BUFFALO – SKEDADDLE

SAGE GROUSE

POPULATION MANAGEMENT UNIT

HABITAT RISK ASSESSMENT

NARRATIVE

March 30, 2003

The following is a DRAFT, PRE-DECISION document outlining HABITAT management risks, conservation measures, and monitoring action for sage grouse in the Buffalo-Skedaddle Population Management Unit (PMU). This narrative fulfills Goal 1, Objective 3, as described on Page 32 of the Nevada Sage Grouse Conservation strategy. In addition, the preliminary conservation measures and monitoring actions described within will be used to fulfill Objectives 5.2 and 5.4 (page 34).

The following narrative discusses risk assessments for sage grouse habitat, as completed by the California and Nevada sage grouse habitat subgroups. The sage grouse population subgroup has completed the population risk assessment. When the population and habitat risk assessments have been completed for all five PMUs in the Washoe-Lassen-Modoc area, the conservation measures and monitoring actions discussed in the following narrative will be finalized, combined with those of other PMUs, in Nevada, and prioritized. These same conservation measures and monitoring actions will become part of the Lassen-Modoc Sage Grouse Working Group's Conservation Strategy within the California portion of the PMU. An implementation schedule and list of funding needs will be developed from the prioritized list.

TABLE OF CONTENTS

Buffalo-Skedaddle Sage Grouse PMU – Habitat Risk Assessment Narrative

INTRODUCTION

The Buffalo-Skedaddle PMU encompasses 1,487,929 acres in northern Washoe County, Nevada, and northern and central Lassen County, California. Elevations range from 4,100 feet on the western boundary to 7,964 feet on the summit of Observation Peak. Yearly precipitation ranges between 6 inches to 16 inches, depending upon elevation. Ownership or administrative responsibilities for the PMU are as follows.

Table 1. Ownership and administrative status within the Buffalo-Skedaddle PMU

Status	Acres	Percent
Administered by Bureau of Land Management [1]	1,150,813	70
Private Lands (Includes County and City)	460,325	28
State Lands (Includes State Lands Commission & California Department of Fish and Game)	32,881	2
TOTAL ACRES WITHIN BUFFALO - SKEDADDLE PMU	**1,487,929**	

1. Includes 5,280 acres withdrawn for Sierra Army Depot, and 400 acres of Pyramid Indian Reservation. The total of 5680 acres equals a trace, or 0.3% of the total area. Therefore, for persons who appreciate exactness the BLM manages 69.7% of the area.

Bureau of Land Management Administered Lands

The Eagle Lake Field Office administers most of the PMU, with the Winnemucca Field Office, Nevada administering public lands within the PMU's eastern boundary, and Alturas, and Surprise Field Offices administering some public lands along the PMU's northern boundary. The Bureau of Land Management (BLM) manages these lands in accordance with the Federal Land Policy and Management Act of 1976 (FLPMA), Public Law 94-579-October 21, 1976, as amended through September 1999. Section 102 Declaration of Policy states "*The Congress declares it is the policy of the United States that--… (8) the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; that will provide for outdoor recreation and human occupancy and use;…*"

As directed in 43 Code of Federal Regulations (CFR) 4180.1 *Fundamentals of Rangeland Health*, and associated *Standards* (43 CFR 4180.2) The Sierra Front – Northwestern Great Basin Resource Advisory Council (RAC) developed Standards for Rangeland Health and Guidelines for Livestock Grazing that affect

how the BLM manages public lands within Washoe County, Nevada outside those managed by the Eagle Lake and Surprise Field Offices. These "Fallback" Standards and Guidelines were approved by the Secretary of the Interior, February 12, 1997. Rangeland Health (later changed to Land Health) Standards, and Guidelines for livestock grazing were developed by the Northeast California RAC for public lands managed by the Eagle Lake, Alturas, and Surprise Field Offices in California and Nevada. These Standards and Guidelines were approved by the Secretary of the Interior July 13, 2000. The Standard for Land Health that most directly affects how the BLM manages for sage grouse is Standard 5. Biodiversity – *Viable, healthy, productive and diverse populations of native and desired plant and animal species, including special status species*. Meaning that: *Native and other desirable plant and animal populations are diverse, vigorous, able to reproduce, and support nutrient cycles and energy flows*. For a more in-depth discussion of this standard for land health please refer to Appendix 1. Bureau of Land Management policy (USDI, 2001), in BLM Manual 6840 part 22. *Conservation of species other than under the ESA*. States in part "…*It is in the interest of the public and the affected special status species for BLM to undertake conservation actions for such species before listing is warranted or the designation of critical habitat becomes necessary. It is also in the interest of the public and affected species for BLM to undertake conservation actions that improve the status of such species to the point where their special status recognition is no longer warranted."…*Part 22C. *Agreements, Assessments, and Cooperative Strategies for Conservation* states in part; "*The BLM shall work cooperatively with other agencies, organizations, governments, and interested parties for the conservation of plants and animals, and their habitats to reduce, mitigate, and possibly eliminate the need for their identification as a special status species.*"…

