubs, grasses, and forbs. Mosaic patches can include stands of young and old pinyon-juniper, openings, wet meadows, seeps, and other interspersed shrub habitats. The communities will be composed of a variety of different height structures and age classes, with a thriving understory community of native grasses, forbs, and shrubs.

DFC-VM-24 and **DFC-VM-28**
Stands of pinyon-juniper will include a balance between tree, shrub, and perennial grass cover to support pinyon jay and mule deer. This mosaic will include stands of old growth pinyon-juniper to support juniper titmouse; large openings of grasses, forbs and shrubs to support mule deer and provide foraging habitat for raptors such as sharp-shinned hawk, northern goshawk, Coopers hawk, American kestrel, and red-tailed hawk; and areas of sparse to dense tree canopy cover to support pinyon jay.

DFC-VM-26
Endemic plant species and associated communities such as creosote bush, Joshua tree, Mojave yucca and cacti, will be present along with other shrubs, grasses, and wildflowers. These communities can include stands of young and old shrubs, sparse vegetation, scattered to larger expanses of creosote bush or Joshua trees, seeps, healthy streamside vegetation, and other interspersed grassland and shrub habitats.

DFC-RP-01
Riparian areas will consist of a diversity of vertical and horizontal structures, vegetative age classes, and endemic species.

DFC-WF-16
Mule deer habitat in pinyon-juniper woodland sites will include a healthy diverse mosaic of trees, shrubs, grasses, and forbs.

DFC-VM-39
The Interior Chaparral Ecological Zone will consist of diverse populations of endemic vegetative species, particularly shrubs, and a mosaic of age class distributions of these species (see Map 2.3).

DFC-VM-40
Endemic plant species and associated communities such as manzanita, silk tassel, and live oak will be present, along with other shrubs, grasses, and forbs.

Riparian Communities

DFC-RP-05
All riparian areas will be in, or moving towards, proper functioning condition.

DFC-RP-08
Availability of surface water at seeps and springs will be appropriate for the soil type, climate, and landform and will support a diverse population of endemic plant and wildlife species.

DFC-TE-19 and **DFC-TE-15**
Essential habitats, important migration routes, required flows, and water quality will be protected and maintained in lentic and lotic systems in the Arizona Strip FO **(Monument)**.

Wildlife Habitat

DFC-VM-27 and **DFC-VM-31**
Endemic animal species such as desert tortoise and chuckwalla will be present and thriving with more than adequate food, water, and cover resources.

DFC-WF-02
Native wildlife communities will be protected. A complete range of diverse, healthy, and self-sustaining populations of native animal species will occupy all available suitable habitats.

DFC-VM-41
Endemic animal species such as black-chinned sparrow and mule deer will be present and thriving with more than adequate food, water, and cover resources.

Habitat Connectivity

DFC-WF-06
Habitat connectivity and wildlife movement between ecological zones will be maintained.

Wildlife Forage Needs

DFC-WF-14 and **DFC-WF-15**
Forage in crucial summer mule deer habitat will include at least 10% grasses and forbs composition by weight (CBW) and at least 30% palatable browse species CBW at all key areas, where consistent with site potential.

DFC-WF-15 and **DFC-WF-16**
Forage in crucial winter mule deer habitat will include at least 30% palatable browse species CBW at all key areas, where consistent with site potential.

DFC-WF-29 and **DFC-WF-30**
Forage in desert bighorn sheep habitat areas will include at least 20% grasses, 20% forbs, and 20% palatable shrub species CBW, where consistent with site potential.

DFC-WF-41 and **DFC-WF-42**
Forage composition in turkey habitat will include at least 20% grasses and forbs, and 20% mast-producing species at all key areas CBW, where consistent with site potential.

Fences

DFC-WF-05
Fences will be the minimum necessary for effective livestock control or other administrative purposes. Fences will be wildlife passable, consistent with the species found in the area.

DFC-WF-19 and **DFC-WF-20**
All fences in mule deer habitat will be deer passable.

Healthy Wildlife Populations

DFC-WF-03
Forage, water, cover, and space will be available to wildlife of sufficient quantity and quality to support productive and diverse wildlife populations.

DFC-WF-12 and **DFC-WF-13**
Mule deer habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-27 and **DFC-WF-28**
Desert bighorn habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-34 and **DFC-WF-35**
Desert cottontail habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-36 and **DFC-WF-37**
Migratory bird habitats will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-39 and **DFC-WF-40**
Merriam's turkey habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-44 and **DFC-WF-45**
Carnivore habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

Wildlife Population Numbers

DFC-WF-13 and **DFC-WF-14**
Mule deer populations will be at or near maximum levels sustainable for the habitat.

DFC-WF-28 and **DFC-WF-29**
Desert bighorn sheep populations will be at or near maximum levels sustainable for the habitat.

DFC-WF-35 and **DFC-WF-36**
Desert cottontail rabbits will be present in sufficient quantity to provide an adequate prey base for raptors, carnivores, and other predatory species, as well as ample recreational opportunities for hunting and wildlife viewing.

DFC-WF-37 and **DFC-WF-38**
Migratory birds that nest in the Arizona Strip FO **(Monument)** will have resources of sufficient quantity and quality to provide for nesting sites and to fledge young successfully.

Wildlife Waters

DFC-WF-04
All waters will be safely accessible to wildlife.

DFC-WF-17 and **DFC-WF-18**
Water sources within mule deer habitat will be safely accessible to deer and other wildlife.

DFC-WF-18 and **DFC-WF-19**
Water sources within mule deer habitat will be spaced no more than 3 miles apart.

DFC-WF-30 and **DFC-WF-31**
Water sources within bighorn sheep habitat areas will be safely accessible to bighorn and other wildlife.

DFC-WF-31 and **DFC-WF-32**
Water sources within bighorn sheep habitat will be spaced no more than 4 miles apart.

DFC-WF-42 and **DFC-WF-43**
Water sources within game bird habitats will be safely accessible by all wildlife.

DFC-WF-43 and **DFC-WF-44**
Water sources within Merriam's turkey habitat will be spaced no more than 3 miles apart.

DFC-RP-09
A sufficient quantity of water with safe access for wildlife will be available, where appropriate.

Threatened and Endangered Species Habitat

DFC-TE-03
The Arizona Strip **(Monument)** will provide a block of remote, contiguous habitat that will serve as refugia for populations of special status species.

DFC-TE-25 and **DFC-TE-21**
Habitat areas for special status raptors will provide sufficient forage and cover attributes to support thriving populations of the species.

DFC-TE-27 and **DFC-TE-23**
Potential roosting and nesting sites (for special status raptors) will be abundant.

Healthy Special Status Species Populations

DFC-TE-24 and **DFC-TE-20**
Special status raptor populations will be healthy and self-sustaining throughout their range.

DFC-TE-29 and **DFC-TE-25**
Rodent populations, as a prey base (for special status raptors), within the Arizona Strip FO/**Monument** will be abundant.

No Net Loss of Threatened and Endangered Species Habitat

DFC-TE-04 and **DFC-TE-08**
There will be no net loss in the quality or quantity of special status species habitat throughout the Arizona Strip FO/**Monument**.

DFC-TE-20 and **DFC-TE-16**
No net loss will occur in the quality and quantity of suitable habitat for endemic amphibians and aquatic invertebrate species within the Arizona Strip FO/ **Monument**.

DFC-TE-26 and **DFC-TE-22**
No net loss will occur in the quality and quantity of suitable habitat for special status raptors within the Arizona Strip FO/**Monument**.

DFC-TE-33 and **DFC-TE-29**
No net loss will occur in the quality and quantity of suitable habitat for riparian-dependent special status bird species within the Arizona Strip FO/**Monument**.

Condors

DFC-TE-31 and **DFC-TE-27**
The experimental non-essential population of California condor will be at or above 150 individuals, viable, and stable to increasing in number.

Aquatic Habitat

DFC-TE-21 and **DFC-TE-17**
All biologically suitable perennial waters on public lands in the Arizona Strip FO **(Monument)** will be occupied by thriving, self-sustaining populations of native,

endemic amphibians and aquatic invertebrate species, as appropriate.

Recreation and Visitor Services

DFC-RR-01

Recreation and visitor services will be managed to provide varying levels of both:

1. Structured recreation opportunities that offer a range of specific benefits, activities, and experiences within outdoor settings and/or,
2. Dispersed, unstructured recreation opportunities that focus only on visitor health and safety, user conflict, and resource protection issues (extensive recreation management areas (ERMAs).

DFC-RR-01

Recreation and visitor services will be managed to provide varying levels of structured recreation opportunities that offer a range of specific benefits, activities, and experiences within outdoor settings (Special Recreation Management Areas [SRMAs].

DFC-RR-04

The excellent opportunities that exist to enjoy remote, rustic settings that provide moderate challenge and solitude in the Specialized travel management areas (TMAs) will be maintained/enhanced.

DFC-RR-05

In Backways and Specialized TMAs, recreation opportunities associated with somewhat remote settings, such as exploring backcountry roads, vehicle camping, hunting, sightseeing, recreation aviation, and picnicking will be maintained/enhanced on existing roads, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

DFC-RR-06 and **DFC-RR-07**

In the Primitive TMA, high quality recreation opportunities associated more with primitive recreation experience opportunities and non-motorized uses such as camping, sightseeing, hiking, horseback riding, and hunting, will be maintained/enhanced, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

Wilderness

DFC-WM-01

The first and dominant goal will be to provide for the long-term protection and preservation of the areas' wilderness character under a principle of non-degradation. The areas' natural condition, opportunities for solitude, opportunities for primitive and unconfined types of recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical value present will be managed so that they remain unimpaired.

DFC-WM-06
BLM wilderness areas will be managed to be ecologically sustainable and resilient to natural and human-caused perturbations (See Vegetation Management and Fire Management decisions). The BLM will strive to preserve or restore the natural quiet and natural sounds associated with the physical and biological resources of designated wilderness.

Wild and Scenic Rivers

DFC-WR-02
Until Congress acts to designate or release from further consideration rivers determined to be eligible and suitable through the previous RMP process and the subsequent Arizona Statewide W&SR Legislative EIS, the following desired conditions will be maintained:

- Preservation of the stream's free-flowing nature.
- Preservation, protection, and, to the greatest extent practicable, enhancement of identified outstandingly remarkable values.
- Virgin River: scenic, geologic, aquatic, and riparian values
- Preservation of characteristics that establish the potential classifications as Wild, Scenic, or Recreational:
- Wild: free of impoundments, generally inaccessible except by trail, with shorelines essentially primitive and waters unpolluted.
- Scenic: free of impoundments and generally inaccessible except by trail. However, shoreline disturbance from highway construction is apparent at several points.
- Recreational: several access points and noticeable human developments.

Areas of Critical Environmental Concern

DFC-AC-01
ACECs will provide protection for special status plant and animal species, scenic values, riparian values, and significant cultural resources.

Visual Resources

DFC-VR-01
Public lands will be managed in a manner which will protect the quality of the scenic (visual) values of these lands. (43 U.S. Code [USC] 1701, Section 102 (a) (8)).

DFC-VR-03
The region's scenic beauty, open space landscapes, and other high-quality visual resources will be maintained within the Arizona Strip FO.

2. Specific Resource Objectives

Arizona Strip Desert Bighorn Sheep Management Plan, as amended (July 2006)

BS1 Enhance and maintain forage, water, and cover conditions on 720 square miles of bighorn sheep habitat so that watersheds are in proper functioning condition, ecological processes are maintained, water quality standards are met, and threatened and endangered species habitat is conserved. Manage this habitat to support an average density of no more than four sheep per square mile within each habitat area by the year 2010.

BS2 Increase populations of desert bighorn sheep to fully occupy 720 square miles of suitable habitat on the Arizona Strip at an average density of no more than four bighorn per square mile by the year 2010. Maximum populations for the four desert bighorn habitat areas would be 886 for the Virgin and Beaver Dam Mountains, 700 for the Grand Wash Cliffs, 820 for Kanab Creek, and 432 for the Paria-Vermilion Cliffs area. The maximum population for the Arizona Strip would be 2880 desert bighorn.

Allotment Management Plans[2]

Black Rock Allotment

1. Summer-Fall System

    a. Increase cool season grasses in the Black Rock Tank, Low Mountain and Maple Pastures from 5% to 20% composition and maintain vigorous browse conditions.

    b. Increase and/or maintain cool season grasses in seeded areas to 40% composition.

2. Winter-Spring System

    a. Increase Indian ricegrass, sand dropseed and galleta grass from the present trace (5%) to 20% composition.

    b. Increase vegetative cover of desirable perennial forage from 10% to 25% on specific areas that lack cover or are dominated by annual vegetation. Such areas are found in Lizard Pasture No. 1 and the northern portion of Lizard No. 2.

    c. Increase the composition of winterfat, hopsage and ephedra to 35% on all suitable areas. Several areas on the allotment now support 35% showing a potential for other areas supporting only traces.

[2] Frequency objectives found in the allotment management plans are presented and analyzed in this assessment. They will be replaced by the Desired Plant Community objectives developed for this and future assessments.

3. Fall-Winter System

a. Increase perennial grasses from the present trace to 15% of the vegetative composition.
b. Increase vigor of existing forage species by confining grazing to a designated beneficial season of use[3].

All composition percentages were derived from the 1974 vegetative survey and can be compared proportionally with established trend plots to monitor any changes.

c. Overall Objectives (Cooperator)

1) Provide sufficient livestock forage during breeding and calving periods to obtain at least a 90% calf crop.
2) Annually produce 1,680 AUMs of forage on a sustained yield basis.

Sullivan Canyon Allotment

1. Winter

a. Improve the vigor and forage production of shrubs such as Mormon tea, blackbrush and bursage, and increase composition of Mormon tea from 5% to 10%.

b. Produce enough winter forage to carry 125 cows for 52 months or 688 AUMs.

2. Intermediate

a. In Pasture #4 increase composition of native grasses from 10% to 15%.

b. Maintain present grass composition in seeded areas at 60%.

c. Improve vigor of browse plants in upper Sullivan Canyon by limiting utilization to 30% of current year's growth.

d. Produce sufficient forage for 125 cows for 2 months or 250 AUMs.

3. Summer

a. Maintain 60% grass composition of seeded areas by keeping grasses vigorous enough to out-compete invading sagebrush.

[3] A "beneficial season" occurs when a pasture is rested from grazing during the spring and/or late summer rainy seasons to allow forage species to grow and mature. Grazing near or after seed ripe is also beneficial.

b. Increase composition of native grasses from 10% to 20% in untreated areas.

c. Improve vigor and forage production of Gambel oak.

d. Produce enough forage to carry 125 cows 42 months or 562 AUMs.

Desired Plant Community (DPC) Objectives

DPC is one of the several plant community types that may occupy an ecological site, the one or combination that meets the minimum quality criteria for the soil, water, air, plant, and animal resources, and that meets the resource objectives established for that ecological site. The DPCs must be consistent with the site's capability to produce the desired vegetation through management, land treatment, or combination of the two. The objectives listed below were developed during this evaluation process by an interdisciplinary team of resource specialists by consulting the Natural Resource Conservation Service's ecological site guides, and considering site specific information of the potential of the site to produce vegetation. The site guide used is Soil Survey of Shivwits Area, Arizona Part of Mohave County, USDA-Natural Resource Conservation Service,2004. DPC objectives include species Composition by Weight (CBW) and percent basal vegetative cover, and will replace the AMP vegetation frequency objectives since it is believed these are a better indicator of movement toward the desired vegetative communities. The IAT determined that these DPC objectives are attainable under current management. DPC objectives, when obtained, will assure rangeland health, forage on a sustained yield basis, and habitat for wildlife species. The species listed below reflect plant species to be monitored to measure success of management actions.

Black Rock Allotment

The following objectives are to occur during or by the end of a 20 year period from the time of permit renewal. A broader spectrum of species is included than contained within the old AMPs; the species listed below are valuable as forage for wildlife and livestock, and are important for watershed protection. These species are monitored for trend; those noted with an asterisk (*) are key species which are also monitored for utilization.

Key Area: Lizard #1

Rangesite: Loamy Wash, Gypsic (6 to 9 inch p.z.*)

*p.z. = precipitation zone

- Maintain big galleta* between 15 and 20 percent composition by weight
- Maintain sand dropseed between 7 and 15 percent composition by weight
- Maintain fourwing saltbush* between 2 and 5 percent composition by weight
- Maintain winterfat* between 1 and 2 percent composition by weight
- Maintain Mormon tea* between 1 and 2 percent composition by weight
- Maintain creosote between 25 and 35 percent composition by weight
- Maintain wolfberry between 1 and 5 percent composition by weight

Key Area: Lizard #2

Rangesite: Loamy Wash, Gypsic (6 to 9 inch p.z.)

- Maintain big galleta between 15 and 20 percent composition by weight
- Maintain sand dropseed between 7 and 14 percent composition by weight
- Maintain winterfat between 1 and 2 percent composition by weight
- Maintain Mormon tea* between 1 and 2 percent composition by weight
- Maintain wolfberry between 1 and 5 percent composition by weight

Key Area: Black Rock Tank

Rangesite: Shallow Loamy (10 to 14 inch p.z.)

- Maintain galleta* between 1 and 5 percent composition by weight
- Maintain squirreltail between 5 and 10 percent composition by weight
- Maintain Indian ricegrass* between 5 and 10 percent composition by weight
- Maintain wheatgrass* between 3 and 5 percent composition by weight
- Maintain globemallow at 1 percent composition by weight
- Maintain viguiera and other perennial forbs between 1 and 5 percent composition by weight
- Maintain barberry between 1 and 2 percent composition by weight
- Maintain sagebrush between 15 and 25 percent composition by weight
- Maintain cliffrose* between 5 and 10 percent composition by weight
- Maintain juniper between 1 and 5 percent composition by weight

Key Area: Winter Road A

Rangesite: Shallow Upland (10 to 14 inch p.z.)

- Maintain squirreltail between 5 and 10 percent composition by weight
- Maintain Apache plume between 5 and 10 percent composition by weight
- Maintain Mormon tea* between 4 and 10 percent composition by weight
- Maintain sagebrush between 5 and 10 percent composition by weight
- Maintain cliffrose* between 5 and 10 percent composition by weight
- Maintain pinyon between 1 and 5 percent composition by weight
- Maintain juniper between 1 and 5 percent composition by weight

Key Area: Low Mountain #5
Rangesite: Clay Loamy Upland Gravelly (13 to 17 inch p.z.)

- Maintain squirreltail at 2 percent composition by weight
- Maintain seeded grass between 50 and 75 percent composition by weight
- Maintain globemallow between 1-5 percent composition by weight
- Maintain serviceberry* between 5 and 10 percent composition by weight
- Maintain sagebrush between 15 and 20 percent composition by weight
- Maintain cliffrose* between 1 and 5 percent composition by weight
- Maintain pinyon between 5 and 10 percent composition by weight
- Maintain juniper between 8 and 10 percent composition by weight

Key Area: Black Rock #4
Rangesite: Basalt Upland (17 to 25 inch p.z.)

- Maintain squirreltail between 5 and 10 percent composition by weight
- Maintain muttongrass* between 1 and 5 percent composition by weight
- Maintain sand dropseed between 1 and 2 percent composition by weight
- Maintain seeded grass between 50 and 70 percent composition by weight
- Maintain serviceberry* at 5 percent composition by weight
- Maintain black/big sage between 15 and 20 percent composition by weight
- Maintain pinyon between 2 and 10 percent composition by weight

Key Area: Maple #14
Rangesite: Basalt Slopes (13 to 17 inch p.z.)

- Maintain squirreltail at 1 percent composition by weight
- Maintain buckwheat at 2 percent composition by weight
- Maintain serviceberry* between 1 and 3 percent composition by weight
- Maintain sagebrush between 1 and 5 percent composition by weight
- Maintain cliffrose* between 1 and 2 percent composition by weight
- Maintain bitterbrush* between 5 and 10 percent composition by weight
- Maintain buckbrush between 5 and 10 percent composition by weight
- Maintain mountain mahogany* between 5 and 10 percent composition by weight
- Maintain silk tassel and manzanita between 20 and 25 percent composition by weight
- Maintain oak between 20 and 30 percent composition by weight
- Maintain pinyon/juniper at 5 percent composition by weight

Sullivan Canyon Allotment

Key Area: Mountain Sheep #2
Rangesite: Clay Loamy Upland Gravelly (13 to 17 inch p.z.)

- Maintain big galleta* between 2 and 10 percent composition by weight
- Maintain banana yucca between 5 and 10 percent composition by weight
- Decrease blackbrush to between 55 and 60 percent composition by weight
- Maintain Mormon tea* between 5 and 10 percent composition by weight
- Maintain winterfat* between 1 and 10 percent composition by weight

Key Area: New #4
Rangesite: Clay Loamy Upland Gravelly (13 to 17 inch p.z.)

- Maintain squirreltail between 5 and 20 percent composition by weight
- Maintain muttongrass* between 5 and 20 percent composition by weight
- Maintain crested wheatgrass* between 10 and 30 percent composition by weight
- Maintain intermediate wheatgrass* between 5 and 15 percent composition by weight
- Maintain Russian wildrye* between 2 and 5 percent composition by weight
- Maintain perennial forbs at 5 percent composition by weight
- Maintain cliffrose* between 6 and 10 percent composition by weight
- Maintain black sage between 15 and 20 percent composition by weight
- Maintain pinyon between 5 and 100 percent composition by weight
- Maintain juniper between 5 and 10 percent composition by weight
- Maintain serviceberry* between 1-10%.

Key Area: Upper Sullivan #5
Rangesite: Basalt Slopes (13 to 17 inch p.z.)

- Maintain squirreltail between 2 and 5 percent composition by weight
- Maintain muttongrass* between 2 and 5 percent composition by weight
- Maintain perennial forbs at 8 percent composition by weight
- Maintain serviceberry* at 3 percent composition by weight
- Maintain manzanita between 1 and 10 percent composition by weight
- Maintain desert holly between 1 and 3 percent composition by weight
- Maintain sagebrush between 5 and 10 percent composition by weight
- Maintain gooseberry between 1 and 2 percent composition by weight
- Maintain sumac between 1 and 3 percent composition by weight
- Maintain locust between 5 and 10 percent composition by weight
- Maintain oak between 3 and 10 percent composition by weight
- Maintain pinyon at 3 percent composition by weight
- Maintain juniper at 5 percent composition by weight

Key Area: Black Rock Neck East #6
Rangesite: Shallow Loamy (10 to 14 inch p.z.)