Private Lands

Approximately 416,620 acres are private lands. Large tracts of contiguous private lands include Madeline Plains and Grasshopper Valley in the northern and northeastern portions in California, Willow Creek Valley northeast of Susanville, California, and to a small extent the Shinn Ranch, Horn Ranch, Smoke Creek Ranch, and Rush Creek Ranch complex in California and Nevada.

State Lands – California

The State of California, either through its State Lands Commission or the California Department of Fish and Game (CDFG), administers 29,759 acres. Lands administered by the California Department of Fish and Game are primarily lands associated with springs.

Habitat

Sagebrush or lands with sagebrush potential dominate the landscape, accounting for 90% of the vegetation. Wyoming big sagebrush is the dominant sagebrush species followed by mountain big sagebrush, basin big sagebrush, and low sagebrush. There are scattered areas of riparian, mountain mahogany, aspen, cheatgrass and medusahead grass, increasing stands of western juniper, and unvegetated rocky outcrops.

Sage grouse use the PMU year-round. Some individuals carry out their life cycle within 3.2 miles of a lek while other individuals may travel up to 300 square kilometers (116 sq. miles) during the year using widely separated seasonal habitat features, returning to their ancestral leks during strutting season. Sage grouse habitat quality varies across the landscape. Land health, the degree to which the integrity of the soil and ecological processes of land ecosystems are maintained (Committee on Rangeland Classification 1994), varies from excellent to poor. The Task Group on Unity in Concepts and Terminology (1995) defined rangeland health as; *The degree to which the integrity of the soil, vegetation, water, and air, as well as the ecological processes of the rangeland ecosystem, are in balance and sustained*. They defined integrity as; *Maintenance of the functional attributes characteristic of a locale, including normal variability*. The BLM manages the lands they administer to achieve land health. Seventeen attributes are used to assess land health (USDI 2000). The land health evaluation summary sheet, and description of the seventeen attributes of land health are provided in Appendix 2.

Cheatgrass occurs throughout the lower elevations, dominating 13.16% of the PMU. Emergency stabilization and rehabilitation of wildfires focuses on using revegetation techniques that will limit the ability of cheatgrass to dominate burned areas. Over 200,000 acres have burned since 1982. Most of these fires were at higher elevations which allowed native herbaceous vegetation to recover quickly. The shrub component of these burned stands required ten years or more to recover. Those fires that could become dominated by cheatgrass were reseeded with, in most cases, native vegetation. For purposes of mapping sage grouse restoration habitats, burns that are high enough in elevation to recover naturally are mapped as R-1 habitat. Those fires that burned in lower elevation are mapped as R-1 or R-4 habitat dependant upon rehabilitation success.

Domestic livestock, primarily cattle, wild horses and burros, and wild ungulates all graze within the PMU. Livestock grazing can be used as a management tool under appropriate conditions. Wild horse and burro numbers continually exceed Appropriate Management Levels (AML) because of limited funding for gathers, and the cost of maintaining wild horses and burros being kept on sanctuaries, and in holding facilities. The need to maintain relatively unimpaired movement of wild horses and burros confounds the ability to use fences in managing domestic livestock as a management tool. With a recruitment level of 17% or higher, and

yearlong grazing, wild horses and burros impact on herbaceous vegetation continues to increase. Approximately 300 wild horses were removed from the Buckhorn-Observation-Rush Fire Complex during December, 2002. Two hundred more will be removed this spring. Continued efforts to remove animals to AMLs is hampered by limited funds beyond this date.