- Maintain squirreltail between 5 and 10 percent composition by weight
- Maintain three-awn at 1 percent composition by weight
- Maintain perennial forbs at 5 percent composition by weight
- Maintain cliffrose* between 5 and 20 percent composition by weight
- Maintain sagebrush between 13 and 25 percent composition by weight
- Maintain juniper between 3 and 5 percent composition by weight

Key Area: Twin Pine #8
Rangesite: Basalt Upland (17 to 25 inch p.z.)

- Maintain crested wheatgrass* between 10 and 15 percent composition by weight
- Maintain intermediate wheatgrass* between 40 and 60 percent composition by weight
- Maintain perennial forbs between 5 and 10 percent composition by weight
- Maintain snowberry between 1 and 5 percent composition by weight
- Maintain serviceberry* between 2 and 5 percent composition by weight
- Maintain sagebrush between 15 and 20 percent composition by weight
- Maintain oak between 5 and 10 percent composition by weight

Key Area: Trails End #1
Rangesite: Basalt Upland (17 to 25 inch p.z.)

- Maintain crested wheatgrass* between 10 and 15 percent composition by weight
- Maintain intermediate wheatgrass* between 25 and 40 percent composition by weight
- Maintain muttongrass* between 3 and 5 percent composition by weight
- Maintain squirreltail between 5 and 10 percent composition by weight
- Maintain perennial forbs between 2and 4 percent composition by weight
- Maintain black sage between 15 and 20 percent composition by weight

Key Area: Black Rock Neck West
Rangesite: Basalt Upland (17 to 25 inch p.z.)

- Maintain junegrass between 1 and 10 percent composition by weight
- Maintain squirreltail between 6 and 10 percent composition by weight
- Maintain muttongrass between 4 and 10 percent composition by weight
- Maintain crested wheatgrass* between 5 and 25 percent comp. by weight
- Maintain intermediate wheatgrass* between 1 and 10 percent comp. by weight
- Maintain perennial forbs between 5 and 10 percent composition by weight
- Maintain black sage between 15 and 20 percent composition by weight
- Maintain locust between 1 and 5 percent composition by weight
- Maintain oak between 1 and 5 percent composition by weight
- Maintain juniper between 5 and 10 percent composition by weight

Rationale: The above DPCs are drawn from the vegetation currently present in the key areas, the site guides (which state what vegetation could be present), and from team suggestions. The DPCs are in large part the same as the site guide, but there are exceptions. These exceptions occur in the higher elevation key areas on Low Mountain, Black Rock, Black Rock Neck, Twin Pines, Trails End and New Pastures where land treatments with seedings of grass still exist and are present in healthy quantities. The team members want to continue to maintain these seedings with the grazing systems present as they have been since the 1960s, so the seedings remain in the DPC for those pastures. The seedings provide early spring feed for deer and summer feed for livestock and deer. The above vegetation provides good wildlife habitat components and ground cover. The areas outside of the seedings have the DPCs written to maintain or increase the plants to the suggested levels in the site guides. All the DPC objectives are set to meet RMP objectives.

D. Key Species

Management of the allotments is based on a selection of key species for each allotment. These species are selected for their similarity to other grasses and browse species that occur in the allotments. The definition of key species is: (1) Forage species of sufficient abundance and palatability to justify its use as an indicator to the *degree of use* of associated species. (2) Those species which must, because of their importance, be considered in the management program. The key species listed in the old AMPs did not represent the wide range of plant communities inherent in the allotments, as both allotments range from the Mojave Desert to Montane Forest. The site guides demonstrate the wide variety of important plants to wildlife, livestock, and watershed protection.

Key species for these allotments are: Mormon tea, winterfat, galleta grass, mountain mahogany, bitterbrush, cliffrose, serviceberry, crested/intermediate wheatgrass, Russian wildrye, muttongrass, slender wheatgrass, Indian ricegrass, beardless wheatgrass, and fourwing saltbush.

E. Grazing System

Both allotments are grazed under deferred rotation systems. A specific discussion of the grazing system for each allotment is included below.

Black Rock Allotment

The allotment management plan (AMP) for this allotment was developed in 1975 and revised in 1979. The Black Rock AMP employs three grazing systems to adequately manage livestock and facilitate other resource uses.

1. Summer-Fall System (June 7 through October 7)

   This system consists of a three-pasture rest rotation, making use of the Black Rock, Maple, and Low Mountain Pastures. One pasture is grazed from June 7

through August 6, the second is grazed from August 7 through October 7, and the third pasture is rested (thus, each pasture receives rest once every three years).

2. Fall-Winter System (October 8 through December 31)

   This system establishes a beneficial season of use (i.e., resting the pasture during growing seasons of forage; there is a spring growing and summer growing season) for the Winter Road Pasture and allows the operator to shift some use into the Black Rock Tank Pasture on alternate years (when not used in the spring).

3. Winter-Spring System (January 1 through June 6)

   This system provides alternate years of spring rest to the pastures involved. Lizard #1 and Lizard #2 are used during winter and early spring (January 1 through April 30) while Winter Road Pasture and Black Rock Tank Pasture are used to complete the spring period (May 1 through June 6).

Sullivan Canyon Allotment

An AMP for this allotment was written in 1973. Under this AMP there are three different grazing systems: one each for winter, intermediate, and summer range.

1. Winter System (December 1 through May 15)

   This system provides one spring's rest for each of the three pastures involved (Lower Sullivan Canyon, Mountain, and Lizard) every three years.

2. Intermediate System (May 16 through June 15 and November 1 through November 30)

   The New Pasture is grazed in the fall and Upper Sullivan Canyon Pasture is grazed in the spring each year.

3. Summer System (June 16 through October 31)

   This system provides one spring's rest for each of the three pastures involved (Black Rock Neck, Twin Pines, and Trail's End) every three years. For the two pastures that are grazed each year, one is grazed from June 16 through October 31 while the other is grazed from August 1 through October 31.

F. Other Uses

1. Special Status Species

Threatened and Endangered Species

The California condor (*Gymnogyps californiianus*) may either fly over or forage on carrion found within these allotments at any time of year. The condor is currently listed as endangered under the Endangered Species Act (ESA). A reintroduction program began on the BLM's Arizona Strip District in 1996. This reintroduced population has been designated experimental, non-essential, as defined under Section 10(j) of the ESA. They are a scavenger by nature and can fly hundreds of miles in their searches for carrion. They do not nest (or roost) in these allotments.

The Mexican spotted owl (*Strix occidentalis lucida*) was listed as threatened on April 15, 1993. This species is known to nest in Zion and Grand Canyon National Parks near Arizona Strip BLM lands. To date, no spotted owls have been found to nest on the Arizona Strip District, although a confirmed sighting of an owl occurred in 2007 just north of Colorado City.

BLM Sensitive Species, Wildlife Species of Concern, and Migratory Birds

Species listed as sensitive by the BLM typically consist of small and widely dispersed populations, inhabit ecological refugia or specialized or unique habitats, could become endangered or extirpated from the State or within a significant portion of its range; are under status review by the U.S. Fish and Wildlife Service (USFWS); or are State-listed, but may be better conserved through application of BLM sensitive species status. Arizona wildlife species of special concern are ones whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Arizona Game and Fish Department's (AGFD) listing of Wildlife of Special Concern in Arizona. Table 1 lists the sensitive animal species and State wildlife species of concern that may occur within the Black Rock and/or Sullivan Canyon Allotments.

Table 1. Sensitive Species and Wildlife Species of Concern that are Known to Occur or have the Potential to Occur* in the Allotments

Species	Black Rock	Sullivan Canyon	BLM Sensitive	Arizona Wildlife Species of Concern
Bald eagle (*Haliaeetus leucocephalus*)	potential	potential	no	endangered
American peregrine falcon (*Falco peregrinus*)	verified	potential	yes	yes
Northern goshawk (*Accipiter gentilis*)	potential	potential	no	yes
Spotted bat (*Euderma maculatum*)	verified	verified	yes	yes
Western small-footed myotis (*Myotis ciliolabrum*)	verified	verified	yes	no
Fringed myotis (*Myotis thysanodes*)	verified	verified	yes	no
Big free-tailed bat (*Nyctinomops macrotis*)	verified	verified	yes	yes
Small-footed myotis (*Myotis ciliolabrum*)	verified	verified	yes	no
Long-legged myotis (*Myotis volans*)	verified	verified	yes	no
Long-eared myotis (*Myotis evotis*)	verified	verified	yes	no

* "Potential to occur" means that suitable habitat exists, but species presence has not been verified.

Executive Order 13186 requires the BLM and other Federal agencies to work with the USFWS to provide protection for migratory birds. These species are protected by legislation and it is important to maintain habitat for these species so migratory patterns are not disrupted. All migratory birds are protected under the 1918 Migratory Bird Treaty Act (16 USC 703), which prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations (50 CFR Subchapter B). Additional protection is provided by the Neotropical Migratory Bird Conservation Act of 2000 (16 U.S.C. Chapter 80).

Bald and golden eagles are protected by the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). This law, enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" eagles, including their parts, nests, or eggs.

The peregrine falcon (delisted in 1999) may occasionally fly over the area. Northern goshawks are listed by the State of Arizona as a Wildlife Species of Concern. Goshawks have been proposed for federal listing under the ESA on a number of occasions but the listing has not been found to be warranted.

2. Other Wildlife Species

The Sullivan Canyon and Black Rock allotments lie within AGFD's Game Management Unit (GMU) 13B. Game species that are known from both allotments include desert bighorn sheep (*Ovis canadensis nelsoni*), mule deer (*Odocoileus hemionus*), and Merriam's turkey *(Meleagris gallopavo merriami)*. Pronghorn (*Antilocapra americana*) may be found in the northeast or southeast portions of the Black Rock Allotment.

Other wildlife species that may be present on these allotments include a variety of small mammals, birds, reptiles, some amphibians and invertebrates.

3. Recreation

General Management: The Sullivan Canyon and Black Rock allotments have outstanding recreation values for their geology, scenic viewsheds, remoteness, and solitude. General recreational activity consists of recreational OHV use, driving for pleasure, horseback riding, hiking, backpacking, camping, hunting, rock collecting, technical rock climbing, photography, bird watching and nature study. The area has become a destination point for large groups wanting to gather for family reunions or just to enjoy the outdoors.

The Black Rock Mountain Road is a popular area for family camping and picnicking. Undeveloped sites along the road have a long history of use. Picnic tables provided by the BLM have attracted more users to these areas. The area is a prime recreational location due to the presence of a ponderosa pine forest close to the St. George, Utah, and Mesquite, Nevada, population centers. Access is easy and views are superb.

Recreational Settings: The northern half of the Black Rock Allotment falls within the St. George Basin Special Recreation Management Area (SRMA), which is managed for quick, easy access from town to sustainable day-use adventure, challenge, exercise, and social outdoor recreation. Recreation activities include OHV driving, ATV and motorcycle riding, equestrian and hiking use, rock climbing, rock crawling, mountain biking, and competitive events. The southern half of the Black Rock Allotment is within the extensive recreation management area (ERMA) which is managed to maintain naturalness/remoteness qualities. ERMAs receive only custodial management regarding visitor health and safety, user conflict and resource protection issues, with no activity level planning. In the ERMA, regulation of visitor use will occur only when monitoring indicates a trend towards unacceptable change to desired recreational settings brought about by such use.

The allotments contain portions of all four Travel Management Areas (TMAs): Rural, Backways, Specialized, and Primitive. TMAs describe areas delineated for varying types of access. The Rural TMA provides for the widest variety of motorized, non-motorized, and mechanical travel modes to serve existing and

future recreational, traditional, casual, commercial, educational, and private needs adjacent to communities, but not to the detriment or exclusion of the protection of resources. The Backways and Specialized TMAs provide for a variety of motorized, non-motorized, and mechanical travel modes to serve existing and future recreational, traditional, casual, commercial, and private needs in remote, rustic settings, also not to the detriment or exclusion of the protection of resources. They are characterized by low to moderate densities of improved roads and primitive roads. In the Primitive TMA, high quality recreation opportunities associated with more primitive recreation experience opportunities and non-motorized uses such as camping, sightseeing, hiking, horseback riding, and hunting, will be maintained/ enhanced, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

Off Highway Vehicle Management (OHV): The OHV area designation for these allotments is "limited to designated roads and trails" except in the wilderness, which is closed to OHV use.

Areas of Critical Environmental Concern (ACEC): The Virgin River defines part (about ½ mile) of the northern boundary of the Sullivan Canyon Allotment. This portion of the river is within the Virgin River ACEC, which was designated to protect cultural resources, endangered fish in the Virgin River, riparian and scenic values.

Trails: No developed recreational or historic trails exist on these allotments. The Jedediah Smith Trail of 1826-7 through the Virgin River Gorge falls on the northern edge of the Sullivan Canyon Allotment. No physical remnants of this historic passage have yet been found.

Visual Resource Management (VRM): Most of the Sullivan Canyon Allotment has been designated VRM Class I because it is within designated wilderness. A small portion of the allotment outside the wilderness along the central eastern edge of the allotment has been designated VRM Classes II and III. That portion of the Sullivan Canyon Allotment in the St. George Basin is almost entirely VRM Class II because of scenic qualities except for the area along the Navajo-McCullough Transmission Line which is designated VRM Class IV.

Approximately 25% of the Black Rock Allotment is designated VRM Class II for scenic qualities. The northern portion of the Black Rock Allotment, where the Navajo-McCullough transmission line and the gypsum mine are located, is designated VRM Class IV. The remainder of the allotment is designated VRM Class III.

The objectives for these VRM classes are:

Class I: The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the

characteristic landscape should be very low and must not attract attention.

Class II - The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III - The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV - The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Wild & Scenic Rivers: The Virgin River defines part of the northern boundary of the Sullivan Canyon Allotment. This segment of the Virgin River, classified as recreational, has been determined to be suitable for inclusion in the National Wild and Scenic Rivers System. There are no suitable wild and scenic river segments in the Black Rock Allotment.

Wilderness Characteristics: There are no areas managed to maintain wilderness characteristics in either allotment.

4. Wilderness

The extreme southwestern corner of the Black Rock Allotment is within the Paiute Wilderness. The Sullivan Canyon Allotment is almost entirely within this designated wilderness except for a small area on the east central side of the allotment. Recreation use overall is light in the Paiute Wilderness, and consists primarily of hunting (mule deer, mountain lion, and bighorn sheep), sightseeing, hiking, horseback riding, and backpacking.

F. Issues

1. Issues Relating to Rangeland Health

a. Lack of long term water available in crucial areas such as Lone Pine Reservoir. (The only water available is on private land, i.e. Larsen Tank.)

b. Water may not be available to wildlife/livestock at the spring in Sullivan Canyon at the following location: T. 40 N., R. 14 W. NW 1/4, Sec. 15 (primary wildlife concern is for bighorn).

c. Livestock concentration area where Sullivan Canyon meets the Virgin River is an eyesore.

d. Cattle intrusion into Sullivan Spring exclosure.

e. Old and new vegetative treatments (chainings/pushes) in areas such as the south end of Low Mountain need to be evaluated as to their value for wildlife/livestock.

2. Issues Not Relating to Rangeland Health and not discussed further in this document.

a. Increasing recreational use of the ponderosa pine type on the top of Black Rock Mountain is compromising cattle/livestock forage, and disturbing wildlife in this area. The area is critical to deer and turkeys, especially in the spring and summer.

IV. MANAGEMENT EVALUATION

A. Purpose of Evaluation

The purpose of this assessment is to determine if the existing soil, water, and vegetative resources are meeting, making progress toward meeting or are not meeting the Arizona Standards for Rangeland Health in these allotments. These resources are managed according to the Arizona Strip Field Office RMP, Grand Canyon-Parashant National Monument Management Plan, allotment management plans, and other activity plans, which identify terms and conditions for management of public lands within the Black Rock and Sullivan Canyon Allotments. If the current livestock grazing practices are determined to be causing non-attainment of standards then they will be modified to comply with the Guidelines for Grazing Administration. This assessment will also evaluate and update existing activity plan objectives to ensure multiple use objectives are tied to the indicators for rangeland health.

B. Summary of Studies Data

1. Actual Livestock Use

Year	AUMs on Blackrock	AUM's on Sullivan Canyon
86	1415	962
87	1049	940
88	1385	1049
89	1462	962
90	1406	943
91	1343	889
92	1363	961
93	1445	932
94	1329	950
95	1294	846
96	1426	959
97	1402	962
98	1463	962
99	1422	962
00	1463	962
01	1427	958
02	1460	1016
03	985	837
04	1089	814
05	1110	822
06	1326	851
07	1358	849
08	954	627
09	1466	769

2. Precipitation

Average annual precipitation at the Lizard rain gauge is 8.23 inches over the past 22 years. The Lizard rain gauge represents the Lizard 1&2 pastures of Black Rock Allotment. The high precipitation at this gauge was 13.09 inches in 1982-83 and the low was 2.13 inches in 1999-2000.

Average annual precipitation at the Blackrock Larson rain gauge is 21.79 inches over the past 27 years. This rain gauge represents the Black Rock and Low Mountain, and Maple Pastures of Black Rock. The high precipitation at this gauge was 34.39 inches in 1992-93 and the low was 7.5 inches in 2001-2002.

Average annual precipitation at the Blackrock Sullivan rain gauge is 20.66 inches over the past 27 years. This rain gauge represents the high pastures of Sullivan Canyon Allotment (i.e., Trails End, Twin Pine, Neck, New and Upper Sullivan). The high precipitation at this gauge was 32.04 inches in 1992-93 and the low was 7.13 inches in 2001-2002. Seasonal and yearly totals are included in Appendix C.

A Note on Drought and Vegetation

Over the last 10 years (1999 to 2008) the Lizard and Blackrock Larson rain gauges recorded nine years of below average precipitation (the range was from 35-91% of normal) and one year of above average precipitation (168% of normal). Research on drought and vegetation demonstrates that drought reduces vegetation volume and quantity. Weaver and Albertson in their book *Grasslands of the Great Plains* documented the results of their research during the drought of the 1930s. A paraphrase from page 97 of this book states that basal cover in ungrazed, moderately grazed and heavily grazed short grass ranges (where the cover in 1932 varied from 88 to 80 percent) were all reduced (due to drought) in a somewhat similar manner. The basal cover three years after the drought started (in 1935) was reduced to: 65% on ungrazed range, 48% on moderately grazed range, and 22% on heavily grazed range. In 1936, basal cover dropped to 58% (ungrazed), 7% (moderately grazed), and 3% (heavily grazed). By 1938, six years into the drought, basal cover was 31% (ungrazed), 22% (moderately grazed), and 13% (heavily grazed).

The drought ran from 1933 to 1939; as demonstrated above, basal cover during this drought was severely reduced, and remained so until normal rainfall returned in 1940. Then the basal cover returned to 80+ percent again. This demonstrates the effect of drought on reducing the volume of vegetation.

3. Utilization

Utilization is the proportion or degree of current year's forage production that is consumed or removed by animals (both livestock and wildlife). Estimates of utilization are made using the key species grazed class method, a procedure in which photo guides are used to estimate utilization. Utilization was read at the

key areas. Tables 2 and 3 below show the utilization data that has been compiled for this evaluation.

Table 2. Black Rock Allotment Utilization Data (% of Current Year's Growth)

Species	Lizard #1																	
	Year																	
	80	**81**	**82**	**83**	**84***	**84***	**85**	**86**	**87**	**88**	**90**	**91**	**92**	**93**	**06**	**07**	**08**	**09**
Winterfat	45	53	47	22	34	27	33	10	50	15	32	5	19	12	15	48	46	44
Fourwing	70		51													70		50
Mormon Tea	54		40	19	34			27	65	5	40	15	33	15			51	47
Galleta	25	42	50	20	28	22	24	18	38	5	28	16	18	12	3	21	23	35

Lizard #2															
	82	**83**	**84**	**86**	**87**	**88**	**89**	**91**	**92**	**93**	**95**	**06**	**07**	**08**	**09**
Galleta	25	37	46	46	42	21	39	42	39	47	40	42	60	48	52
Dropseed	13					4									
Mormon Tea	25	50	35	40	45	42	49	17	37	47	15	25	60	50	34
Fourwing	23		35								34	16	62		57
Winterfat				35	50	42	49	17	37	34	47	41	84	31	34
Indian Ricegrass					50	3	50	12	36	3	50				-

Winter Road #3											
	82	**84**	**86**	**87**	**88**	**89**	**90**	**92**	**93**	**07**	**09**
Squirreltail		45	7	16	24	16	20	8	30	50	16
Cliffrose	32	24	3	6	10	11	5	33	37	3	1
Tea	44	16	3	6		6	5	33	37	2	1
June grass			9	24			20	11	30	50	0
Galleta					31						0
Seeded grass					44						0

Black Rock Tank #4								
	81	**82**	**84**	**87**	**92**	**06**	**07**	**09**
Squirreltail	37		20	25	22	0	70	29
Ricegrass	47	52	12	25	39	0	70	46
Galleta	52	60		20	32	0		-
Cliffrose	44			3	12		40	48
Bitterbrush	70						70	-
Seeded grass			13			38		-

Low Mountain #5												
	86	**87**	**88**	**89**	**90**	**91**	**93**	**06***	**06***	**07***	**07***	**08**
Crested wheat	31	13	8	30	46	26	42	28	61	34	48	0
Squirreltail	32								70		15	0
Muttongrass	21								71			0
Bitterbrush	51				40							0
Cliffrose					40	6	37	48		65	49	0
Smooth brome											60	0

Black Rock #4														
	81	**83**	**84**	**86***	**86***	**88**	**89**	**90**	**91**	**92**	**06**	**07**	**08**	**09**
Crested/Intermediate	47	31	44	55	36	34	29	8	51	47	38	0	30	30
Muttongrass	64										18	0		-
Squirreltail	47											0	0	0
Smooth Brome											58	0	0	0

Maple									
	81	**82**	**86**	**89**	**90**	**93**	**01**	**07/08**	**09**
Muttongrass	53	26	49	10	22	30	23	0	0
Cliffrose	78	30	37		16	11	19	0	14
Mahogany	66	42	43					0	41
Squirreltail	35	22	49			30		0	-
Serviceberry									25
Bitterbush									35

* Two readings were done after two utilization periods.

Table 3. Sullivan Canyon Allotment Utilization Data (% of Current Year's Growth)

Species	**Mountain Sheep #2**						
	Year						
	80	**81**	**88**	**90**	**06**	**08**	
Mormon Tea	0	24		5	0	14	
Cliffrose	0	24	5	8	0	10	
4-Wing	0			5	0	-	
Junegrass		16	12		0	-	
Squirreltail			3	17	0	-	
Cliffrose						10	

New #4								
	Year							
	86	**87**	**88**	**89**	**90**	**92**	**06**	**08**
Seeded	33	5	17	36	22	44	23	39
Squirreltail	44							23
Cliffrose	46	7	15	24	33	17	0	9

Black Rock Neck East								
	82	**92**	**09**					
Sand dropseed	5	35	-					
Galleta	8	33	-					
Indian ricegrass	38	32	-					
Needlegrass	38	32	-					
Cliffrose	17	34	38					
Bitterbrush			56					
Squirreltail			0					

Twin Pine												
	84	**86***	**86***	**87**	**88**	**89**	**91**	**93**	**06**	**07**	**08**	**09**
Seeded grass	45	51	19	15	17	37	38	31	40	67	52	16
Squirreltail		53									70	0
Oak						25	29	8			0	0

Trails End #1									
	82	**86**	**87**	**89**	**92**	**95**	**06**	**08**	**09**
Seeded grass	42	31	11	34	45	20	41	30	29
Oak				18	32	6			0
Muttongrass							60	70	13

Black Rock Neck West												
	80	**86**	**88**	**89**	**90**	**91**	**92**	**93**	**95**	**06**	**07**	**08**
Seeded grass	48	33	26	28	14	28	48	31	7	37	70	44
Oak				13		34	26					
Cliffrose					20	34		38				
Squirreltail	41	10	6									20
Blue grama						24	10	11				
Muttongrass										65	40	54

* Two readings were done after two utilization periods.

Upper Sullivan Canyon utilization was read once and found to have too few forage species on which to read utilization. Sagebrush at this key area is totally dominant, along with oak and other non-palatable shrubs.

4. Trend

The trend of an area may be judged by noting changes in vegetation attributes such as species composition, density, cover, production, and frequency. Vegetation data is collected at different points in time on the same key area, and the results are then compared to detect change.

Trend monitoring was collected using the Pace-Frequency method, which measures the occurrence frequency of forage and non-forage vegetative species. This monitoring is conducted at five key areas over the AMP area. Cover data, which determines the percent of bare ground, litter, rock and live basal vegetation, is also collected. Ground cover is determined by dividing the total number of hits

for all categories except bare ground by the total number of hits (including bare ground) – see page 73 of TR 1734-4 (*Sampling Vegetation Attributes*). In addition, the occurrence frequency of all plant species is collected. The first readings established a baseline for comparison to all future readings. Trend is considered up when the species increases by 10+ points from the first reading to the last shown reading. The trend of a species is static if it shows a change of 0 to 10 or 0 to -10 from the first to the last reading. Down trend is a reading of more than -10 from the first reading.

Trend studies have been set up for all key areas. Tables 4 and 5 display the trend data for the allotments.

Table 4. Black Rock Allotment Trend Data

Species	Year Plots Were Read					Trend
	1983	1988	2006			
Lizard #1						
Indigo bush	0	0	0			Static
Creosote	17	19	25			Static
Mormon tea*	1	2	2			Static
Winterfat*	6	3	3			Static
Wolfberry	7	7	10			Static
Desert peach		.5	0			Static
4-Wing	0	1	2			Static
Hopsage*	1					Static
Ratany	1	1				Static
Horsebrush	1					Static
Galleta*	7	6	11			Static
Dropseed	.5		4			Static
Fluffgrass			2			Static
Mallow						Static
Lizard #2						
Species	**1981**	**1985**	**1988**	**1991**	**2005**	**Trend**
Snakeweed	15	25	22	20	9	Static
Horsebrush	9	4	0	1	1	Static
Mormon tea*	1	3	.5	1	3	Statuc
Yucca	2	1	0	0	0	Static
Galleta*	53	69	54	50	49	Static
Dropseed	2	2	2	1	2	Static
Blackgrama	3		.5	0	0	Static
Fluffgrass	3	4	3	1	11	Static
Burrograss	4	6	4	8	7	Static
Mallow	2	3	.5	0	1	Static
Bush muhly	1	2	2	3	0	Static
Winterfat*		1	.5	2	1	Static
4-wing		1	0	0	0	Static

Black Rock Tank Key Area 3&3A**						
Species	**1981**	**1984**	**1991**	**Key Area 3A New+**	**2006**	**Trend**
Snakeweed	9	9	5	Snakeweed	47	Static/No trend
Sagebrush	77	69	55	Rabbitbrush	7	Static/NT
Galleta*	7	9	10	Sagebrush	12	Static/NT
Indian ricegrass	9	17	4	Cliffrose*	4	Static/NT
Western wheatgrass	22	0	7	Squawbush	2	Down/NT
Squirreltail*	3	0	4	Holly	2	Static/NT
Penstemon	6		1	Juniper	2	StaticNT
Mallow	1	2	1	Buckwheat	1	Static/NT
Cactus		1		Squirreltail*	21	Static/NT
Horehound		1		Ricegrass	14	Static/NT
Crested wheatgrass*					1	No trend
Western wheatgrass					1	No trend
Needlegrass					1	No trend
Galleta*					.5	No trend
Mallow					5	"
Vigueria					14	"
Gaura					1	"
Aster					1	"
Commandra					2	"
Annuals					5	"
Winter Road A						
Species	**1983**	**1988**	**1991**	**2008**		**Trend**
Sagebrush	27	34	50	16		Down
Snakeweed	3	4	0	2		Static
Pinyon	3	2	.5	4		Static
Juniper	6	19	11	14		Static
Cliffrose*	6	7	11	8		Static
Cactus	t	1	4	4		Static
Tea*	t	3	5	2		Static
Apache Plume	4	2	4	1		Static
Squirreltail*	1	1	7	3		Static
Muttongrass*	1	t	2	0		Static
Sand dropseed	t	t	t	0		Static
Moss				22		Static

Low Mountain #5A						
	1983	**1986**		**2007**		**Trend**
Sagebrush	4	1		8		Static
Pinyon	t			2		Static
Juniper	t			3		Static
Bitterbrush*	t	t				Static
Cliffrose*	t	t		5		Static
Buckwheat	1	t		0		Static
Serviceberry	t			3		Static
Mtn Mahogany*	t	t		0		Static
Snakeweed	t			1		Static
Western/ Intermediate wheat	45	43		34		Down
Crested wheat*	20	43		50		Up
Squirreltail*	9	28		2		Static
Junegrass	t					Static
Smooth brome	t			8		Static
Muttongrass*	6	8				Static
Mallow	5	13		1		Static
Clover	3			t		Static
Penstemon	6			t		Static
Phlox	t	2		t		Static
Viguieria	1			t		Static
Aster	1			t		Static
annuals		5		t		Static
James buckwheat	t			1		Static
Cactus	t			1		Static

Black Rock #4						
Species	**1984**	**1988**	**2005**	**2008*** **		**Trend**
Sagebrush	41	38	72	30		Down
Serviceberry	t	1	5	1		Static
Oak	1	0		0		Static
Seeded grass	82	76	113+	77		Static
Muttongrass*	0		22	.5		Static
Sand drop	t	0	1	0		Static
Squirreltail*		3	3	0		Static
Mallow	3	1	4	12		Static
Snakeweed		2	1	0		Static
Lupines		3	6	0		Static
Hymenoxys		2	0	2		Static
Loco/peavine		1	1	0		Static
Pinyon			1	1		Static
Maple #14						
Species	**1984**	**1988**	**1991**	**2008**		**Trend**
Serviceberry	20	16	33	12.5		Static
Oak	16	4	17	.5		Down
Sage	20	17	36	25		Static
Cliffrose*	t	4	2	2.5		Static
Bitterbrush*	t	2	3	.5		Static
Buckbrush	4	8	4	1		Static
Juniper	9	11	11	12.5		Static
SilkTassel,etc	6	18	8	3		Static
Barberry	t	0	0	0		Static
Mahogany*	4	13	6	4.5		Static
Squirreltail*	3	12	2	0		Static
Junegrass	1	0	1	0		Static
Muttongrass*	4	0	20	6.5		Static
Sedges	T	0	4	0		Static
others	16	6	13			Static

t = trace (i.e., species present at key area, but no hits made at transect)

+ This number includes two different species; thus the value over 100%.

* Key Species from the old AMP.

** A new key area (3A) was established because the old key area was too close to water; in addition, sagebrush totally dominated the area and few other species were present. The new key area has a better variety of species (so is more representative of the site) and is ¾-mile from water. These trend readings are the baseline reading from which trend will be assessed.

*** Half of key area burned in 2007.

Table 5. Sulllivan Canyon Allotment Trend Data

Species	Year Plots Read			Trend
	2006			
Mountain Sheep Key Area # 2				
Blackbrush	69			Static
Tea*	5			Static
Yucca	4			Static
Shrubby Buckwheat	.5			Static
Winterfat*	.5			Static
Galleta*	.5			Static
Paint Brush	1			Static
New Key Area #4				
Species	**1982**	**1988**	**2005**	**Trend**
Snakeweed	43	61	45	Static
SageBrush	25	25	57	Up
Cliffrose*	2	7	9	Static
Pinyon			3	Static
Juniper			1	Static
Service berry	3	1	2	Static
Buckwheat	.5		2	Static
Wheatgrasses*	75	75	80	Static
Squirreltail*	15	14	11	Static
Mallow	11	1	1	Down
Penstemon	10	6	4	Static
Muttongrass*	0	0	20	Up
Rice grass	0	0	1	Static
Commandra	0	2	15	Static
Others			4	

Upper Sullivan #5					
Species	**1981**	**1988**	**1991**	**2005**	**Trend**
Sagebrush	81	92	79	35	Down
Oak	7	9	15	6	Static
Juniper	2	1	2	2	Static
Locust	1	1	0	1	Static
Squirreltail*	3	3	2	2	Static
Muttongrass*	1		0	1	Static
Pinyon		1	0	2	Static
Barberry			2	1	Static
Ash			2		Static
Rhus				2	No trend
Ribes				2	‘’
Commandra				1	‘’
Physalis				1	‘’
Lupinus				4	‘’
Daisy				5	‘’
Globemallow				1	‘’
Chenopodium				1	‘’

Black Rock Neck East #6				
Species	**1982**	**1988**	**2005**	**Trend**
Juniper	0	3	12	Up
Pinyon	0		0	Static
Snakeweed	78	56	35	Down
Cliffrose*	7	12	22	Up
Sage	7	5	16	Static
Cactus		2	4	Static
Turbinella		1	2	Static
Barberry	2	0	1	Static
Yerba Santa	7	7	2	Static
Three awn	5	5	1	Static
Squirreltail*	50	10	20	Down
Dropseed	3	0	0	Static
Crested*	7	.5	0	Static
Galleta*	1	.5	1	Static
Mallow	12	4	1	Down
Vigueria spp		8	42	Up
Apache Plume		3	0	Static

Twin Pine Key Area #8				
Species	**1983**	**1988**	**2005**	**Trend**
Oak	16	19	24	Static
Serviceberry	t	9	3	Static
Sage	13	7	30	Up
Snowberry	14	9	18	Static
Locust	t	0	0	
Wheatgrasses*	100	81	121	Up
Forbs			5	Static
Lupine	0	8	2	Static
Trails End Key Area #1				
Species	**1988**	**2005**		**Trend**
Oak	5			Static
Sagebrush	66	79		Up
Wheatgrasses*	88	101+		Up
Lupine	1			Static
Rabbitbrush	0	101+		Up
Muttongrass*	0	22		Up
Squirreltail*	0	18		Up
Phlox	0	7		Static
Penstemon	0	9		Static
Forbs	0	5		Static
Black Rock Neck West				
Species	**1981**	**1988**	**2005**	**Trend**
Oak	7	9	11	Static
Sagebrush	37	52	77	Up
Rabbitbrush	11	0	0	Down
Snakeweed	2	13	7	Static
Juniper	3	3	2	Static
Locust	.5	5	1	Static
Muttongrass*	10	11	22	Up
Wheatgrasses*	51	32	40	Down
Forbs	14	7	20	Static
Squirreltail*	0	12	20	Up
Dropseed	0	1		Static
Knotweeds	0		38	Up
Lupine	0		10	Up

+ This number includes two different species; thus the value over 100%.

The frequency trend shown in Tables 4 and 5 show mostly static trend between the first reading and last reading. The readings fluctuated over time; generally, the big increases occurred after a few years of wet weather and the decreases occurred with dry years. The large increase of some plants in 2005 readings were the result of wet weather (168% of average). However, the last ten years have been mostly on the dry side, when many plant species show a decrease in

frequency. Weather is the biggest influence on trend of all species. In studying the data, the non-forage plants (such as snakeweed or sagebrush) generally show the reducing effects of weather with the same magnitude as forage species. When both forage and non-forage species show similar trends, it probably means weather is the strongest impact agent. When a forage species shows down trend as opposed to an up trend for a non-forage species, it could be due to the forage species being used too heavily for a number of years.

5. Ecological Site Inventory

The "Dry Weight Rank" vegetative sampling method was used to measure composition, which is the proportion (percentage) of various plants in relation to the total at a particular area. This vegetation attribute is also used to describe ecological sites. An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. It is the product of all the environmental factors responsible for its development. Ecological sites have developed a characteristic kind and amount of vegetation. The natural plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in annual production (*Ecological Site Inventory,* BLM, 2001). While the natural plant community of a particular ecological site is recognized by characteristic *patterns* of species associations and community structure, the *specific species* present from one location to another may exhibit natural variability - the natural plant community is not a precise assemblage of species for which the proportions are the same from place to place, or even in the same place from year to year. Variability is the rule rather than the exception.

The distinctive plant communities associated with each ecological site (including the variability which frequently occurs) can be identified and described, and are called ecological site descriptions. These ecological site descriptions (or guides) are provided by the Natural Resource Conservation Service. The ecological site's potential for change in composition over time was considered along with other vegetation attributes to quantify desired plant community objectives for each key area. The potential composition is determined by the applicable soil type and precipitation zone. These potentials are described in Ecological Site Guides provided by the Natural Resources Conservation Service, and are used to set DPC objectives.

Ecological status is the present state of the vegetation at an ecological site in relation to the potential natural community (PNC). A PNC is "the biotic community that would become established if all successful sequences were completed without interferences by humans under the present environmental conditions". It may include "naturalized non-native species" (*Interpreting Indicators of Rangeland Health*, BLM, 2005 and *Ecological Site Inventory*, BLM, 2001). This differs from "historic climax plant community" in that an historic climax plant community is "the plant community that existed before European

immigration and settlement" (*Ecological Site Inventory*, BLM, 2001). The BLM uses "potential natural community" terminology rather than "historic climax plant community" because PNC recognizes past influences by man. It is an expression of the relative degree to which the kinds, proportions, and amount of plants in a plant community resemble that of the PNC for the site. It is a coefficient of community similarity, which gives an ecological rating of the plant community.

Ecological status expresses the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the potential natural plant community for the site. Ecological status changes slowly for most of the sites in this area; it is reported in the following four classes, or seral stages, which are the developmental stages of ecological succession (and corresponds to percent similar to the PNC):

- **Early Seral:** 0-25% of the expected potential natural community exists.
- **Mid Seral:** 26-50% of the expected potential natural community exists.
- **Late Seral:** 51-75% of the expected potential natural community exists.
- **PNC:** 76-100% of the expected potential natural community exists.

Table 6 displays ecological site inventory data for Black Rock Allotment; Table 7 displays ecological site inventory data for Sullivan Canyon Allotment.

Table 6. Black Rock Allotment Ecological Site Inventory Data

Key Area and Species	Current Composition (%)	Site Guide Allowable Composition (%)	Similarity to PNC	Ecological Status
Lizard #1	2005	Loamy Wash, Gypsic 6-9"	73	Late Seral
4-Wing	2	5	2	
Winterfat	2	2	2	
Mormon tea	2	0	0	
Ratany	9	2	2	
Creosote	38	35	35	
Wolfberry	13	5	5	
Big galleta	26	20	20	
Sand dropseed	7	15	7	

Lizard #2	2005	Loamy Wash, Gypsic 6-9"	30	Mid- Seral
Winterfat	2	2	2	
Mormon tea	6	0	0	
Snakeweed	6	0	0	
Wolfberry	8	5	5	
Cactus	4	1	1	
Big galleta	58	20	20	
Burro grass	5	0	0	
Sand dropseed	2	15	2	
Fluff grass	9	0	0	
Globemallow	1	0	0	
Black Rock Tank	2005	Shallow Loamy 10-14"	42	Mid-seral
Snakeweed	35	0	0	
Rabbitbrush	6	5	5	
Sage	19	25	19	
Cliffrose	1	5	1	
Sumac	6			
Barberry	2			
Juniper	2	5	2	
Squirreltail	9	5	5	
Ricegrass	6	5	5	
Wheatgrass	3	0		
Galleta	0	5		
Globemallow	1			
Viguiera	10	5 (Other Perennial Forbs)	5	
Winter Road A	2008	Shallow Upland 10-14"	24	Early-seral
Sage	25	5	5	
Snakeweed	7	0	0	
Pinyon	19	0	0	
Juniper	11	0	0	
Cliffrose	15	5	5	
Squirreltail	5	5	5	
Apache plume	5	5	5	
Mormon tea	4	10	4	

Low Mountain Key Area #5	2007	Clay Loam Upland Gravelly 13-17"	27	Early Seral
Sage	5	20	5	
Pinyon	5	10	5	
Juniper	8	10	8	
Cliffrose	1	2	1	
Serviceberry	1	10	1	
Seeded grass	76	5	5	
Squirreltail	2			
Globemallow	2	5	2	
Black Rock #4	2008	Basalt Upland 17-25" (PIPO)	25	Mid-seral
Serviceberry	0	5	0	
Black/big sage	32	15	15	
Pinyon	2	10	2	
Seeded grass	63	5 Other P. Grass	5	
Muttongrass	0	0	0	
Squirreltail	0	10	0	
Sand dropseed	0	0	0	
Others	3	5	3	
Maple #14	2008	Basalt Slopes 13-17"	22	Early seral
Serviceberry	3	3	3	
Oak	3	33	3	
Sage	30	5	5	
Cliffrose	2			
Bitterbrush	0			
Buckbrush	0			
Pinyon/juniper	8	8	8	
Mt. mahogany	2			
SilkTassel & Manzanita	3	25	3	
Squirreltail	0	1	0	
Buckwheat	2			
Commandra	0	2	0	

Table 7. Sullivan Canyon Allotment Ecological Site Inventory Data

Key Area and Species	Current Composition (%)	Site guide Allowable Composition (%)	Scimilarity to PNC	Ecological Status
Mountain Sheep #2	2006	Shallow Upland 10-14"	63	Late Seral
Blackbrush	91	55	55	
Mormon tea	3	5	3	
Banana yucca	4	5	4	
Shrubby Buckwheat		0		
Winterfat		0		
Big galleta	1	2	1	
Paintbrush				
New #4	2009	Clay Loam Upl 13-17	26	Mid Seral
Black sage	34	20	20	
Cliffrose	7	1	1	
Snakeweed	0	0	0	
Juniper	0	10		
Pinyon	2	10	2	
Serviceberry	3	10	3	
Crested wheat	34	0	0	
Intermediate wheat	10	0	0	
Wildrye	0	0	0	
Muttongrass	0	2	0	
Squirreltail	5	0	0	
Perennial forbs	5	0		

Upper Sullivan #5	2005	(80)Basalt Slopes 13-17"	21	Early Seral
Serviceberry	5	3	3	
Manzanita	1	10	1	
Sagebrush	61	5	5	
Desert holly	1	0	0	
Juniper	3	5	3	
Cactus	1	0	0	
Pinyon	3	3	3	
Oak	11	3	3	
Sumac	3	0	0	
Gooseberry	2	0	0	
Locust	1	5	1	
Muttongrass	1	2	1	
Squirreltail	1	1	1	
Perennial forbs	8			
Black Rock Neck East #6	2005	Shallow Loamy 10-14"	38	Mid Seral
Sage	13	25	13	
Berberis	2	2	2	
Cliffrose	21	5	5	
Yerba sSanta	1	1	1	
Snakeweed	17	2	2	
Juniper	15	5	5	
Cactus	2	0	0	
3-awn	1	0	0	
Squirreltail	6	5	5	
Perennial forbs	22	5	5	
Twin Pine #8	2005	Basalt Upland 17-25"	30	Mid Seral
Serviceberry	2	5	2	
Sage	17	15	15	
Oak	11	5	5	
Snowberry	5	0	0	
Crested wheat	8	0	0	
Intermediate wheat	56	5	5	
Perennial forbs	3	5	3	

Trails End	2005	Basalt Upland 17-25"	31	Mid Seral
Black sage	39	15	15	
Crested wheat	15	0	0	
Intermediate wheat	37	5	5	
Muttongrass	3	5	3	
Squirreltail	4	10	4	
Perennial forbs	4	5	4	
Black Rock Neck West	2005	Basalt Upland 17-25"	32	Mid Seral
Black sage	49	15	15	
Big sage	2			
Snakeweed	4	0	0	
Juniper		10	0	
Opuntia		0	0	
Oak	4	5	4	
Locust		0	0	
Crested wheat	22	0	0	
Intermediate	1	5	1	
Junegrass	1	10	1	
Muttongrass	4	0		
Squirreltail	6	10	6	
Perennial forbs	10	5	5	

Wildfire can affect vegetation. In 2007, portions of Black Rock Pasture, Maple Pasture, Black Rock Tank and Winter Road Pastures burned. The pastures with burned portions all were reduced to a lower score, to mid-seral. The Black Rock Pasture had its sagebrush reduced in the meadows which lowered the score to the mid-seral stage. The seeded perennial grass stayed static while sagebrush was reduced in weight and frequency, which lowered the area's ecological status. Only part of the Black Rock Key #4 key area burned, with only a small reduction of sagebrush, which allowed the seeded grasses to maintain high levels. The seeded grasses, while desirable for forage, are not considered a part of the site guide, thus having a high percent of seeded exotic grasses lowers the overall seral stage score also. The area of Maple Pasture that burned is covered with mountain shrubs that all resprout after a fire and thus were little affected from a seral stage standpoint. Their quantities or frequencies remained about the same.