ASSESSMENT, RESEARCH, MONITORING, and ADAPTIVE MANAGEMENT

Understanding of plant communities, their structure, and arrangement in time and space can simplify discussions on the relationships of wildlife to their habitat. This is also basic to understanding interactions of ecological factors, evaluating their relative influences, and predicting the results of manipulation (Leckenby et al. 1976). The maxim stated by Leckenby et al. is very true but understanding wildlife – habitat relationships is highly complex, and sometimes, confusingly subtle. The California Department of Fish and Game is using radio collared sage grouse to describe their movements and seasonal habitats. A product of this work is *Sage Grouse Nesting Habitat in Northeastern California* (Popham 2000). Through a Cooperative Agreement between the BLM and Point Reyes Bird Observatory (PRBO) data are being gathered concerning the impacts of juniper encroachment, and Off-Highway Vehicle (OHV) use impacts, if any, on demographics of sagebrush obligate bird species. PRBO is also monitoring sagebrush obligate bird populations within sagebrush communities with varying levels of land health. Eagle Lake Field Office began continuing land health assessment in 1999 (USDI 2000a). The standard land health assessment protocol is supplemented with collection of species cover and structure. This information allows for a correlation between land health and wildlife species habitat condition (USDI 2000b). Land health assessments are being completed on PRBO sagebrush obligate bird surveys where a land health assessment does not already occur. Combining all the data being collected will allow the partners in sage grouse conservation to prioritize additional information needs, and begin to establish adaptive management practices which should benefit the sagebrush ecosystem and sage grouse populations. For this narrative adaptive management is defined as: *the process of implementing policy decisions as scientifically driven management experiments that test predictions and assumptions in management plans, and using the resulting information to improve the plans* (Noss and Cooperrrider 1994).

While habitat and population assessments, inventories, and research are extremely important in beginning adaptive management, monitoring is the cornerstone. Without monitoring we cannot learn if our management of human activity is doing what we expect it to and we cannot adapt (Noss and Cooperrider 1994). Short and long term impacts are scientifically monitored on a periodic basis, and management is adjusted based on monitoring data for properly functioning adaptive management. Unfortunately, when budgets are short or workload priorities are set monitoring is usually the last item funded. In order to

properly implement the conservation measures, and subsequent conservation strategy for the Buffalo-Skedaddle PMU monitoring must be more than a "buzz" word. Monitoring must be a high priority, adequately funded task within all the agencies, and offices involved. With monitoring we can develop working management actions that support sound land health/sagebrush ecosystem, and subsequently sage grouse habitat management.

MAPPING

Following the guidance of The Nevada Sage Grouse Conservation Strategy, vegetation within the 1,475,506 acres of potential sagebrush habitat within the PMU was evaluated and classified into the "restoration habitats" provided in the plan.

R0 – 124,120 acres (8.4%)

Areas with desired species composition which have sufficient, but not excessive, sagebrush canopy and sufficient grasses and forbs in the understory to provide adequate cover and forage to meet seasonal needs of sage grouse (nesting, early brood, summer, and fall/winter).

R1 – 323,966 (22%)

Areas with potential to produce sagebrush plant communities that have good understory composition of desired grasses and forbs, but lacks sufficient sagebrush canopy.

R2 – 66,275 acres (4.5%)

Areas with potential to produce sagebrush plant communities that have a sagebrush overstory, but lack sufficient herbaceous understory.

R3 – 4,251 acres (0.3%)

Areas with potential to produce sagebrush communities that have not crossed the pinyon/juniper, or juniper woodland threshold, but are in various stages of becoming dominated by pinyon/juniper, or juniper (sagebrush seedlings present).

X3 – 97,226 acres (6.6%)

Areas which have crossed the threshold from sagebrush plant communities (sagebrush seedlings absent) into pinyon/juniper, or juniper woodlands.

R4 – 684,627 acres (46%)

Areas with potential to produce sagebrush communities (sagebrush seedlings present) that are currently annual grasslands, forbs, or bareground.

X4 – 175,041 acres (12%)

Areas which have crossed the threshold from sagebrush communities (seedlings absent) into annual grasslands, forbs, or bareground.