6. Special Status Species

California condor: The California condor may either fly over or forage on carrion found within these allotments. The reintroduction of condors to northern Arizona began with the release of six captive-reared birds on the Vermilion Cliffs in 1996.

This population is designated as experimental non-essential under section 10(j) of the Endangered Species Act. As of August 2010, there were 73 condors in the wild in northern Arizona. The reintroduced population as a whole appears to be stable and is increasing. The reintroduction continues annually as captive-reared birds are released along the Vermilion Cliffs. Each released condor is equipped with radio telemetry or GPS satellite transmitters and numbered wing tags to allow observers to track their movements.

Condors range widely, easily covering over 100 miles in a day, and their current range includes the entire Arizona Strip, throughout the Grand Canyon, into adjacent Utah and Nevada, and south of the Grand Canyon in Arizona. Condors are most commonly observed near the release site on the Vermilion Cliffs, at Navajo Bridge near Marble Canyon, on the Kaibab Plateau, and near the South Rim of the Grand Canyon. They have also been seen flying over Fredonia. Condors may either fly over or feed within these allotments.

Condors are strictly scavengers and prefer to eat large, dead mammals such as mule deer, elk, pronghorn, bighorn sheep, cattle, and horses. While the condors now find much of their food on their own, carcasses of dairy calves are provided near the Vermilion Cliffs release site in order to provide carrion which is contaminant free. Condors are especially vulnerable to lead poisoning.

Mexican spotted owl: As stated on page 23 of this assessment, the Mexican spotted owl was listed as threatened on April 15, 1993. The range of the Mexican spotted owl extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in central and southern Utah, southward through Arizona and New Mexico and into northern Mexico. Although the Mexican spotted owl's entire range covers a broad area of the southwestern United States and Mexico, it does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forests, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico. Steep slopes and canyons with rocky cliffs characterize much of the owl's habitat on the Colorado Plateau (which includes the majority of the Arizona Strip). The Arizona Strip District is surrounded by areas where Mexican spotted owls have been detected, including Grand Canyon, Zion, and Canyonlands national parks, and Grand Staircase-Escalante National Monument.

Designated critical habitat was established for this species in 2001 and revised in 2004. No designated critical habitat occurs on these allotments. A tool for predicting suitable canyon habitats that may have higher potential for species occupancy and nesting birds than other nearby canyons is the Mexican Spotted Owl Habitat Model (Willey, 2001, and 1997). The model uses terrain parameters to determine depth and width of canyons (owls need cooler microsites for nesting and roosting) and other features (such as distance to water and north facing cliff sites). The model predicts the canyons most likely to support nesting owls; from

this it can then be determined if any "higher quality" habitat (according to the model) exists. It is important to note that any model is only an analysis tool, and experience with the current owl model has shown it to be accurate in some cases, but not in others (such as delineating cliff faces outside of canyons as high potential owl habitat). For canyon habitats, the primary constituent elements of habitat include one or more of the following attributes: (1) cooler and often more humid conditions than the surrounding area, (2) clumps or stringers of trees and/or canyon walls with crevices, ledges or caves, (3) high percent of ground litter and woody debris, and (4) riparian or woody vegetation. The primary constituent elements related to forest structure include (1) a range of tree species, (2) a shade canopy created by the tree branches covering 40 percent or more of the ground, and (3) large dead trees with a trunk diameter of at least 12 inches.

According to the 1997 Willey model, Black Rock and Sullivan Canyon allotments both contain potentially suitable Mexican spotted owl habitat. Black Rock contains a total of 1,588 acres of both canyon and forested potential habitat, with the vast majority of that acreage consisting of forested habitat. Sullivan Canyon contains 1,382 acres of both canyon and forested potential habitat, with the vast majority of that acreage consisting of canyon habitat. Ground surveys were performed to assess the validity of the model's assertion, accounting for crucial habitat constituents including the presence of cool microsites, availability of water, and vegetation types. Assessed forested habitat in both allotments consisted of relatively open stands dominated by ponderosa pine and pinyon-juniper woodlands, with species typically found in mixed-conifer forest types completely absent, and was thus determined unsuitable. Potential (modeled) canyon habitat occurs in areas of Sullivan Canyon that are greater than 0.5 miles wide and receive high amounts of overall sun exposure and exposed cliff faces. Another limiting factor was the lack of fresh water in these locations, with most sites having no consistent water source and no woody riparian vegetation. Thus, despite the presence of cool microsites in some limited locations, field assessments determined all potential canyon habitats likewise unsuitable.

BLM Sensitive Species, Wildlife Species of Concern, and Migratory Birds

Bald eagles may occur on these allotments. The bald eagle was delisted from the Federal ESA on August 9, 2007. This species is not known to nest anywhere on the BLM's Arizona Strip District, although it is a seasonal (winter) migrant that forages in and around the Arizona Strip. Because there are no large areas of open water containing fish in this area, bald eagles are both scavengers and predators. Golden eagles are known from the Arizona Strip District (Jensen pers. comm. 2008). They feed mainly on small mammals like rabbits and ground squirrels, but may also take snakes, birds, and insects, even juvenile ungulates and carrion.

The American peregrine falcon was delisted in October 1999. There are monitoring requirements developed by the USFWS to assess the status of the species regionally. Historic and active nests are monitored annually on the Arizona Strip District. There are no known nests within these allotments,

although suitable nesting habitat occurs. Birds from nearby nests may use these allotments for foraging.

Inventories were conducted for northern goshawks on Black Rock Mountain in 1993, 1994, and 2000. No goshawks were detected, however, suitable habitat occurs in parts of these allotments.

The spotted bat, western small-footed myotis, fringed myotis, big free-tailed bat, small-footed myotis, long-legged myotis, and long-eared myotis are known from these allotments. Bat colonies documented by AGFD also occur within the Virgin Mountains on the Sullivan Canyon Allotment. All of these bat species have been captured and recorded as part of a monitoring program.

7. Wildlife Habitat

Mule Deer: Mule deer populations are monitored annually by AGFD. While there is no estimate of mule deer numbers available specifically for these allotments, these allotments lie within Game Management Unit (GMU) 13B and population trends should parallel data collected for this GMU (see Appendix D). Since the early 1990s, mule deer populations have been gradually increasing, and AGFD considers the mule deer population in the habitat area to be stable.

Mule deer tend to concentrate on crucial summer ranges on Black Rock Mountain during the warmer months, but are widely distributed at low densities during the winter. Areas above 6,000 feet in elevation are managed as crucial mule deer habitat in accordance with HMP objectives.

Desired plant community objectives developed for mule deer summer range in these allotments include provisions for cool season grasses in total (e.g. western wheatgrass and squirreltail) at or above 15 percent, and winter browse species in total (e.g. cliffrose and mountain mahogany) at or above 25 percent.

Bighorn Sheep: The Sullivan Canyon and Black Rock allotments lie within the Virgin Mountains Wildlife Habitat Area established in the Arizona Strip Field Office RMP (2008). This habitat area includes over 220 square miles of bighorn habitat on BLM lands. A total of 62 bighorn sheep were translocated into these mountains from 1979 to 1982. Current populations probably exceed 200 bighorn sheep.

Bighorn sheep require approximately equal components of grass, forbs, and shrubs. The rugged and steep nature of their habitat is considered ungrazed by livestock, which limits contact between sheep and livestock to a few areas. No key areas are located within bighorn habitat.

Turkey: Twelve Merriam's turkeys were introduced at Larson Tank on Black Rock Mountain in January 1979. Supplemental transplants were authorized in 1991. In January 1994 AGFD and BLM released 22 hens and six mature goblers

near Larsen Tank on Black Rock Mountain. Additional releases occurred in 2007, 2008, and 2009. A total of 140 turnkeys have been translocated on Federal and private lands within these allotments; to date, it appears the turkeys have done well.

Merriam's turkey typically prefer open stands of mature ponderosa pine forests. Park-like openings with a good understory component of forbs and grass cover are important foraging areas for turkeys. Native cool season grasses (e.g. sand drop-seed, Arizona fescue, wild bromes) are desirable as well as mast-producing species (e.g. Gambel oak). Turkeys typically concentrate in the vicinity of watering areas.

Forage allocations made under the original AMPs for these allotments did not consider the needs of wild turkey as this species had not been re-introduced at the time the AMP was completed. Desired plant community objectives developed for this current standards and guidelines assessment considered the forage and cover needs of Merriam's turkey.

Other Wildlife: Nongame wildlife forage and cover needs have not been specifically addressed in wildlife management plans. However, it is typically assumed that management actions that provide for healthy rangelands will benefit most wildlife species. This is particularly true where there is a mosaic of habitat types separated by edge or transitional communities. Rodent populations provide an abundant food source for many larger wildlife species. No monitoring programs have been established that would identify trends in nongame wildlife populations.

8. Riparian/Fisheries Habitat

There are four springs or seeps located on these allotments. Sullivan Spring (3 acres) and Gates/Mullen Spring (5 acres) in Sullivan Canyon Allotment both have fenced wet meadows and both are rated in proper functioning condition. Quaking Aspen Spring's aspen patch is 21 acres in size and is unrated. It has little to no open water and is mostly subterranean flow except for a seep. Black Rock Allotment has Maple Spring, which is fenced, but has no open water as the water is totally piped to a storage tank. These springs have riparian vegetative cover for riparian-dependent species, but there is not enough water to provide habitat for fish.

Sullivan Canyon Allotment has a small area (about ½ mile) of the Virgin River in the Virgin River Gorge. This ½ mile falls in Segment 4 of the Virgin River inventory done in the 1990s just downstream of the Virgin River Campground. The riparian area was assessed and determined to be properly functioning. Vegetation found in the 1990 inventory (weight based) is shown in Table 8.

Table 8. Riparian Vegetation Data – Virgin River Segment 4

Zone	Tamarisk	Sedge	Rabbit foot Grass	Smartweed	Aster	Creosote bush	Desert Willow	Russian Thistle	
Wet	29	10	60	1					
Woody Regeneration	99				1				
Floodplain	54				1	3	31	11	

There is a riparian key area located upstream in the Virgin River Gorge from the Sullivan Canyon stretch of river. The key area is representative of the Gorge area. During the 1990s, the Virgin River through the Gorge, and elsewhere, was surveyed and evaluated. Since then the vegetation, and changes due to floods, has been monitored every other year by a green-line method. The green-line method involves measuring the changes in the woody regeneration zone along and just above the wet zone. A measuring tape is stretched for 300 feet along the zone and at every 10 foot interval a 6 foot by 3 foot plot is put down and all woody vegetation is counted and classed by height within the plot. The results of the 2008 green line are shown in Table 9.

Table 9. Riparian Vegetation Data – Virgin River Key Area

Species	2004	2004	2004	2004	2006	2006	2006	2006	2008	2008	2008	2008
Ht Class	0-3'	3-6'	6-10'	10'+	0-3	3-6	6-10	10+	0-3	3-6	6-10	10+
Willow	21	26	7	0	0	0	0	0	9	21	0	0
Tamarisk	43	176	138	0	180	30	0		87	86	27	0
Seep Willow	23	3	1	0	0	0	0	0	0	0	0	0
Phragmites	00	0	0		0	0	0	0	65	843	0	0

A large flood occurred in 2005, with much scouring action and channel changes, which substantially changed the 2005 plot (new channels and large scour zones). The river is functioning as it historically does. The riverside vegetation is dominated by tamarisk, but willows and phragmites play a big role also. Grazing can affect willow and phragmites, but grazing has not had an adverse effect to date. The cattle are gone during the riparian growing season. The composition of a cross-section of the river (at the key area) from 2008 is listed below.

River Right Cross-section
0-12 feet: tamarisk
13-102 feet: old channel
103-112 feet: sedge/grass
113-124 feet: tamarisk
125-135 feet: sand bar
136-148: arrow weed
149 feet +-: upland

River Left Cross-section
0-18 feet: young tamarisk
19-40 feet: tamarisk
41-83 feet: upland

9. Wild Horse and Burro Habitat

Neither of these allotments is within a herd management Area (HMA).

10. Lithology and Soils

a. Lithology

The high elevations of the Black Rock Allotment consist of the top and eastern slope of Black Rock Mountain, the west slope of Wolfhole Mountain, then north down Maple and Tombstone Canyons to the lower elevations near the Black Rock Interchange on I-15. The top of Black Rock Mountain is mainly basalt, which caps the Shinarump (conglomerate, sandstone) and Moenkopi Formation (gypsite, mudstone, sandstone, siltstone, and limestone), that form the steep east slopes of the mountain. The basalt capped Moenkopi Formation forms the steep west slopes of Wolfhole Mountain on the east side of the allotment. Kaibab limestone and a few gypsum outcrops are exposed along Maple and Tombstone Canyons and at the lower elevations near I-15. Mixed gravelly and silty alluvium from these formations form the narrow canyon bottom floodplains and the floodplains and alluvial fans at the north end of the allotment.

The Sullivan Canyon Allotment consists of three separate areas, a large mountainous area containing Sullivan Canyon itself and two smaller areas in foothills. One is about 6 miles to the northeast and the other is about 4 miles to the southeast of the canyon.

In the canyon part, starting at the top, are outcrops of basalts, Chinle, Shinarump, and Moenkopi Formations, Kaibab limestone, and Toroweep sandstones mainly along the east side. On the top west side are outcrops of Redwall and Martin limestones, Bright Angel shales, granitics and undifferentiated limestones and dolomites. In the lower part of the canyon are exposures of Kaibab limestone, Toroweep and Supai sandstones, and Hermit shale on both sides with some Callville limestone along the west side. Coarse alluvium from these formations fills the canyon bottom floodplain.

In the northeast area, steep Moenkopi outcrops (gypsite, mudstone, sandstone, siltstone, and limestone) form the slopes below a basalt capped mesa. Kaibab limestone is exposed below the Moenkopi and is covered in spots by old alluvial fans.

In the southeast area, steep Moenkopi outcrops form the slopes along the west, northwest, and south sides. Kaibab limestone is exposed through the middle and eastern portions. There are fine to gravelly alluvial deposits along the narrow valley bottom.

b. Soils

SCS Soil Survey of Mohave County, Area 623, Arizona, 1993.

10 Berzatic fam-RO-Goblin complex, 35 to 70 percent slopes, (escarpments, cliffs), LS-gyp; Berzatic=Breaks, 7" to 11"; Goblin=Breaks (gypsiferous), 7" to 11"

16 Cave-Harrisburg-Grapevine complex, 1 to 15 percent slopes (fan); Cave and Harrisburg=Limey Upland, 6" to 9"; Grapevine=Limey Upland (Deep), 6" to 9"

20 Dermala fam-Guy fam-Rock Outcrop complex, 10 to 40 percent slopes (mesa scarp) basalt; Basalt Slopes, 13" to 17"

21 Disterheff-Natank-Yumtheska complex, 2 to 15 percent slopes (hills) Virgin/lower red; Disterheff and Natank=Clay Loam Upland (Gravelly), 13" to 17"; Yumtheska=Limestone Slopes, 13' to 17"

25 Goesling loam, 1 to 5 percent slopes (stream terrace), Moenkopi; Loamy Upland (Gravelly), 13" to 17"

26 Grapevine-Hobcan complex, 1 to 5 percent slopes (fan, fan terrace), LS, Moenkopi; Grapevine=Limey Upland (Deep), 6" to 9"; Hobcan=Loamy Wash (Gypsic), 6" to 9"

27 Grapevine-Shelley complex, 1 to 5 percent slopes (fan terrace), LS, Moenkopi; Grapevine and Shelley=Limey Upland (Deep), 6" to 9"

30 Gypill-Hobog complex, 6 to 35 percent slopes, (hills, ridges, mesas), gypsite, limestone; Gypill=Gypsum Hills, 6" to 9"; Hobog=Limey Upland, 6" to 9"

31 Gypill very cobbly sandy loam, 15 to 40 percent slopes, (hills, scarps), gypsite, mudstone; Cobbly Gypsum Hills, 6" to 9"

34 Hindu-RO-Gypill complex, 35 to 70 percent slopes, (cliffs, scarps, mtns), gyp, LS, SS, CG; Hindu=Limestone Hills, 6" to 9"; Gyphill=Gypsum Hills, 6" to 9"

36 Hobog-Grapevine complex, 2 to 35 percent slopes, (ridges, mesas), limestone, calc-SS; Hobog= Limey Upland, 6" to 9"; Grapevine=Limey Upland (Deep), 6" to 9"

37 Hobog-Grapevine complex, 2 to 35 percent slopes, moist, (ridges, fan terraces) LS, Moenkopi; Hobog=Shallow Upland, 9" to 12"; Grapevine=Sandy Loam (Gravelly), 9" to 12"

38 Hobog-Tidwell fam complex, 8 to 35 percent slopes, (plateau, mesa, ridge), limestone; Hobog and Tidwell=Limey Upland, 6" to 9"

39 Hobog very gravelly sandy loam, 5 to 30 percent slopes, (plateau, mesa), limestone; Shallow Upland, 9" to 12"

42 Katzine-Rock outcrop-Yumtheska complex, 35 to 70 percent slopes, (mountain canyons and cliffs), Supai sandstone, Callville & Red Wall limestones; Limestone Slopes, 13" to 17"

44 Meadview very gravelly sandy loam, 2 to 18 percent slopes, (fan terraces) LS, Moenkopi; Limey Upland (Deep), 6" to 9"

45 Mellenthin-Rock Outcrop-Torriorthents complex, 10 to 70 percent

slopes (mesa, hill) Kiabab; Mellenthin=Shallow Loamy, 9" to 13"; Torriorthent=Breaks, 9" to 13"

47 Mellenthin-Strych complex, 4 to 25 percent slopes, warm, (plateau, mesa) LS, mudstone; Mellenthin=Shallow Upland (calcareous), 9" to 13"; Strych=Loamy Upland (calcareous), 9" to 13"

48 Mellenthin-Tanbark complex, 5 to 50 percent slopes, cool (mesas, hills) Kiabab, Harrisburg; Mellenthin=Shallow Loamy, 9" to 13"; Tanbark=Gypsum Hills, 9" to 13"

50 Mellenthin-Tanbark complex, 5 to 50 percent slopes, warm (hill, mesa, LS, Moenkopi; Mellenthin=Shallow Upland (calcareous), 9" to 13"; Tanbark=Gypsum Hills (calcareous), 9" to 13"

51 Meriwhitica-Rock outcrop-Strych complex, 35 to 70 percent slopes, (cliffs, canyons); Callville & Redwall limestones; Meriwhitica=Breaks, 9" to 13"; Strych=Loamy Upland, 9" to 13"

56 Nikey fam-Ruesh fam-RO complex, 10 to 40 percent slopes (mesa) basalt, Moenkopi; Nikey and Ruesh= Basalt Slopes, 6' to 9"

60 Pocum-Childers-Ubank complex, 1 to 10 percent slopes, (mesa), basalt; Shallow Upland (calcareous), 9" to 13"

61 Pocum-Spenlo complex, 1 to 10 percent slopes, (mesa), basalt; Pocum=Basalt Upland, 9" to 13"; Spenlo=Loamy Upland, 9" to 13"

64 Riverwash-Torrifluvents complex, 1 to 3 percent slopes, (channel, floodplain), mixed; Torrifluvents=Sandy Wash, 9" to 12"

67 Ruesh very gravelly fine sandy loam, 3 to 20 percent slopes, (fan terrace), mixed sediment; Gypsum Fan, 6" to 9"

72 Springerville-Delenbaw complex, 3 to 25 percent slopes (mesa) basalt; Springerville and Delenbaw=Clay Loam Upland (gravelly), 13" to 17"

73 Strych very gravelly loam, 2 to 10 percent slopes (fan) mixed; Loamy Upland, 9" to 13"

74 Tanbark fam-Strych fam-RO complex, 10 to 40 percent slopes (mesa) Moenkopi, basalt; Tanbark and Strych= Basalt Slopes (calcareous), 9" to 13"

80 Tsezhin fam-Ashfork fam-RO complex, 10 to 70 percent slopes (mesa) basalt/Moenkopi; Tsezhin and Ashfork=Basalt Slopes, 13" to 17"

84 Virgin Peak-Rock outcrop complex, 10 to 70 percent slopes (mountain) granitics, gneiss; Granitic Hills (Stony), 13" to 17"

88 Winkel very gravelly loam, 2 to 25 percent slopes (mesa) basalt; Winkel=Limey Upland, 6" to 9"

92 Yellowhorse-Luzena fam complex, 1 to 10 percent slopes (mesa) basalt; Yellowhorse and Luzena=Basalt Upland, 17' to 20"

93 Yumtheska-Katzine-Rock Outcrop complex, 2 to 30 percent slopes (hills) limestone; Yumtheska=Limestone Slopes, 13" to 17"; Katzine=Loamy Upland (gravelly), 13" to 17"

94 Yumtheska-Katzine-Rock outcrop complex, 5 to 50 percent slopes, moist (mountain) Supai sandstone, Callville & Redwall limestones; Yumtheska and Katzine= Limestone Slopes, 13" to 17"

c. Recent field reconnaissance to locate possible problem areas via onsite soil profile property's determinations showed the following:

No significant grazing impacts to the soils. The soils in these allotments pass Standard 1 for soil erosion/health.

C. Information and/or Data Pertaining to Issues (from III.G.1.)

1. Issues Relating to Rangeland Health

a. Lack of long term water available in crucial areas such as Lone Pine Reservoir. (The only water available is on private land, i.e. Larsen Tank.)

Consider repairing Lone Pine Reservoir or creating additional wildlife waters in area.

b. Water may not be available to wildlife/livestock at the spring in Sullivan Canyon (T. 40 N., R. 14 W., N.W. 1/4, Sec. 15). The primary wildlife concern is bighorn.

There is no data on this matter for the bighorn sheep – water availability at this site is not monitored due to its remote and inaccessible location (in designated wilderness).

c. Livestock concentration area where Sullivan Canyon meets the Virgin River is an eyesore.

Cattle are present in this area in the winter and then are absent the rest of the year.

d. Cattle intrusion into Sullivan Spring exclosure.

This was an issue in the past. However, checks on this in 2004 and 2006 indicated no intrusions by cattle – vegetation was tall and ungrazed.

e. Old and new vegetative treatments (chainings/pushes) in areas such as the south end of Low Mountain need to be evaluated as to their value for wildlife/livestock.

The old chainings and seeding are still used by wildlife and livestock. Where the fire burned in 2007, the forbs and grass are in very good condition. See the trend and ecological site data for details on species in the old seeding. Also see Black Rock #4, Low Mountain #5, Trails End, New and Twin Pine trend transects and ecological site inventory.

V. CONCLUSIONS[4]

A. Pertaining to Objectives

1. Land Use Plan Objectives

Arizona Strip Field Office RMP
Grand Canyon – Parashant National Monument Resource Management Plan (in bold if differing)

Water

DFC-RP-06
All surface water will meet, or be improving towards, Arizona State water quality standards.

DFC-WS-03
Surface water availability at seeps and springs will be appropriate for the soil type, climate, and landform.

The two springs in Sullivan Canyon Allotment (Gates Mullen Spring and Sullivan Spring) are in properly functioning condition and there are no water quality issues. Quaking Aspen is a seep on a very steep slope and what little water comes from this seep primarily goes into a small trough. Maple Spring (in Black Rock Allotment) is fenced but has no open water as the water from this spring is totally taken for water storage in a tank. Seeps have not been accounted for in these allotments as they have very little water flow. Field visits to these springs and seeps have not indicated any water quality issues.

Watershed/Soil Stability

DFC-VM-03 and ***DFC-VM-04***
Vegetative communities will provide sufficient plant cover and litter accumulation to protect soils from wind and water erosion and enhance nutrient cycling and productivity, even during drought years.

DFC-WS-06
The natural hydrologic functions of all watersheds will be intact.

DFC-WS-07
Soils will exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform.

[4] Similar RMP objectives have been grouped together with one conclusion per grouping.

DFC-WS-08
Physical soil crusts will show an increase in organic cover including cryptobiotic colonies, moving them towards being organic crusts.

These objectives were being met until much of this area burned in the summer of 2007. Subsequent thunderstorms have caused erosion in several areas and flood damage in Maple Canyon. There was only enough post-fire rehabilitation funding obtained to seed the steep east-facing slopes of Black Canyon and Maple Canyon. Oak brush and grasses are returning over most of the burn area. However, some slopes north and south of Lone Pine Reservoir are barren and still subject to severe sheet erosion. The objectives are being met over the rest of the areas in the allotments.

Ecological Processes

DFC-VM-04 and ***DFC-VM-05***
Ecological processes and functions will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Standards for Rangeland Health.

DFC-RP-02
Riparian areas will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Arizona Standards for Rangeland Health.

DFC-RP-03
Ecological functions and processes will be intact with vegetative species composition and cover appropriate to the site.

DFC-WS-04
Ecological functions and processes will be intact at all seeps and springs.

DFC-WF-01
Ecological conditions will be within the range of natural variability and will be functional for dependant animal species.

DFC-WF-11 and ***DFC-WF-12***
The natural biological diversity of fish, wildlife, and plant species will be maintained or, where necessary and feasible, restored throughout the Arizona Strip FO ***(Monument)****. Habitats will be managed on an ecosystem basis, ensuring that all parts of the ecosystem and natural processes are functional.*

The two springs in Sullivan Canyon Allotment (Sullivan Canyon Spring and Gates Mullein Spring) are fenced and the wet meadows are protected. Plant species are diverse in these two allotments as can be seen in the seral stages of

key areas, which range from three in early seral, 9 in mid seral, and 3 in late seral. These key areas all have diversity of plants. These objectives are met.

Invasive Plants

DFC-VM-05 and ***DFC-VM-06***
Invasive plant species will be contained, controlled, or eliminated and native species restored to meet desired plant community (DPC) objectives.

DFC-VM-38
Management of Mohave-Great Basin Transition Ecological Zone plant communities will focus on removing invasive non-native plants, especially cheatgrass, Sahara mustard, and red brome, and preventing habitat degradation due to wildfire.

DFC-RP-11
Invasive plants and animals such as tamarisk, Russian olive, and brown-headed cowbird will be reduced or eliminated.

Invasive plants are monitored and treated to the extent feasible. There is no tamarisk or Russian olive in the two allotments' springs. However, there is extensive tamarisk along the Virgin River. The tamarisk leaf beetle has been released in Utah and has moved downriver into the Virgin River Gorge. It is uncertain what effect this insect may have on the tamarisk.

In 2008 the *Comprehensive Watershed Analysis of the Virgin River Watershed in Utah, Arizona, and Nevada* was completed. The analysis was completed by the U.S. Army Corps of Engineers in close partnership with local and county governments, tribal, state and federal agencies (including the BLM), municipalities, landowners, citizen groups, nongovernmental organizations and the public. The purpose of this analysis was to produce a watershed plan that will facilitate: 1) coordination and cooperation among stakeholders on management of the Virgin River and tributaries and related resources; 2) obtaining funding for projects within the watershed; and 3) educating stakeholders on watershed problems and solutions. The plan included a summary of watershed issues and planning objectives as defined with stakeholders; one of the top five issues identified was invasive species (including tamarisk). The BLM continues to participate in the implementation of this watershed plan in order to find solutions to the issue of invasive species along the Virgin River.

The red brome only occurs on very wet years, such as 2005, in the Lizard #1 pasture and lower part of Lizard #2. There has been no red brome from 2006 through 2009. On very wet years this objective is not met. On normal to dry years the red brome objective is met.

No Net Loss

DFC-VM-28 and ***DFC-VM-32***
There will be no net loss of acres of Mohave Desert plant communities (i.e., long-term or permanent removal from the landscape). A no net loss objective will not preclude restoration, rehabilitation, or related management actions.

DFC-VM-42
There will be no net loss of acres of Interior Chaparral plant communities (i.e., long-term or permanent removal from the landscape). A no net loss objective will not preclude restoration, rehabilitation, or related management actions.

These objectives are being met. There has been no net loss of any plant communities. None of the plant communities have been removed from the landscape. DPC objectives have been developed to maintain the current acreages of Mohave Desert and Interior Chaparral plant communities.

Livestock Grazing

DFC-GM-02
Livestock use and associated management practices will be conducted in a manner consistent with other resource needs and objectives to ensure that the health of rangeland resources is preserved or improved so that they are productive for all rangeland values. Where needed, public rangeland ecosystems will be improved to meet objectives.

DFC-GM-04
Monument values will be maintained, protected, and improved.

These objectives are being met. Livestock grazing (i.e., season of use, utilization levels, etc.) is managed to maintain or improve the ecological condition of the allotments. Both allotments have rotation grazing systems with deferment and rest during growing seasons built into the system. Utilization most years is below 50%. If ecological conditions, such as rainfall and interspecific plant species competition, are such that certain forage grasses can increase into niches in the plant community, this moderate utilization allows upward trend in forage and browse into those niches.

Desired Plant Communities

DFC-GM-01
Healthy, sustainable rangeland ecosystems will be maintained or improved to meet Arizona's Standards for Rangeland Health, and produce a wide range of public values such as wildlife habitat, livestock forage, recreation opportunities, clean water, and functional watersheds.

DFC-VM-02 and ***DFC-VM-03***

Native vegetative communities will be protected. A mosaic of native perennial and non-invasive annual vegetative communities will be present across the landscape with diversity of species, canopy, density, and age class reflecting its local ecological site potential and naturally occurring habitat conditions.

DFC-VM-21 and ***DFC-VM-25***

Healthy, diverse woodland communities will consist of a mosaic of trees, shrubs, grasses, and forbs. Mosaic patches can include stands of young and old pinyon-juniper, openings, wet meadows, seeps, and other interspersed shrub habitats. The communities will be composed of a variety of different height structures and age classes, with a thriving understory community of native grasses, forbs, and shrubs.

DFC-VM-24 and ***DFC-VM-28***

Stands of pinyon-juniper will include a balance between tree, shrub, and perennial grass cover to support pinyon jay and mule deer. This mosaic will include stands of old growth pinyon-juniper to support juniper titmouse; large openings of grasses, forbs and shrubs to support mule deer and provide foraging habitat for raptors such as sharp-shinned hawk, northern goshawk, Coopers hawk, American kestrel, and red-tailed hawk; and areas of sparse to dense tree canopy cover to support pinyon jay.

DFC-VM-26

Endemic plant species and associated communities such as creosote bush, Joshua tree, Mojave yucca and cacti, will be present along with other shrubs, grasses, and wildflowers. These communities can include stands of young and old shrubs, sparse vegetation, scattered to larger expanses of creosote bush or Joshua trees, seeps, healthy streamside vegetation, and other interspersed grassland and shrub habitats.

DFC-RP-01

Riparian areas will consist of a diversity of vertical and horizontal structures, vegetative age classes, and endemic species.

DFC-WF-16

Mule deer habitat in pinyon-juniper woodland sites will include a healthy diverse mosaic of trees, shrubs, grasses, and forbs.

DFC-VM-39

The Interior Chaparral Ecological Zone will consist of diverse populations of endemic vegetative species, particularly shrubs, and a mosaic of age class distributions of these species.

DFC-VM-40

Endemic plant species and associated communities such as manzanita, silk tassel, and live oak will be present, along with other shrubs, grasses, and forbs.

These objectives are being met. The allotments support a diversity of wildlife (including avian species, reptiles, and large and small mammals), provide forage for livestock, provide recreational opportunities, and provide functional watersheds. DPC objectives have been developed on the allotments to maintain and/or enhance these public values.

The Interior Chaparral Ecological Zone has a diverse population of endemic vegetative species. The Maple Pasture key area currently has manzanita/silk tassel at 3% and live oak at 3%; other shrubs amount to 47%. Grasses and forbs are 0%. Upper Sullivan's key area has 1% manzanita, 11% oak, 79% other shrubs, and 10% grasses and forbs. The percent composition of manzanita, silk tassel, and live oak and associated shrubs and trees are quite abundant. In the area burned in 2007, manzanita, silk tassel, oak, cliffrose, and mountain mahogany have already resprouted with new growth more than 3 feet tall in 2008.

Riparian Communities

DFC-RP-05
All riparian areas will be in, or moving towards, proper functioning condition.

DFC-RP-08
Availability of surface water at seeps and springs will be appropriate for the soil type, climate, and landform and will support a diverse population of endemic plant and wildlife species.

DFC-TE-19 and ***DFC-TE-15***
Essential habitats, important migration routes, required flows, and water quality will be protected and maintained in lentic and lotic systems in the Arizona Strip FO ***(Monument)***.

These objectives are being met. Sullivan Spring, with its large wet meadow and willow stands, is fenced, protected and properly functioning. Gates Mullen Spring is also rated as properly functioning. Quaking Aspen Spring in Sullivan Canyon has a structurally tall and large quantity of aspen growing around it. This spring was unrated as it has no flowing water and is subterranean. However, this area is periodically monitored as it has a large quantity of aspens growing around it. There is no protective fence because the area is on a very steep slope. The water at this spring is mostly subsurface, so there is no running water in this grove.

As described previously in this assessment report, Sullivan Canyon Allotment has about ½ mile of the Virgin River in the Virgin River Gorge. The riparian area in this segment
of the Virgin River has been assessed and determined to be properly functioning.

Wildlife Habitat

DFC-VM-27 and **DFC-VM-31**
Endemic animal species such as desert tortoise and chuckwalla will be present and thriving with more than adequate food, water, and cover resources.

DFC-WF-02
Native wildlife communities will be protected. A complete range of diverse, healthy, and self-sustaining populations of native animal species will occupy all available suitable habitats.

DFC-VM-41
Endemic animal species such as black-chinned sparrow and mule deer will be present and thriving with more than adequate food, water, and cover resources.

These objectives are being met. Sustainability needs (such as forage, cover, shelter, and nesting sites) of endemic wildlife species, including the black-chinned sparrow and mule deer, have been taken into consideration when developing DPC objectives for these allotments.

Habitat Connectivity

DFC-WF-06
Habitat connectivity and wildlife movement between ecological zones will be maintained.

This objective is being met through continued wildlife population and habitat monitoring. Habitat connectivity and wildlife movement are taken into consideration for all project level planning, including travel management.

Wildlife Forage Needs

DFC-WF-14 and ***DFC-WF-15***
Forage in crucial summer mule deer habitat will include at least 10% grasses and forbs composition by weight (CBW) and at least 30% palatable browse species CBW at all key areas, where consistent with site potential.

DFC-WF-15 and ***DFC-WF-16***
Forage in crucial winter mule deer habitat will include at least 30% palatable browse species CBW at all key areas, where consistent with site potential.

DFC-WF-29 and ***DFC-WF-30***
Forage in desert bighorn sheep habitat areas will include at least 20% grasses, 20% forbs, and 20% palatable shrub species CBW, where consistent with site potential.

DFC-WF-41 and ***DFC-WF-42***
Forage composition in turkey habitat will include at least 20% grasses and forbs, and 20% mast-producing species at all key areas CBW, where consistent with site potential.

Key areas within crucial mule deer habitat, bighorn sheep habitat, and/or turkey habitat have the following forage compositions:

Key Area	Grasses/Forbs	Mast (Berry/Nut Producing Species)
Twin Pine	67%	18%
Upper Sullivan	10%	24%
Trails End	63%	0%
Neck	42%	0%
Neck East	74%	11%

In addition, sustainability needs such as appropriate forage composition for mule deer, desert bighorn sheep, and Merriam's turkey were taken into consideration when the DPC objectives for these allotments were developed. These objectives are therefore being met.

Fences

DFC-WF-05
Fences will be the minimum necessary for effective livestock control or other administrative purposes. Fences will be wildlife passable, consistent with the species found in the area.

DFC-WF-19 and ***DFC-WF-20***
All fences in mule deer habitat will be deer passable.

Progress toward meeting these objectives is occurring and is ongoing. A mule deer management plan is being jointly developed by the BLM and AGFD. This plan will outline specific fence objectives to better manage this species.

Healthy Wildlife Populations

DFC-WF-03
Forage, water, cover, and space will be available to wildlife of sufficient quantity and quality to support productive and diverse wildlife populations.

DFC-WF-12 and ***DFC-WF-13***
Mule deer habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-27 and ***DFC-WF-28***
Desert bighorn habitat will provide the necessary forage, water, and shelter

components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-34 and ***DFC-WF-35***
Desert cottontail habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-36 and ***DFC-WF-37***
Migratory bird habitats will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-39 and ***DFC-WF-40***
Merriam's turkey habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

DFC-WF-44 and ***DFC-WF-45***
Carnivore habitat will provide the necessary forage, water, and shelter components for healthy, self-sustaining populations within the range of natural variability.

These objectives are all being met. Habitat needs (such as forage, cover, and shelter) for wildlife including mule deer, bighorn sheep, desert cottontail rabbits, migratory birds, Merriam's turkey, and carnivores were taken into consideration when the DPC objectives for these allotments were developed. Wildlife waters are inspected by the BLM and AGFD and maintained/repaired as funding allows. A mule deer management plan is being jointly developed between the BLM and AGFD. This plan will outline objectives to better manage this species. Wildlife population and habitat monitoring will continue. Annual mule deer and bighorn sheep surveys will continue and the results will provide data to assist in management of these and other species.

Wildlife Population Numbers

DFC-WF-13 and ***DFC-WF-14***
Mule deer populations will be at or near maximum levels sustainable for the habitat.

DFC-WF-28 and ***DFC-WF-29***
Desert bighorn sheep populations will be at or near maximum levels sustainable for the habitat.

DFC-WF-35 and ***DFC-WF-36***
Desert cottontail rabbits will be present in sufficient quantity to provide an adequate prey base for raptors, carnivores, and other predatory species, as well

as ample recreational opportunities for hunting and wildlife viewing.

DFC-WF-37 and ***DFC-WF-38***
Migratory birds that nest in the Arizona Strip FO ***(Monument)*** *will have resources of sufficient quantity and quality to provide for nesting sites and to fledge young successfully.*

These objectives are being met. Sustainability needs such as forage, cover, shelter, and nesting sites for mule deer, bighorn sheep, desert cottontail rabbits, and migratory birds have been taken into consideration when developing DPC objectives for these allotments which will facilitate wildlife population numbers reaching maximum levels sustainable for the habitat. A mule deer management plan, which will outline objectives to better manage this species, is being jointly developed by the BLM and AGFD. Annual mule deer and bighorn sheep population surveys will continue and the results will provide data to assist in management of these and other species.

Wildlife Waters

DFC-WF-04
All waters will be safely accessible to wildlife.

DFC-WF-17 and ***DFC-WF-18***
Water sources within mule deer habitat will be safely accessible to deer and other wildlife.

DFC-WF-18 and ***DFC-WF-19***
Water sources within mule deer habitat will be spaced no more than 3 miles apart.

DFC-WF-30 and ***DFC-WF-31***
Water sources within bighorn sheep habitat areas will be safely accessible to bighorn and other wildlife.

DFC-WF-31 and ***DFC-WF-32***
Water sources within bighorn sheep habitat will be spaced no more than 4 miles apart.

DFC-WF-42 and ***DFC-WF-43***
Water sources within game bird habitats will be safely accessible by all wildlife.

DFC-WF-43 and ***DFC-WF-44***
Water sources within Merriam's turkey habitat will be spaced no more than 3 miles apart.

DFC-RP-09
A sufficient quantity of water with safe access for wildlife will be available, where appropriate.

Progress toward meeting these objectives is occurring and is ongoing. Wildlife and livestock water catchments are inspected and repaired/maintained as funding allows; those found to be hazardous to wildlife (including mule deer, bighorn sheep, game birds, and Merriam's turkey) are modified. A mule deer management plan for the Arizona Strip has been jointly developed by the BLM and AGFD; a statewide bighorn sheep management plan was jointly developed by the BLM and AGFD in 2006. Both of these plans include objectives to provide additional wildlife waters (to meet the water spacing requirement) and repair and maintain existing wildlife waters (to ensure reliable and safely accessible water sources).

Threatened and Endangered Species Habitat

DFC-TE-03
The Arizona Strip ***(Monument)*** *will provide a block of remote, contiguous habitat that will serve as refugia for populations of special status species.*

DFC-TE-25 and ***DFC-TE-21***
Habitat areas for special status raptors will provide sufficient forage and cover attributes to support thriving populations of the species.

DFC-TE-27 and ***DFC-TE-23***
Potential roosting and nesting sites (for special status raptors) will be abundant.

These objectives are all being met. Quantity and quality of habitat for special status species are taken into consideration for all project-level planning, including applications for new trails, roads, or projects that bisect contiguous habitat and/or may affect the habitat needs for these species. Sustainability needs such as prey items, forage, cover, roosting and nesting sites, and quantity of suitable habitat for special status species have also been taken into consideration when developing the DPC objectives for these allotments.

Healthy Special Status Species Populations

DFC-TE-24 and ***DFC-TE-20***
Special status raptor populations will be healthy and self-sustaining throughout their range.

DFC-TE-29 and ***DFC-TE-25***
*Rodent populations, as a prey base (for special status raptors), within the Arizona Strip FO/****Monument*** *will be abundant.*

These objectives are being met. Sustainability needs such as forage, cover, shelter, and nesting sites, for special status species have been taken into consideration when developing DPC objectives for these allotments, which will facilitate wildlife population numbers (including those of special status raptor species) reaching maximum levels sustainable for the habitat.

No Net Loss of Threatened and Endangered Species Habitat

DFC-TE-04 and ***DFC-TE-08***
*There will be no net loss in the quality or quantity of special status species habitat throughout the Arizona Strip FO/**Monument**.*

DFC-TE-20 and ***DFC-TE-16***
No net loss will occur in the quality and quantity of suitable habitat for endemic amphibians and aquatic invertebrate species within the Arizona Strip FO/ ***Monument.***

DFC-TE-26 and ***DFC-TE-22***
*No net loss will occur in the quality and quantity of suitable habitat for special status raptors within the Arizona Strip FO/**Monument**.*

DFC-TE-33 and ***DFC-TE-29***
*No net loss will occur in the quality and quantity of suitable habitat for riparian-dependent special status bird species within the Arizona Strip FO/**Monument**.*

These objectives are all being met. Quantity and quality of habitat for special status species are taken into consideration for all project-level planning, including applications for new trails, roads, or projects that bisect contiguous habitat and/or may eliminate habitat for these species. Sustainability needs such as prey items, forage, cover, roosting and nesting sites, and quantity of suitable habitat for special status species have also been taken into consideration when developing the DPC objectives for these allotments.

Condors

DFC-TE-31 and ***DFC-TE-27***
The experimental non-essential population of California condor will be at or above 150 individuals, viable, and stable to increasing in number.

Progress toward meeting this objective is occurring and is ongoing. The BLM works cooperatively with USFWS, AGFD, and the Peregrine Fund to continue the highly successful California condor reintroduction program on the Arizona Strip. The BLM provides financial and in-kind assistance to this program. In addition, conservation measures developed specifically for the California condor are incorporated into all projects that have the potential to affect the species.

Aquatic Habitat

DFC-TE-21 and ***DFC-TE-17***
All biologically suitable perennial waters on public lands in the Arizona Strip FO ***(Monument)*** *will be occupied by thriving, self-sustaining populations of native, endemic amphibians and aquatic invertebrate species, as appropriate.*

These objectives are being met. Sullivan Spring, with its large wet meadow and willow stands, is fenced, protected and properly functioning. Quaking Aspen Spring in Sullivan Canyon has a structurally tall and large quantity of aspen growing around it. These riparian areas thus provide habitat for endemic amphibians and aquatic invertebrates. The BLM is in discussions with USFWS and AGFD to determine which sites are suitable for relict leopard frog re-introductions (possibly to include springs within these allotments).

Recreation and Visitor Services

DFC-RR-01
Recreation and visitor services will be managed to provide varying levels of both:

> *1. Structured recreation opportunities that offer a range of specific benefits, activities, and experiences within outdoor settings and/or,*
> *2. Dispersed, unstructured recreation opportunities that focus only on visitor health and safety, user conflict, and resource protection issues (extensive recreation management areas (ERMAs).*

DFC-RR-01
Recreation and visitor services will be managed to provide varying levels of structured recreation opportunities that offer a range of specific benefits, activities, and experiences within outdoor settings (Special Recreation Management Areas [SRMAs].

DFC-RR-04
The excellent opportunities that exist to enjoy remote, rustic settings that provide moderate challenge and solitude in the Specialized TMAs will be maintained/enhanced.

DFC-RR-05
In Backways and Specialized TMAs, recreation opportunities associated with somewhat remote settings, such as exploring backcountry roads, vehicle camping, hunting, sightseeing, recreation aviation, and picnicking will be maintained/enhanced on existing roads, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

DFC-RR-06 and ***DFC-RR-07***
In the Primitive TMA, high quality recreation opportunities associated more with primitive recreation experience opportunities and non-motorized uses such as camping, sightseeing, hiking, horseback riding, and hunting, will be

maintained/enhanced, provided they will be compatible with the protection and enhancement of sensitive resource values, where appropriate.

These objectives are being met. A wide variety of recreation experiences are being provided to local community members and regional visitors within these allotments.

Wilderness

DFC-WM-01
The first and dominant goal will be to provide for the long-term protection and preservation of the areas' wilderness character under a principle of non-degradation. The areas' natural condition, opportunities for solitude, opportunities for primitive and unconfined types of recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical value present will be managed so that they remain unimpaired.

DFC-WM-06
BLM wilderness areas will be managed to be ecologically sustainable and resilient to natural and human-caused perturbations (See Vegetation Management and Fire Management decisions). The BLM will strive to preserve

or restore the natural quiet and natural sounds associated with the physical and biological resources of designated wilderness.

The objectives for the management of designated wilderness in these allotments are being met. The Paiute Wilderness is managed to protect its wilderness characteristics; these values are taken into consideration during all project-level planning so that the wilderness remains unimpaired.

Wild and Scenic Rivers

DFC-WR-02
Until Congress acts to designate or release from further consideration rivers determined to be eligible and suitable through the previous RMP process and the subsequent Arizona Statewide W&SR Legislative EIS, the following desired conditions will be maintained:

- *Preservation of the stream's free-flowing nature.*
- *Preservation, protection, and, to the greatest extent practicable, enhancement of identified outstandingly remarkable values.*
  - *Virgin River: scenic, geologic, aquatic, and riparian values*
- *Preservation of characteristics that establish the potential classifications as Wild, Scenic, or Recreational:*
  - *Wild: free of impoundments, generally inaccessible except by trail, with shorelines essentially primitive and waters unpolluted.*

- *Scenic: free of impoundments and generally inaccessible except by trail. However, shoreline disturbance from highway construction is apparent at several points.*
- *Recreational: several access points and noticeable human developments.*

This objective is being met for the suitable Virgin River wild and scenic river segments because livestock grazing (or other actions authorized by the BLM) would not affect the maintenance of the characteristics that established their potential classifications.

Areas of Critical Environmental Concern

DFC-AC-01
ACECs will provide protection for special status plant and animal species, scenic values, riparian values, and significant cultural resources.

This objective for the Virgin River ACEC is being met. Protection of cultural resources, endangered fish in the Virgin River, riparian, and scenic values is being provided by site-specific management actions. These actions include the following:

- The ACEC is closed to all vegetative product sales;
- The riparian area within the ACEC is managed to achieve and/or maintain proper functioning condition.

As described on pages 52-53 of this assessment, monitoring of the riparian area in this section of the Virgin River indicates that it is properly functioning. In addition, the values for which this ACEC was designated are taken into consideration during project-level planning in order to protect them.

Visual Resources

DFC-VR-01
Public lands will be managed in a manner, which will protect the quality of the scenic (visual) values of these lands. (43 U.S. Code [USC] 1701, Section 102 (a) (8)).

DFC-VR-03
The region's scenic beauty, open space landscapes, and other high-quality visual resources will be maintained within the Arizona Strip FO.

The objectives for management of visual resources in these allotments are being met. Visual resources are taken into consideration for all project-level planning in order to minimize impacts from proposed activities.

2. Specific Resource Objectives

Arizona Strip Desert Bighorn Sheep Management Plan, as amended (July 2006)

BS1 Enhance and maintain forage, water, and cover conditions on 720 square miles of bighorn sheep habitat so that watersheds are in proper functioning condition, ecological processes are maintained, water quality standards are met, and threatened and endangered species habitat is conserved. Manage this habitat to support an average density of no more than four sheep per square mile within each habitat area by the year 2010.

Progress toward meeting this objective is occurring and ongoing. Sustainability needs such as appropriate forage, water and cover for desert bighorn sheep have been taken into consideration when the DPC objectives for the allotment were developed. Impacts to wildlife, including bighorn sheep, and their forage needs are taken into consideration and analyzed during all project-level planning. The BLM, in partnership with AGFD and the Bighorn Sheep Society, have prioritized the repair needs of water catchments and are implementing repairs annually. The number of water catchments repaired each year is based on funding availability.

BS2 Increase populations of desert bighorn sheep to fully occupy 720 square miles of suitable habitat on the Arizona Strip at an average density of no more than four bighorn per square mile by the year 2010. Maximum populations for the four desert bighorn habitat areas would be 886 for the Virgin and Beaver Dam Mountains, 700 for the Grand Wash Cliffs, 820 for Kanab Creek, and 432 for the Paria-Vermilion Cliffs area. The maximum population for the Arizona Strip would be 2880 desert bighorn.

Progress toward meeting this objective is occurring and is ongoing. The bighorn sheep population is healthy and stable although the numbers are low. Supplemental transplants are scheduled pending funding availability. However, the BLM and AGFD would prefer to provide for the habitat needs of bighorn sheep to allow the population to expand into underutilized habitats on their own. Accomplishing this would be facilitated by providing additional wildlife waters and repairing/maintaining existing wildlife waters (to ensure reliable year-round water sources).

Allotment Management Plans

See trend and ecological site tables for specific data.

Black Rock Allotment

1. Summer Fall System

   a. Increase cool season grasses in the Black Rock Tank, Low Mountain and Maple Pastures from 5 to 20% composition and maintain vigorous browse conditions.

   This objective is being met at Black Rock Tank, which has 18% cool season grasses. The objective is exceeded at Low Mountain (which has 78% cool season grasses); the objective is not being met at Maple (which has 0% cool season grass). Maple Pasture, according to the site guide, should have 6% cool season grasses. However, the site is dominated by browse (serviceberry at 3%, oak at 3%, silk tassel and manzanita at 3%, and mountain mahogany at 2%), sagebrush (at 30%), and pinyon/juniper (at 8%). Meeting the grass objective would require treating the area to remove competing vegetation.

   b. Increase and maintain cool season grasses in seeded areas to 40% composition.

   Cool season grasses in the seeded areas are 76% at Low Mountain and 63% at Black Rock Pasture Seedings. The objective is therefore exceeded.

2. Winter Spring System

   a. Increase Indian ricegrass, sand dropseed and galleta grass from the present trace to (5%) to 20% composition.

   This objective involves Black Rock Tank and Winter Road Pastures. Currently Black Rock Tank has 6% Indian ricegrass, 0% sand dropseed, and 0% galleta, so this old AMP objective is not being met. However, site guides now available state that Black Rock Tank key area should have up to 5% Indian ricegrass, 5% galleta, and no sand dropseed (so galleta would not meet the site guide objectives).

   Winter Road currently has 0% Indian ricegrass, 0% sand dropseed, and 0% galleta. This AMP objective is again not being met. The Winter Road Pasture site guide shows 5% desert needle grass and 5% other perennial grasses. The key area has 5% squirreltail, so it meets the site guide objective.

b. *Increase vegetative cover of desirable perennial forage from 10% to 25% on specific areas that lack cover or are dominated by annual vegetation. Such areas are found in Lizard #1 and northern portion of Lizard #2.*

Lizard #1 has 39% desirable perennial forage, which consists of perennial grasses (galleta, Indian ricegrass, squirreltail) and browse (winterfat, fourwing saltbush, and goldeneye). Lizard #2 has 68% desirable perennial forage. This objective is therefore exceeded.

c. *Increase the composition of winterfat, hopsage and ephedra to 35% on all suitable areas. Several areas on the allotment now support 35% showing a potential for other areas supporting only traces.*

These plants occur mostly in the lower three pastures (Lizard #1, Lizard #2, and Winter Road). The site guides for the three key areas show the following:

- Lizard #1 and Lizard #2 – winterfat at 2%, hopsage at 0%, and ephedra at 0%.
- Winter Road –winterfat at 0%, hopsage at 0%, and ephedra at 10%.

This objective has not been met, nor can it be met as it is outside the sites' potential to meet the old objective. The objective needs to be changed to fit the site guides (see new DPC objectives on pages 17-18 of this assessment).

3. Fall Winter System

a. *To increase perennial grasses from the present trace to 15% of the vegetative composition.*

Lizard #1 currently has 33 % perennial grasses and Lizard #2 has 60% perennial grasses, so this objective is exceeded.

b. *To increase vigor of existing forage species by confining grazing to a designated beneficial season of use.*

The grazing rotation systems used employs a "beneficial seasons of use" (i.e., rest from grazing during growing seasons of forage species). Once plants have made the seed ripe stage the plants are as vigorous as the year's conditions provide. Both Black Rock and Sullivan Canyon provide rest to all pastures during growing seasons and/or the two rainy seasons that occur on most years, which is designed to improve and/or maintain vigor of plants.

Overall Objectives (Cooperator)

1. *To provide sufficient livestock forage during breeding and calving periods to obtain at least a 90% calf crop.*

2. *To annually produce 1,680 AUM's of forage on a sustained yield basis.*

These are livestock performance objectives for which the BLM does not monitor.

Sullivan Canyon Allotment

1. *Winter System*

   a. *Improve the vigor and forage production of shrubs such as Mormon tea, blackbrush, and bursage and increase composition of Mormon tea from 5% to 10%.*

Blackbrush is now 91% and Mormon tea is 3%, so the objective for Mormon tea is not met. However, site guides now available state the area's Mormon tea composition should be 3%, so there is little chance to substantially increase the species unless blackbrush is reduced.

   b. *Produce enough winter forage to carry 125 cows for 52 months or 688 AUMs.*

This objective is being met.

2. *Intermediate System*

   a. In Pasture #4 increase composition of native grasses from 10% to 15%

In the New Pasture the seeded grasses are now 31% and native grasses are 3%. The seeded grasses are too dominant to allow the native grasses to increase. Thus, this objective is not met as natives are too low. This objective was written before the land treatments occurred (in 1982-3) and crested wheat, Russian wildrye and intermediate wheat were seeded, which compete strongly with native grasses.

   b. *Maintain present grass composition in seeded areas at 60%.*

This involves New Pasture and it has 76 percent grass composition. The objective is therefore exceeded.

c. Produce sufficient forage for 125 cows for 2 months or 250 AUMs.

This objective is being met.

3. *Summer*

a. Maintain 60% grass composition of seeded areas by keeping grasses vigorous enough to out compete invading sagebrush.

Grass composition on seeded areas is: Black Rock Neck 33%, Trail's End 59%, and Twin Pine 64%. Thus, this objective is met on 2 of 3 pastures.

b. Increase composition of native grasses from 10-20% in untreated areas. No trend areas in untreated areas.

Not met. Most native grass measurements fall between 5-10% in the key areas. This is due to existing competition from dense shrub and tree species or dominant seeded grasses which yield few niches for native grasses.

c. *Improve vigor and forage production of Gambel oak.*

Oak in the key areas in sites that can grow oak are at site guide levels or higher. Upper Sullivan has 11% oak; Neck Pasture has 4% oak; Twin Pine has 11% oak; and Trails End has none in the key area. This objective is met in 3 of the 4 key areas.

d. *Produce enough forage to carry 125 cows for 4 months.*

This objective is being met.

Desired Plant Community (DPC) Objectives

These objectives are written to occur in a 20 year interval from permit renewal. Table 10 presents each DPC objective for Black Rock Allotment and whether or not it is currently being met; Table 11 presents DPC objectives for Sullivan Canyon Allotment and whether each is being met.

Table 10. Black Rock Allotment Desired Plant Community (DPC) Objectives

Species	Current Composition (%)	Allowable Composition (%)	DPC	DPC Met or not Met
Lizard #1				
4-Wing	2	5	Maintain between 2-5%	Met
Winterfat	2	2	Maintain between 1-2%	Met
Mormon tea	2	0	Maintain between 1-2%	Met
Ratany	9	2	Maintain between 1-5%	Not met – too high
Creosote	38	35	Maintain between 25-35%	Not met – too high
Wolfberry	13	5	Maintain between 1-5%	Not met – too high
Big galleta	26	20	Maintain between 15-20%	Not met – too high
Sand dropseed	7	15	Maintain between 7-15%	Met

Lizard #2				
Winterfat	2	2	Maintain between 1-2%	Met
Mormon tea	6	0	Maintain between 1-2%	Not met – too high
Snakeweed	6	0	Maintain at 0	Not met – too high
Wolfberry	8	5	Maintain between 1-5%	Not met – too high
Cactus	4	1		
Big galleta	58	20	Maintain between 15-20%	Not met – too high
Burro grass	5	0	Maintain between 1-2%	Not met – too high
Sand dropseed	2	15	Maintain between 7-14%	Not met – too high
Fluff grass	9	0	Maintain near 0	Not met – too high
Globemallow	1	0	Maintain at 1-2%	Met

Black Rock Tank				
Rabbitbrush	6	5	Maintain at less than 5%	Not met – too high
Sage	19	25	Maintain between 15-25%	Met
Cliffrose	1	5	Maintain between 5-10%	Not met – too high
Rhus	6	0	Maintain between 1-2%	Not met – too high
Barberry	2	0	Maintain between 1-2%	Met
Juniper	2	5	Maintain between 1-5%	Met
Squirreltail	9	5	Maintain between 5-10%	Met
Ricegrass	6	5	Maintain between 5-10%	Met
Wheatgrass	3	0	Maintain between 3-5%	Met
Galleta	0	5	Maintain between 1-5%	Not met – too high
Globemallow	1		Maintain at 1%	Met
Viguiera	10	5 (Other Perennial Forbs)	Maintain between 1-5%	Not met – too high

Winter Road A				
Sage	25	5	Maintain between 5-10%	Not met – too high
Pinyon	19	0	Maintain between 1-5%	Not met – too high
Juniper	11	0	Maintain between 1-5%	Not met – too high
Cliffrose	15	5	Maintain between 5-10%	Not met – too high
Squirreltail	5	5	Maintain between 5-10%	Met
Apache plume	5	5	Maintain between 5-10%	Met
Mormon tea	4	10	Maintain between 4-10%	Met

Low Mountain #5				
Sagebrush	5	20	Maintain between 15-20%	Not met
Pinyon	5	10	Maintain between 5-10%	Met
Juniper	8	10	Maintain between 8-10%	Met
Cliffrose	1	2	Maintain between 1-5%/	Met
Serviceberry	1	10	Maintain between 5-10%	Not met
Seeded grass	76	5	Maintain between 50-75%	Met
Squirreltail	2		Maintain at 2%	Met
Globemallow	2	5	Maintain between 1-5%	Met
Black Rock #4				
Serviceberry	0	5	Maintain at 5%	Met
Black/big sage	32	15	Maintain 15-20%	Not met – too high
Pinyon	2	10	Maintain at 2-10%	Met
Seeded Grass	63	5 Other Perennial Grass	Maintain at 50-70%	Met
Muttongrass	0	0	Maintain 1-5%	Not met
Squirreltail	0	10	Maintain 5-10%	Not met
Sand dropseed	0	0	Maintain between 1-2%	Not met
Others	3	5		

Maple #14				
Serviceberry	3	3	Maintain between 1-3%	Met
Oak	3	33	Maintain between 20-30%	Not met
Sage	30	5	Maintain between 1-5%	Not met
Cliffrose	2		Maintain at 1-2%	Met
Bitterbrush	0	0	Maintain between 5-10%	Not met
Buckbrush	0	0	Maintain between 5-10%	Not met
Pinyon/juniper	8	8	Maintain at 5%	Not met – too high
Mountain mahogany	2	0	Maintain between 5-10%	Not met
Silk tassel & manzanita	3	25	Maintain between 20-25%	Not met
Squirreltail	0	1	Maintain at 1%	Not met
Buckwheat	2	0	Maintain at 2%	Met
Commandra	0	2	Maintain at 2%	Not met

Table 11. Sullivan Canyon Allotment Desired Plant Community (DPC) Objectives

Species	Current Composition (%)	Site guide Allowable Composition (%)	DPC	DPC Met or Not Met
Mountain Sheep				
Blackbrush	91	55	Decrease to 55-60%	Not met – too high
Mormon tea	3	5	Maintain between 5-10%	Not met
Banana yucca	4	5	Maintain between 5-10%	Not met
Winterfat	0	0	Maintain between 1-10%%	Not met
Big galleta	1	2	Maintain between 2-10%	Not met

New #4				
Black sage	34	20	Maintain between 15-20%	Not met – too high
Cliffrose	7	1	Maintain between 6-10%	Met
Juniper	0	10	Maintain between 5-10%	Not met
Pinyon	2	10	Maintain pinyon between 5-10%	Not met
Serviceberry	3	10	Maintain between 1-10%	Met
Crested wheat	34	0	Maintain between 10-30%	Not met – too high
Wildrye	1	0	Maintain between 2-5%	Not met
Muttongrass	0	2	Maintain between 5-20%	Not met
Squirreltail	5	0	Maintain between 5-20%	Met
Perennial forbs	7	0	Maintain at 5%	Not met – too high
Upper Sullivan				
Serviceberry	5	3	Maintain at 3%	Not met – too high
Manzanita	1	10	Maintain between 1-10%	Met
Sagebrush	61	5	Maintain between 5-10%	Not met
Desert holly	1	0	Maintain between 1-3%	Met
Juniper	3	5	Maintain at 5%	Not met
Pinyon	3	3	Maintain at 3%	Met
Oak	11	3	Maintain 3-10%	Not met
Sumac	3	0	Maintain between 1-3%	Met
Gooseberry	2	0	Maintain between 1-2%	Met
Locust	1	5	Maintain 5-10%	Not met
Muttongrass	1	2	Maintain between 2-5%	Not met
Squirreltail	1	1	Maintain between 2-5%	Not met
Perennial forbs	8		Maintain at 8%	Met

BlackRock Neck East (92)				
Sage	13	25	Maintain between 13-25%	Met
Cliffrose	21	5	Maintain between 5-20%	Met
Juniper	15	5	Maintain 3-5%	Not met – too high
3-awn	1	0	Maintain at 1%	Met
Squirreltail	6	5	Maintain at 5-10%	Met
Perennial forbs	22	5	Maintain at 5%	Not met
Twin Pine				
Serviceberry	2	5	Maintain at 2-5%	Met
Sage	17	15	Maintain between 15-20%	Met
Oak	11	5	Maintain between 5-10%	Met
Snowberry	5	0	Maintain between 1-5%	Met
Crested wheat	8	0	Maintain between 10-15%	Not met
Intermediate wheatgrass	56	5	Maintain between 40-60%	Met
Perennial forbs	3	5	Maintain between 5-10%	Met
Trails End				
Black sage	39	15	Maintain between 15-20%	Not met – too high
Crested wheat	15	0	Maintain between 15-20%	Met
Intermediate wheat	37	5	Maintain between 15-20%	Not met – too high
Muttongrass	3	5	Maintain between 3-5%	Met
Squirreltail	4	10	Maintain between 5-10%	Not met
Perennial forbs	4	5	Maintain between 2-4%	Met

Black Rock Neck West				
Black sage	49	15	Maintain 15-20%	Not met – too high
Juniper	0	10	Maintain between 5-10%	Not met
Oak	4	5	Maintain between 1-5%	Met
Locust	0	0	Maintain between 1-5%	Not met
Crested wheatgrass	22	0	Maintain between 5-25%	Met
Intermediate	1	5	Maintain between 1-10%	Met
Junegrass	1	10	Maintain between 1-10%	Met
Muttongrass	4	0	Maintain between 4-10%	Met
Squirreltail	6	10	Maintain between 6-10%	Met
Perennial forbs	10	5	Maintain between 5-10%	Met

B. Pertaining to Issues

1. Issues Relating to Rangeland Health

a. Lack of long term water available in crucial areas such as Lone Pine Reservoir. (The only water available is on private land i.e. Larsen Tank.) Would like to consider acquiring funds to repair Lone Pine or create additional wildlife waters in area.

Conclusion: This reservoir is an existing improvement and can be cleaned out by the rancher to hold more water without prior permission. After heavy thunderstorms this reservoir has held water. It had water in July and August of 2009.

b. Water may not be available to wildlife/livestock at the spring in Sullivan Canyon (at following location: NW ¼, Sec. 15, T. 40 N., R. 14 W.). The primary wildlife concern is for bighorn.

Conclusion: Water availability at this location is not monitored due to inaccessibility since wilderness designation, so it is not known how often water is unavailable.

c. Concentration area where Sullivan Canyon meets the Virgin River is an eyesore.

Conclusion: This is an eyesore during the winter as cattle water from the river. The area is about an acre in size.

d. Cattle intruding into Sullivan Spring exclosure has been an issue in the past.

Conclusion: This has occurred; what has been found is that the gate is opened by unknown persons and left open. However, cattle are often not in the Upper Sullivan Pasture when this occurs and so do not go into the exclosure. For example monitoring revealed the following:

- In 1988 the gate was open but no sign of cattle in exclosure;
- In 1990 the gate was closed and there was no cattle sign;
- In 1992 the gate was open but no sign of cattle utilization on vegetation;
- In 1998 the gate was closed and there was no recent cattle sign in the spring area;
- In 2002 the gate was closed and no cattle sign in the spring area;
- In 2004 the gate was closed and no cattle sign in the spring area;
- In 2006 the gate was closed with no cattle sign;
- In 2008 the gate closed with no cattle sign in the spring area;
- In 2009 the gate was open and cattle had been in the spring area.

Thus, while cattle do get into the spring area some years, the vegetation has been rested for many years in a row and responds quickly after the cattle leave.

e. Old and new vegetative treatments (chainings/pushes) in areas such as the south end of Low Mountain need to be evaluated as to their value for wildlife/livestock.

Conclusion: The area is valuable to livestock as there is much grass and native browse. According to Key Area #5, seeded grass is at 76%, browse is at 7%, and pinyon and juniper are at 13% for cover. Wildlife pellet plot studies need to be done to assess and quantify the heavy wildlife use made by casual observation.

The following is added for conclusions relative to implementation of the Standards for Rangeland Health and Guidelines for Grazing Administration

Based on the analyses and supporting documentation referenced herein, resource conditions on the allotment:

[ ] Meet all applicable standards for rangeland health

[X] Are making significant progress toward meeting the applicable standards for rangeland health

Do not meet the standards for rangeland health for:
[ ] No. 1: Upland sites
[ ] No. 2: Riparian-Wetland sites
[ ] No. 3: Desired Resource Conditions

[ ] Have not been sufficiently documented to make a specific determination, but there is no reason to believe that current management would preclude meeting the standards for rangeland health.

VI. RECOMMENDATIONS

1. Renew the 10 year permits for both allotments, with current terms and conditions.

2. Treat up to 30 percent of decadent pinyon-juniper woodlands to promote and enhance understory growth of key species of grasses, forbs, and browse to benefit wildlife.

3. Monitor the most erosive soils in the Black Rock Allotment to see if they will stabilize after the 2007 fire. Look at both seeded and unseeded areas. Cut down many of the burned trees in the eroding areas by Lone Pine Reservoir, laying them across the slopes to trap sediment and reduce runoff and erosion. Seed grasses in those areas.

AUTHORIZED OFFICER CONCURRENCE:

✓ We concur with the conclusions and recommendations as written.

_____ We do not concur.

_____ We concur, with the following modifications:

Lorraine M. Christian — 11/3/2010

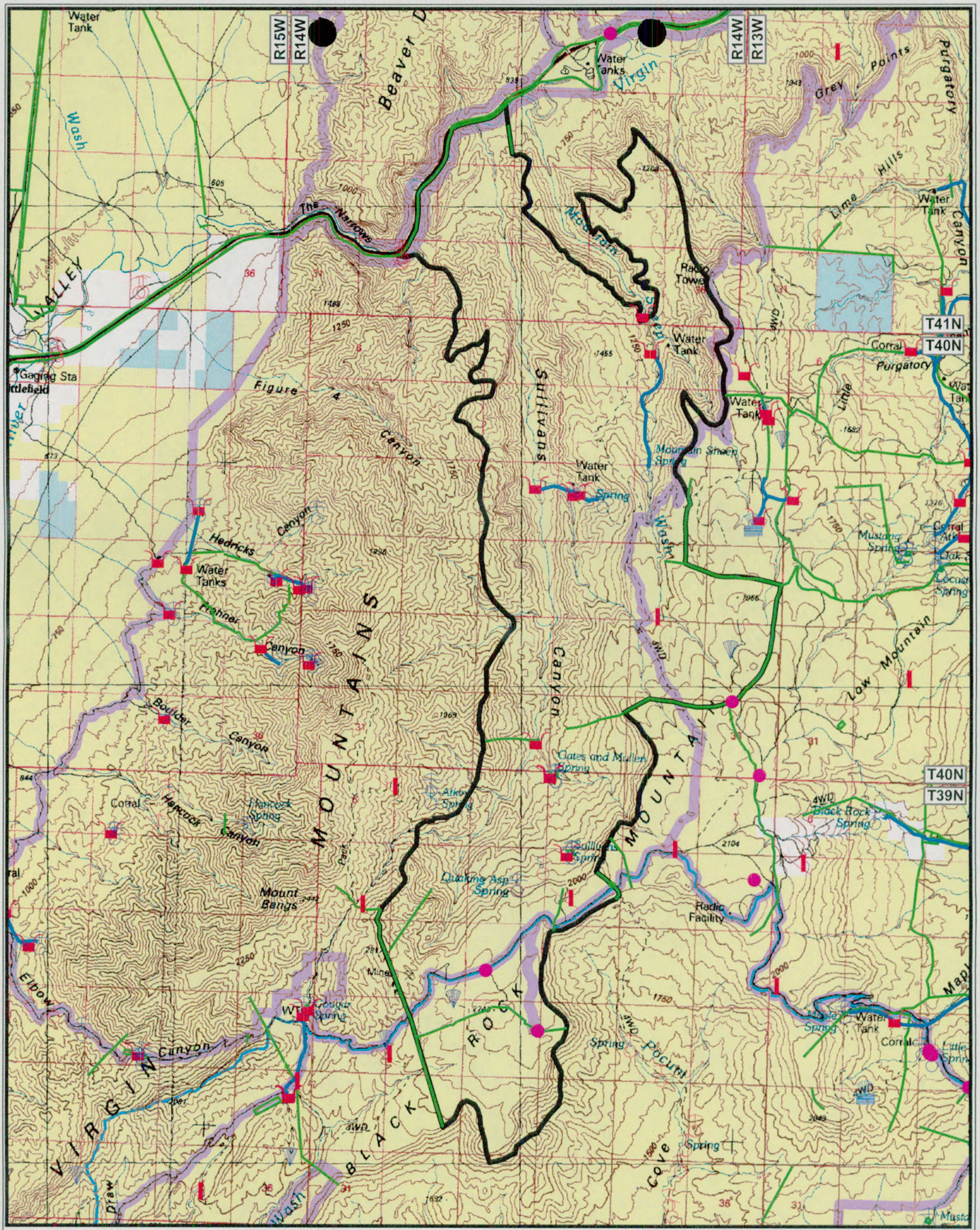
Field Manager
Arizona Strip Field Office

Date

Thomas R. Edgerton — 11/4/10

Monument Manager
Grand Canyon-Parashant National Monument

Date



Sullivan Canyon Allotment

- Noxious Weeds
- Livestock Catchment
- Key Area
- Fence
- Pipeline
- Monument Boundary
- Allotment Boundary
- Wilderness Boundary

Ownership
- BLM
- Forest Service
- Indian Reservation
- National Park
- Private
- Recreation Area
- State

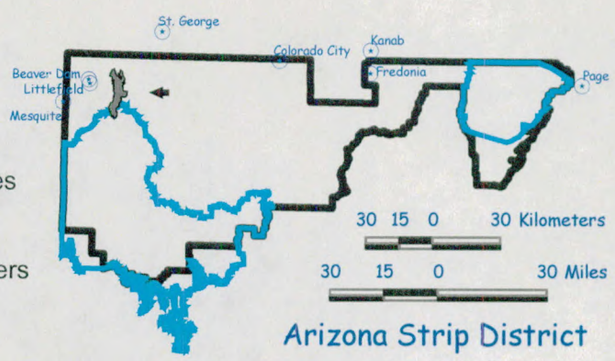
- Fenced Reservoir
- Trough
- Undeveloped Spring
- Unfenced Reservoir
- Water Storage Tank
- Well
- Wildlife Catchment
- Wildlife Drinker
- Windmill
- Cattleguard
- Corral
- Developed Spring

N W E S

1:100,000

1 0.5 0 1 Miles

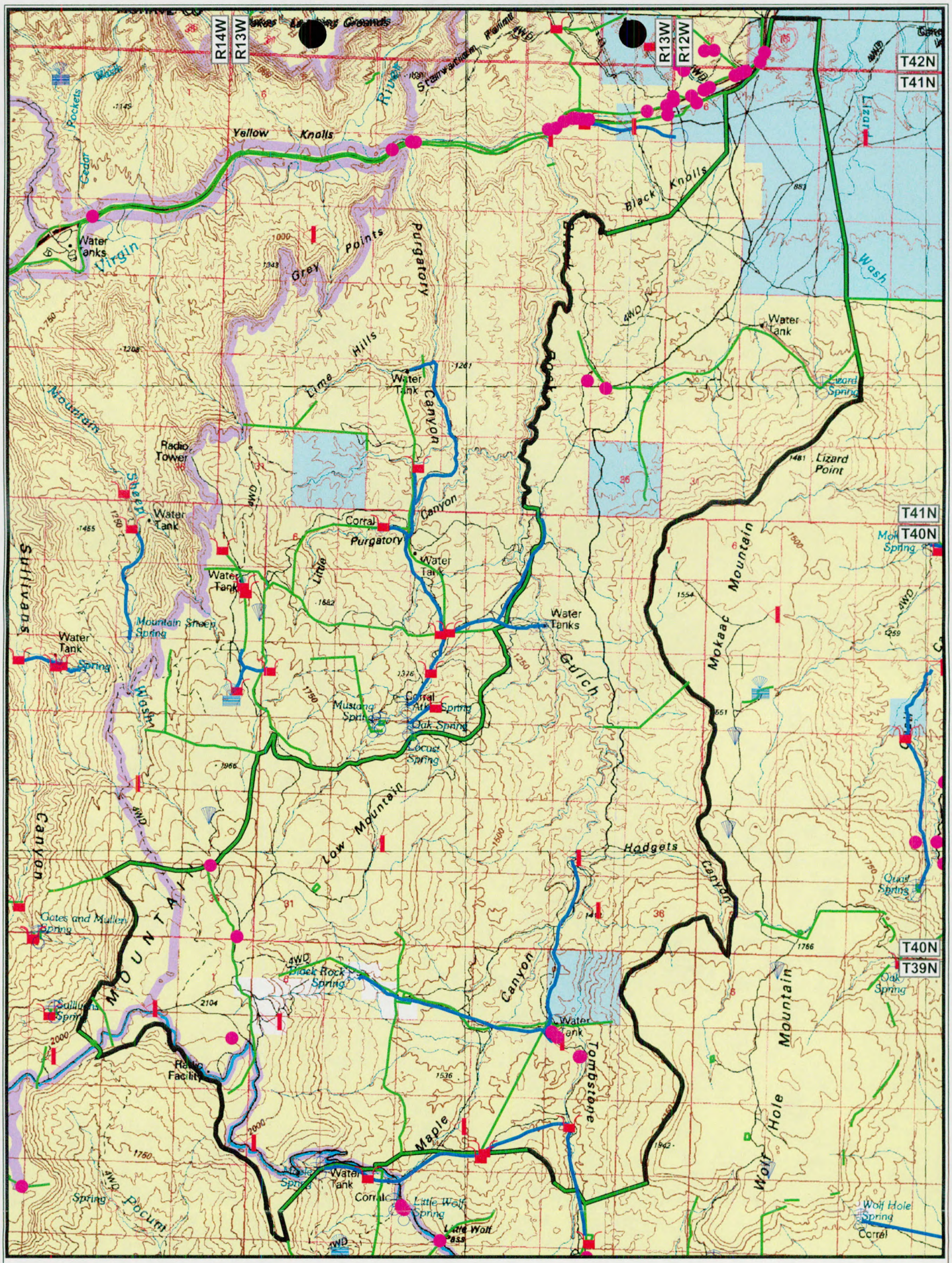
1 0.5 0 1 Kilometers



Bureau of Land Management
Arizona Strip District

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Linda Price
September 29, 2008


R14W
R13W
R13W
R12W
T42N
T41N
T41N
T40N
T40N
T39N
Yellow Knolls
Water Tanks
Virgin
Grey Points
Purgatory
Black Knolls
Wash
Water Tank
Lizard Point
Lime Hills
Canyon
Radio Tower
Sheep
Water Tank
Corral
Purgatory
Water Tank
Water Tank
Mountain Sheep Spring
Water Tank
Spring
Shivwits
Wash
Water Tanks
Gulch
Mokaac Mountain
Mustang Spring
Corral
Oak Spring
Locust Spring
Low Mountain
Hodgets
Canyon
Gates and Mullen Spring
Black Rock Spring
Canyon
Water Tank
Tombstone
Maple
Wolf Hole Mountain
Radio Facility
Water Tank
Corral
Little Wolf Spring
Little Wolf
Wolf Hole Spring
Corral
Spring
Pocum
Black Rock Allotment
Noxious Weeds
Livestock Catchment
Key Area
Fence
Pipeline
Monument Boundary
Allotment Boundary
Wilderness Boundary
Ownership
BLM
Forest Service
Indian Reservation
National Park
Private
Recreation Area
State
Fenced Reservoir
Trough
Undeveloped Spring
Unfenced Reservoir
Water Storage Tank
Well
Wildlife Catchment
Wildlife Drinker
Windmill
Cattleguard
Corral
Developed Spring
1:100,000
1 0.5 0 1 Miles
1 0.5 0 1 Kilometers
St. George
Colorado City
Kanab
Fredonia
Page
Beaver Dam
Littlefield
Mesquite
30 15 0 30 Kilometers
30 15 0 30 Miles
Arizona Strip District
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Arizona Strip District
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Linda Price
September 29, 2008

Appendix A

ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION

ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION

INTRODUCTION

The Department of the Interior's final rule for Grazing Administration, issued on February 22, 1995, and effective August 21, 1995, requires that Bureau of Land Management (BLM) State Directors develop State or regional standards and guidelines for grazing administration in consultation with BLM Resource Advisory Councils (RAC), other agencies and the public. The final rule provides that fallback standards and guidelines be implemented, if State standards and guidelines are not developed by February 12, 1997. Arizona Standards and Guidelines and the final rule apply to grazing administration on public lands as indicated by the following quotation from the Federal Register, Volume 60, Number 35, page 9955.

> "The fundamentals of rangeland health, guiding principles for standards and the fallback standards address ecological components that are affected by all uses of public rangelands, not just livestock grazing. However, the scope of this final rule, and therefore the fundamentals of rangeland health of §4180.1, and the standards and guidelines to be made effective under §4180.2, are limited to grazing administration."

Although the process of developing standards and guidelines applies to grazing administration, present rangeland health is the result of the interaction of many factors in addition to grazing by livestock. Other contributing factors may include, but are not limited to, past land uses, land use restrictions, recreation, wildlife, rights-of-way, wild horses and burros, mining, fire, weather, and insects and disease.

With the commitment of BLM to ecosystem and interdisciplinary resource management, the standards for rangeland health as developed in this current process will be incorporated into management goals and objectives. The standards and guidelines for rangeland health for grazing administration, however, are not the only considerations in resolving resource issues.

The following quotations from the Federal Register, Vol. 60, No. 35, page 9956, February 22, 1995, describe the purpose of standards and guidelines and their implementation:

> "The guiding principles for standards and guidelines require that State or regional standards and guidelines address the basic components of healthy rangelands. The Department believes that by implementing grazing-related actions that are consistent with the fundamentals of §4180.1 and the guiding principles of §4180.2, the long-term health of public rangelands can be ensured.
>
> "Standards and guidelines will be implemented through terms and conditions of grazing permits, leases, and other authorizations, grazing-related portions of activity plans (including Allotment Management Plans), and through range improvement-related activities.
> "The Department anticipates that in most cases the standards and guidelines themselves will not be terms and conditions of various authorizations but that the terms and conditions will reflect the standards and guidelines.
>
> "The Department intends that assessments and corrective actions will be undertaken in

priority order as determined by BLM.

"The Department will use a variety of data including monitoring records, assessments, and knowledge of the locale to assist in making the "significant progress" determination. It is anticipated that in many cases it will take numerous grazing seasons to determine direction and magnitude of trend. However, actions will be taken to establish significant progress toward conformance as soon as sufficient data are available to make informed changes in grazing practices."

FUNDAMENTALS AND DEFINITION OF RANGELAND HEALTH

The Grazing Administration Regulations, at §4180.1 (43 Code of Federal Regulation [CFR] 4180.1), Federal Register Vol. 60, No. 35, pg. 9970, direct that the authorized officer ensures that the following conditions of rangeland health exist:

(a) Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity, and timing and duration of flow.

(b) Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.

(c) Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs.

(d) Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed, Category 1 and 2 Federal candidate and other special status species.

These fundamentals focus on sustaining productivity of a rangeland rather than its uses. Emphasizing the physical and biological functioning of ecosystems to determine rangeland health is consistent with the definition of rangeland health as proposed by the Committee on Rangeland Classification, Board of Agriculture, National Research Council (Rangeland Health, 1994, pg. 4 and 5). This Committee defined Rangeland Health ". . .as the degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained." This committee emphasized ". . .the degree of integrity of the soil and ecological processes that are most important in sustaining the capacity of rangelands to satisfy values and produce commodities." The Committee also recommended that "The determination of whether a rangeland is healthy, at risk, or unhealthy should be based on the evaluation of three criteria: degree of soil stability and watershed function, integrity of nutrient cycles and energy flow, and presence of functioning mechanisms" (Rangeland Health, 1994, pg. 97-98).

Standards describe conditions necessary to encourage proper functioning of ecological processes on specific ecological sites. An ecological site is the logical and practical ecosystem unit upon which to base an interpretation of rangeland health. Ecological site is defined as:

". . . a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management"

(Journal of Range Management, 48:279, 1995). Ecological sites result from the interaction of climate, soils, and landform (slope, topographic position). The importance of this concept is that the "health" of different kinds of rangeland must be judged by standards specific to the potential of the ecological site. Acceptable erosion rates, water quality, productivity of plants and animals, and other features are different on each ecological site.

Since there is wide variation of ecological sites in Arizona, standards and guidelines covering these sites must be general. To make standards and guidelines too specific would reduce the ability of BLM and interested publics to select specific objectives, monitoring strategies, and grazing permit terms and conditions appropriate to specific land forms.

Ecological sites have the potential to support several different plant communities. Existing communities are the result of the combination of historical and recent uses and natural events. Management actions may be used to modify plant communities on a site. The desired plant community for a site is defined as follows: "Of the several plant communities that may occupy a site, the one that has been identified through a management plan to best meet the plan's objectives for the site. It must protect the site as a minimum." (Journal of Range Management, 48:279, 1995.)

Fundamentals (a) and (b) define physical and biological components of rangeland health and are consistent with the definition of rangeland health as defined by the Committee on Rangeland Classification, Board on Agriculture, National Research Council, as discussed in the paragraph above. These fundamentals provide the basis for sustainable rangelands.

Fundamentals (c) and (d) emphasize compliance with existing laws and regulation and, therefore, define social and political components of rangeland health. Compliance with Fundamentals (c) and (d) is accomplished by managing to attain a specific plant community and associated wildlife species present on ecological sites. These desired plant communities are determined in the BLM planning process, or, where the desired plant community is not identified, a community may be selected that will meet the conditions of Fundamentals (a) and (b) and also adhere to laws and regulations. Arizona Standard 3 is written to comply with Fundamentals (c) and (d) and provide a logical combination of Standards and Guidelines for planning and management purposes.

STANDARD AND GUIDELINE DEFINITIONS

Standards are goals for the desired condition of the biological and physical components and characteristics of rangelands. Standards:

(1) are measurable and attainable; and
(2) comply with various Federal and State statutes, policies, and directives applicable to BLM Rangelands.

Guidelines are management approaches, methods, and practices that are intended to achieve a standard. Guidelines:

(1) typically identify and prescribe methods of influencing or controlling specific public land uses;
(2) are developed and applied consistent with the desired condition and within site capability; and
(3) may be adjusted over time.

IMPLEMENTING STANDARDS AND GUIDELINES

The authorized officer will review existing permitted livestock use, allotment management plans, or other activity plans which identify terms and conditions for management on public land. Existing management practices, and levels of use on grazing allotments will be reviewed and evaluated on a priority basis to determine if they meet, or are making significant progress toward meeting, the standards and are in conformance with the guidelines. The review will be interdisciplinary and conducted under existing rules which provide for cooperation, coordination, and consultation with affected individuals, federal, state, and local agencies, tribal governments, private landowners, and interested publics.

This review will use a variety of data, including monitoring records, assessments, and knowledge of the locale to assist in making the significant progress determination. Significance will be determined on a case by case basis, considering site potential, site condition, weather and financial commitment. It is anticipated there will be cases where numerous years will be needed to determine direction and magnitude of trend.

Upon completion of review, the authorized officer shall take appropriate action as soon as practicable but no later than the start of the next grazing year upon determining that the existing grazing management practices or level of use on public land are significant factors contributing to failure to achieve the standards and conform with the guidelines that are made effective under 43 CFR 4180.2. Appropriate action means implementing actions that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with guidelines.

Livestock grazing will continue where significant progress toward meeting standards is being made. Additional activities and practices would not be needed on such allotments. Where new activities or practices are required to assure significant progress toward meeting standards, livestock grazing use can continue contingent upon determinations from monitoring data that the implemented actions are effective in making significant progress toward meeting the standards. In some cases, additional action may be needed as determined by monitoring data over time.

New plans will incorporate an interdisciplinary team approach (Arizona BLM Interdisciplinary Resource Management Handbook, April 1995). The terms and conditions for permitted grazing in these areas will be developed to comply with the goals and objectives of these plans which will be consistent with the standards and guidelines.

ARIZONA STANDARDS AND GUIDELINES

Arizona Standards and Guidelines (S&G) for grazing administration have been developed through a collaborative process involving the Bureau of Land Management State S&G Team and the Arizona Resource Advisory Council. Together, through meetings, conference calls, correspondence, and Open Houses with the public, the BLM State Team and RAC prepared Standards and Guidelines to address the minimum requirements outlined in the grazing regulations. The Standards and Guidelines, criteria for meeting Standards, and indicators are an integrated document that conforms to the fundamentals of rangeland health and the requirements of the regulations when taken as a whole.

Upland sites, riparian-wetland areas, and desired resource conditions are each addressed by a standard and associated guidelines.

Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Criteria for meeting Standard 1:

Soil conditions support proper functioning of hydrologic, energy, and nutrient cycles. Many factors interact to maintain stable soils and healthy soil conditions, including appropriate amounts of vegetative cover, litter, and soil porosity and organic matter. Under proper functioning conditions, rates of soil loss and infiltration are consistent with the potential of the site.

Ground cover in the form of plants, litter or rock is present in pattern, kind, and amount sufficient to prevent accelerated erosion for the ecological site; or ground cover is increasing as determined by monitoring over an established period of time.

Signs of accelerated erosion are minimal or diminishing for the ecological site as determined by monitoring over an established period of time.

As indicated by such factors as:

Ground Cover
- litter
- live vegetation, amount and type (e.g., grass, shrubs, trees, etc.)
- rock

Signs of erosion
- flow pattern
- gullies
- rills
- plant pedestaling

Exceptions and exemptions (where applicable):

None

Guidelines:

1-1. Management activities will maintain or promote ground cover that will provide for infiltration, permeability, soil moisture storage, and soil stability appropriate for the ecological sites within management units. The ground cover should maintain soil organisms and plants and animals to support the hydrologic and nutrient cycles, and energy flow. Ground cover and signs of erosion are surrogate measures for hydrologic and nutrient cycles and energy flow.

1-2. When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments may be designed and implemented to attain improvement.

Standard 2: Riparian-Wetland Sites

Riparian-wetland areas are in properly functioning condition.

Criteria for meeting Standard 2:

Stream channel morphology and functions are appropriate for proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate stream energy associated with high water flows.

Riparian-wetland functioning condition assessments are based on examination of hydrologic, vegetative, soil and erosion-deposition factors. BLM has developed a standard checklist to address these factors and make functional assessments. Riparian-wetland areas are functioning properly as indicated by the results of the application of the appropriate checklist.

The checklist for riparian areas is in Technical Reference 1737-9 "Process for Assessing Proper Functioning Condition." The checklist for wetlands is in Technical Reference 1737-11 "Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas."

As indicated by such factors as:

Gradient
Width/depth ratio
Channel roughness and sinuosity of stream channel
Bank stabilization
Reduced erosion
Captured sediment
Ground-water recharge
Dissipation of energy by vegetation

Exceptions and exemptions (where applicable):

Dirt tanks, wells, and other water facilities constructed or placed at a location for the purpose of providing water for livestock and/or wildlife and which have not been determined through local planning efforts to provide for riparian or wetland habitat are exempt.

Water impoundments permitted for construction, mining, or other similar activities are exempt.

Guidelines:

2-1. Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability, thus promoting stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform.
2-2. New facilities are located away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function. Existing facilities are used in a way that does not conflict with riparian-wetland functions or are relocated or modified when incompatible with riparian-wetland functions.

2-3. The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect ecological functions and processes.

Standard 3: Desired Resource Conditions

Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

Desired plant community objectives will be developed to assure that soil conditions and ecosystem function described in Standards 1 and 2 are met. They detail a site-specific plant community, which when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened, and sensitive species. Thus, desired plant community objectives will be used as an indicator of ecosystem function and rangeland health.

As indicated by such factors as:

Composition
Structure
Distribution

Exceptions and exemptions (where applicable):

Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical.

Guidelines:

3-1. The use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species are appropriate for use where native species (a) are not available, (b) are not economically feasible, (c) cannot achieve ecological objectives as well as non-native species, and/or (d) cannot compete with already established

non-native species.

3-2. Conservation of Federal threatened or endangered, proposed, candidate, and other special status species is promoted by the maintenance or restoration of their habitats.

3-3. Management practices maintain, restore, or enhance water quality in conformance with State or Federal standards.

3-4. Intensity, season and frequency of use, and distribution of grazing use should provide for growth and reproduction of those plant species needed to reach desired plant community objectives.

3-5. Grazing on designated ephemeral (annual and perennial) rangeland may be authorized if the following conditions are met:

ephemeral vegetation is present in draws, washes, and under shrubs and has grown to useable levels at the time grazing begins;

sufficient surface and subsurface soil moisture exists for continued plant growth;

serviceable waters are capable of providing for proper grazing distribution;

sufficient annual vegetation will remain on site to satisfy other resource concerns, (i.e., watershed, wildlife, wild horses and burros); and

monitoring is conducted during grazing to determine if objectives are being met.

3-6. Management practices will target those populations of noxious weeds which can be controlled or eliminated by approved methods.

3-7. Management practices to achieve desired plant communities will consider protection and conservation of known cultural resources, including historical sites, and prehistoric sites and plants of significance to Native American peoples.

Appendix B

TEAM MEMBERSHIP

Interdisciplinary Assessment Team

Linda Price	Project Coordinator (BLM)
Michael Herder	Wildlife Biologist (BLM)
Karen Jensen	Wildlife Biologist Team Lead (BLM)
Tom Folks	Wilderness/Recreation Specialist (BLM)
Diana Hawks	Recreation/Wilderness/Cultural Resources Team Lead (BLM)
LD Walker	Vegetation/Grazing Administration (BLM)
Robert Smith	Soils and Hazmat Watershed(BLM)
Luke Thompson	Wildlife Manager (Arizona Game and Fish Department)
Kyle Spencer	Soils and Vegetation (Natural Resource Conservation Service)
Rob Grumbles	Vegetation and Social Economics (Mohave County Extension Service)

Rangeland Resource Team

Commodity Interests

Bill Gubler,
Grazing
Rancher, St. George, UT

Bill Howes
Off Road Vehicle Use
Wizards Motorcycle Club

Kent McComb,
Grazing
Retired, St. George, UT

Non-Commodity Interests

Scott Hansen,
Environmental Conservation
Retired, St. George, UT

Spence Esplin,
Historical
Retired, St. George, UT

Phil Squire,
Dispersed Recreation/Wildlife
Retired, St. George, UT

Local Area Interests

Frank Malan,
Public-at-Large
Retired, St. George, UT

Roger McPeek
Public-at-Large
Retired, St. George, UT

Dennis Becenti
Native American Interests
Hopi and Navajo Tribes, AZ

Alternates

Maggie Sacher,
Commercial Recreation/Tourism
Owner: Lee's Ferry Lodge,
Marble Canyon, AZ

Paul Weaver
Non-Commodity
St. George, UT

Appendix C:
PRECIPITATION DATA

Historical Precipitation Report

Field Office 100 **Rain Gauge Name:** Blackrock Larson **Rain Gauge** 05

	Seasonal Precipitation Amounts					Annual Average					Percent of Normal				
Year	Fall	Winter	Spring	Summer	Annual	Fall	Winter	Spring	Summer	Annual	Fall	Winter	Spring	Summer	Annual
1978	1.93	9.00	1.71	2.59	15.23	2.98	8.35	3.87	5.99	21.19	65%	108%	44%	43%	72%
1979	1.93	9.00	1.71	2.59	15.23	2.98	8.35	3.87	5.99	21.19	65%	108%	44%	43%	72%
1980	0.49	13.50	6.23	5.84	26.06	2.98	8.35	3.87	5.99	21.19	16%	162%	161%	98%	123%
1981	2.37	4.04	6.98	5.64	19.03	2.98	8.35	3.87	5.99	21.19	80%	48%	180%	94%	90%
1982	3.00	4.97	7.34	10.93	26.24	2.98	8.35	3.87	5.99	21.19	101%	59%	190%	183%	124%
1983	4.00	8.08	7.46	9.40	28.94	2.98	8.35	3.87	5.99	21.19	134%	97%	193%	157%	137%
1984	3.68	5.69	1.65	11.49	22.51	2.98	8.35	3.87	5.99	21.19	124%	68%	43%	192%	106%
1985	2.65	11.77	1.44	4.48	20.34	2.98	8.35	3.87	5.99	21.19	89%	141%	37%	75%	96%
1986	7.42	3.44	6.60	8.44	25.90	2.98	8.35	3.87	5.99	21.19	249%	41%	171%	141%	122%
1987	2.48	6.40	6.98	4.74	20.60	2.98	8.35	3.87	5.99	21.19	83%	77%	180%	79%	97%
1988	6.08	6.10	5.25	6.38	23.81	2.98	8.35	3.87	5.99	21.19	204%	73%	136%	107%	112%
1989	1.30	8.45	1.98	6.20	17.93	2.98	8.35	3.87	5.99	21.19	44%	101%	51%	104%	85%
1990	0.69	7.19	2.29	8.72	18.89	2.98	8.35	3.87	5.99	21.19	23%	86%	59%	146%	89%
1991	3.20	7.29	3.93	4.30	18.72	2.98	8.35	3.87	5.99	21.19	108%	87%	102%	72%	88%
1992	2.18	9.76	12.09	7.45	31.48	2.98	8.35	3.87	5.99	21.19	73%	117%	312%	124%	149%
1993	3.80	24.00	2.34	4.25	34.39	2.98	8.35	3.87	5.99	21.19	128%	287%	60%	71%	162%
1994	3.50	6.88	3.87	16.50	30.75	2.98	8.35	3.87	5.99	21.19	118%	82%	100%	276%	145%
1995	3.60	18.90	4.50	4.00	31.00	2.98	8.35	3.87	5.99	21.19	121%	226%	116%	67%	146%
1996	0.62	7.05	1.58	3.75	13.00	2.98	8.35	3.87	5.99	21.19	21%	84%	41%	63%	61%
1997	6.25	6.40	1.60	8.75	23.00	2.98	8.35	3.87	5.99	21.19	210%	77%	41%	146%	109%
1998	1.75	9.12	4.08	9.36	24.31	2.98	8.35	3.87	5.99	21.19	59%	109%	105%	156%	115%
1999	3.87	2.00	4.13	4.75	14.75	2.98	8.35	3.87	5.99	21.19	130%	24%	107%	79%	70%
2000	0.75	5.50	2.50	6.75	15.50	2.98	8.35	3.87	5.99	21.19	25%	66%	65%	113%	73%
2001	3.67	9.28	4.55	2.00	19.50	2.98	8.35	3.87	5.99	21.19	123%	111%	118%	33%	92%
2002	1.50	2.75	0.75	2.50	7.50	2.98	8.35	3.87	5.99	21.19	50%	33%	19%	42%	35%
2003	3.75	7.75	1.75	5.25	18.50	2.98	8.35	3.87	5.99	21.19	126%	93%	45%	88%	87%
2004	1.50	8.55	2.58	3.62	16.25	2.98	8.35	3.87	5.99	21.19	50%	102%	67%	60%	77%
2005	12.25	15.00	5.21	3.50	35.96	2.98	8.35	3.87	5.99	21.19	412%	180%	135%	58%	170%
2006	2.25	2.25	6.75	4.50	15.75	2.98	8.35	3.87	5.99	21.19	76%	27%	174%	75%	74%
2007	1.88	2.87	1.25	6.00	12.00	2.98	8.35	3.87	5.99	21.19	63%	34%	32%	100%	57%
2008	0.25	11.50	1.00	5.12	17.87	2.98	8.35	3.87	5.99	21.19	8%	138%	26%	86%	84%
2009	2.88	9.34	1.16	3.25	16.63	2.98	8.35	3.87	5.99	21.19	97%	112%	30%	54%	78%
2010	0.75	11.87	4.44	4.50	21.56	2.98	8.35	3.87	5.99	21.19	25%	142%	115%	75%	102%

Historical Precipitation Report

Field Office 100 Rain Gauge Name: Blackrock Sullivan Rain Gauge 06

	Seasonal Precipitation Amounts					Annual Average					Percent of Normal				
Year	Fall	Winter	Spring	Summer	Annual	Fall	Winter	Spring	Summer	Annual	Fall	Winter	Spring	Summer	Annual
1978	2.43	7.00	1.67	2.74	13.84	2.91	7.89	3.58	5.67	20.05	83%	89%	47%	48%	69%
1979	5.00	0.50	1.27			2.91	7.89	3.58	5.67	20.05	172%	6%	35%		
1980	0.94	14.00	3.00	5.45	23.39	2.91	7.89	3.58	5.67	20.05	32%	178%	84%	96%	117%
1981	2.27	3.80	6.60	5.91	18.58	2.91	7.89	3.58	5.67	20.05	78%	48%	184%	104%	93%
1982	2.09	3.87	5.55	11.69	23.20	2.91	7.89	3.58	5.67	20.05	72%	49%	155%	206%	116%
1983	3.00	16.71	6.23	9.27	35.21	2.91	7.89	3.58	5.67	20.05	103%	212%	174%	163%	176%
1984	3.29	4.89	1.65	11.21	21.04	2.91	7.89	3.58	5.67	20.05	113%	62%	46%	198%	105%
1985	2.60	8.70	0.83	4.15	16.28	2.91	7.89	3.58	5.67	20.05	89%	110%	23%	73%	81%
1986	6.35	3.44	6.50	5.71	22.00	2.91	7.89	3.58	5.67	20.05	218%	44%	181%	101%	110%
1987	2.35	5.70	7.14	4.94	20.13	2.91	7.89	3.58	5.67	20.05	81%	72%	199%	87%	100%
1988	6.02	4.50	6.33	6.78	23.63	2.91	7.89	3.58	5.67	20.05	207%	57%	177%	120%	118%
1989	1.25	6.31	1.60	5.07	14.23	2.91	7.89	3.58	5.67	20.05	43%	80%	45%	89%	71%
1990	0.77	6.58	2.20	9.35	18.90	2.91	7.89	3.58	5.67	20.05	26%	83%	61%	165%	94%
1991	2.40	6.90	3.10	4.07	16.47	2.91	7.89	3.58	5.67	20.05	82%	87%	87%	72%	82%
1992	2.23	9.34	11.57	3.56	26.70	2.91	7.89	3.58	5.67	20.05	77%	118%	323%	63%	133%
1993	3.60	24.00	1.94	2.50	32.04	2.91	7.89	3.58	5.67	20.05	124%	304%	54%	44%	160%
1994	2.88	6.48	3.64	15.12	28.12	2.91	7.89	3.58	5.67	20.05	99%	82%	102%	267%	140%
1995	4.05	18.45	4.00	3.50	30.00	2.91	7.89	3.58	5.67	20.05	139%	234%	112%	62%	150%
1996	0.50	5.63	1.25	4.12	11.50	2.91	7.89	3.58	5.67	20.05	17%	71%	35%	73%	57%
1997	5.00	6.20	1.55	9.50	22.25	2.91	7.89	3.58	5.67	20.05	172%	79%	43%	168%	111%
1998	1.94	9.02	4.08	8.96	24.00	2.91	7.89	3.58	5.67	20.05	67%	114%	114%	158%	120%
1999	3.72	1.93	4.35	2.25	12.25	2.91	7.89	3.58	5.67	20.05	128%	24%	121%	40%	61%
2000	0.87	5.00	1.01			2.91	7.89	3.58	5.67	20.05	30%	63%	28%		
2001	4.30	10.86	5.33	4.00	24.49	2.91	7.89	3.58	5.67	20.05	148%	138%	149%	71%	122%
2002	1.50	3.00	1.00	1.63	7.13	2.91	7.89	3.58	5.67	20.05	52%	38%	28%	29%	36%
2003	3.00	6.75	2.25	2.50	14.50	2.91	7.89	3.58	5.67	20.05	103%	86%	63%	44%	72%
2004	1.75	9.25	2.63	2.12	15.75	2.91	7.89	3.58	5.67	20.05	60%	117%	73%	37%	79%
2005	12.50	15.00	5.21	5.00	37.71	2.91	7.89	3.58	5.67	20.05	429%	190%	145%	88%	188%
2006	2.25	1.75	7.00	6.25	17.25	2.91	7.89	3.58	5.67	20.05	77%	22%	195%	110%	86%
2007	2.00	3.00	0.88	6.38	12.25	2.91	7.89	3.58	5.67	20.05	69%	38%	24%	112%	61%
2008	0.06	10.84	0.66	6.92	18.48	2.91	7.89	3.58	5.67	20.05	2%	137%	18%	122%	92%
2009	2.65	9.63	1.87	2.13	16.28	2.91	7.89	3.58	5.67	20.05	91%	122%	52%	38%	81%
2010	0.50	11.20	4.30	3.00	19.00	2.91	7.89	3.58	5.67	20.05	17%	142%	120%	53%	95%

Historical Precipitation Report

Field Office 100 **Rain Gauge Name:** Lizard **Rain Gauge** 16

	Seasonal Precipitation Amounts					Annual Average					Percent of Normal				
Year	Fall	Winter	Spring	Summer	Annual	Fall	Winter	Spring	Summer	Annual	Fall	Winter	Spring	Summer	Annual
1983	2.31	2.74	3.55	4.49	13.09	1.42	2.74	1.40	2.60	8.15	163%	100%	253%	173%	161%
1984	1.57	1.00	0.00	4.57	7.14	1.42	2.74	1.40	2.60	8.15	111%	37%	0%	176%	88%
1985	1.41	4.52	0.89	1.00	7.82	1.42	2.74	1.40	2.60	8.15	100%	165%	64%	39%	96%
1986	2.40	0.62	1.98	1.71	6.71	1.42	2.74	1.40	2.60	8.15	170%	23%	141%	66%	82%
1987	1.20	2.30	2.25	1.03	6.78	1.42	2.74	1.40	2.60	8.15	85%	84%	161%	40%	83%
1988	2.85	2.00	3.26	1.81	9.92	1.42	2.74	1.40	2.60	8.15	201%	73%	233%	70%	122%
1989	0.77	2.71	0.65	3.79	7.92	1.42	2.74	1.40	2.60	8.15	54%	99%	46%	146%	97%
1990	0.32	1.32	0.62	4.79	7.05	1.42	2.74	1.40	2.60	8.15	23%	48%	44%	185%	87%
1991	0.50	2.12	0.80	1.88	5.30	1.42	2.74	1.40	2.60	8.15	35%	78%	57%	72%	65%
1992	0.83	2.79	4.25	0.49	8.36	1.42	2.74	1.40	2.60	8.15	59%	102%	303%	19%	103%
1993	1.50	6.81	1.44	1.50	11.25	1.42	2.74	1.40	2.60	8.15	106%	249%	103%	58%	138%
1994	2.00	2.12	1.19	6.00	11.31	1.42	2.74	1.40	2.60	8.15	141%	78%	85%	231%	139%
1995	1.34	4.41	3.85	2.65	12.25	1.42	2.74	1.40	2.60	8.15	95%	161%	275%	102%	150%
1996	2.62	2.13	0.50	1.25	6.50	1.42	2.74	1.40	2.60	8.15	185%	78%	36%	48%	80%
1997	2.25	2.60	0.65	5.75	11.25	1.42	2.74	1.40	2.60	8.15	159%	95%	46%	222%	138%
1998	0.88	3.37	1.00	5.87	11.12	1.42	2.74	1.40	2.60	8.15	62%	123%	71%	226%	136%
1999	1.81	0.94	2.25	2.50	7.50	1.42	2.74	1.40	2.60	8.15	128%	34%	161%	96%	92%
2000	0.00	1.75	0.38	1.87	4.00	1.42	2.74	1.40	2.60	8.15	0%	64%	27%	72%	49%
2001	1.70	3.80	0.63	1.87	8.00	1.42	2.74	1.40	2.60	8.15	120%	139%	45%	72%	98%
2002	0.25	1.38	0.00	0.50	2.13	1.42	2.74	1.40	2.60	8.15	18%	50%	0%	19%	26%
2003	2.25	2.25	0.75	2.63	7.88	1.42	2.74	1.40	2.60	8.15	159%	82%	54%	101%	97%
2004	0.25	2.75	0.75	1.50	5.25	1.42	2.74	1.40	2.60	8.15	18%	101%	54%	58%	64%
2005	4.00	6.63	2.75	1.87	15.25	1.42	2.74	1.40	2.60	8.15	283%	242%	196%	72%	187%
2006	1.75	0.13	1.62	2.50	6.00	1.42	2.74	1.40	2.60	8.15	124%	5%	116%	96%	74%
2007	1.38	1.37	0.50	4.63	7.88	1.42	2.74	1.40	2.60	8.15	97%	50%	36%	178%	97%
2008	0.00	4.13	0.25			1.42	2.74	1.40	2.60	8.15	0%	151%	18%		
2009	1.50	2.75	0.38	1.12	5.75	1.42	2.74	1.40	2.60	8.15	106%	101%	27%	43%	71%
2010	0.00	5.15	2.10	0.50	7.75	1.42	2.74	1.40	2.60	8.15	0%	188%	150%	19%	95%

Appendix D:

Wildlife Data

Arizona Game and Fish Mule Deer Counts for Game Management Unit 13B.

Year	Number of Animals Surveyed	Bucks / 100 does	Fawns / 100 does	Population Estimate
1985	108	30	50	1,000 - 1,500
1986	41	29	18	1,000 - 1,500
1987	63	31	44	1163
1988	---	No Data	No	No Data
1989	112	71	31	900
1990	63	68	32	900
1991	85	27	37	900
1992	31	24	59	<1,000
1993	117	126	52	800-1,000
1994	143	69	52	No Estimate
1995	88	183	79	No Estimate
1996	154	87	33	No Estimate
1997	64	77	29	No Estimate
1998	156	43	45	No Estimate
1999	145	51	35	No Estimate
2000	155	49	36	No Estimate
2001	275	34	67	No Estimate
2002	118	46	20	No Estimate
2003	84	29	46	No Estimate
2004	102	34	57	No Estimate
2005	128	65	72	No Estimate
2006	143	68	64	No Estimate
2007	152	79	41	No Estimate
2008	158	45	63	No Estimate
2009	150	28	42	No Estimate

Arizona Game & Fish Unit 13BNorth Desert Bighorn Sheep Population Counts							
Year	Total Rams	Ewes	Lambs	Yearling Male	Yearling Female	Unclassified	Total
2003	Insufficient Data						
2004	Insufficient Data						
2005	35	58	19	3	6	0	121
2006	32	90	18	3	10	0	153
2007	36	93	17	6	8	0	160
2008	34	44	8	0	0	0	86
2009	No data						
2010	No data						