1,475,506 TOTAL ACRES OF POTENTIAL SAGEBRUSH HABITAT IN PMU

SAGE GROUSE HABITAT NEEDS

Sage grouse are sagebrush obligates. They cannot live without sagebrush, which is critical to their existence. Herbaceous understory is also important. Grasses of the proper height screen nests and chicks from predators, forbs provide food for hens and chicks, and diverse understory supports insects critical to chick survival. Meadows and other moist areas are important in late summer and fall. Sage grouse habitat needs vary by season. Western Association of Fish and Wildlife Agencies (WAFWA) adopted guidelines (Connelly et al. 2000) provide information on characteristics of sagebrush rangeland needed for productive sage grouse habitat and are summarized in Table 2. Dr. Jack Connelly, principle author of the WAFWA Guidelines, defined "guidelines" as: *a group of criteria, based on the best available data and largely published in the scientific literature or graduate theses, that direct the management of sage-grouse populations and habitats* (USDI 2002).

Lek habitat is open areas within nesting habitat where visibility between birds is critical to mating. Because the sagebrush communities surrounding the open space of leks are nesting habitat the guidelines for nesting habitat apply.

Table 2. Seasonal habitat criteria for sage grouse. Information in parentheses are mean values described by Popham 2000.

Habitat Criteria (Biotic)	Nesting Habitat	Brood-Rearing Habitat[1]	Winter Habitat
Sagebrush Height[2]	30 – 80 cm (65.5) 12" – 31" (26")	40 – 80 cm 16" – 31"	25 – 35 cm[3] 10" – 14"
Sagebrush Canopy	15 – 25% (13[4])	10 – 25%	10 – 30%
Other Shrub Cover	(0.06%[4])		
Herbaceous Height[5]	≥18cm (22.1) 7" (9")	N/A	N/A
Herbaceous Canopy	≥ 15% (14)	> 15%	N/A
Visual Obstruction[6]	≥ 15 cm (40.2) 6" 16"	N/A	N/A
Presence of Insects	N/A	Ants & Beetles	N/A
(Abiotic)			
Rock Cover	(27.67%[4])		

1. A variety of habitats including meadows, farmland, lakebeds, sagebrush and riparian zones are used.
2. Height ranges by sagebrush species and subspecies are part of the sagebrush ecosystem discussion beginning on Page 14.
3. There should be a diversity of height classes including low sagebrush and big sagebrush within winter habitat
4. Lower sagebrush heights with a combination of other shrubs, and rock surface may be an artifact of nesting in Wyoming big sagebrush habitats.

This is reflected by Gail Popham's conclusion concerning the need for heterogeneity within nesting habitat.

5. Heights for grass species that commonly occur within the PMU and are consistent with sagebrush ecological site potential are listed in Appendix 3.
6. Visual obstruction is measured using the Robel Pole Method (Robel et al. 1970), and as described in USDI (1996).

HABITAT RISK ASSESSMENT

Lek Habitat

Lek habitat is unique and is, therefore, discussed separately from nesting, brood-rearing, and winter habitat. Background for discussions of risks, and many conservation measures are based on Connelly et al. (2000), and others. Copies of the WAFWA Guidelines can be provided, upon request, by the authors, WAFWA, or agency personnel involved with this effort.

Risk 1. Loss of sagebrush cover around the lek.

Contributing Factors: Herbicide spraying (Risk Level - Low) of sagebrush and fire (Risk Level - Moderate), or other sagebrush treatment efforts (Risk Level – Low). NOTE: This cover is within nesting habitat and will be discussed below along with the discussion of risks to nesting, brood rearing, and winter habitat.

Conservation Measures: No herbicide spraying of sagebrush within 6 km (3.75miles) of lek unless it is shown to be a benefit to sage grouse. RMP will establish this as a rule. Fire rehabilitation will include priority for sagebrush seeding except on lek.

Responsible Parties: BLM, CDFG, NDOW, NRCS & Private Landowners. NOTE: BLM is responsible for fire suppression and treatment of public lands.

Monitoring: Establish center of lek with GPS. GPS boundary of lek, load into GIS. Monitor for species diversity and overall vegetation cover as part of ESR Plan.

Timelines: Inventory is in progress will be in monitoring phase by 2005. After a fire – each year first 3 yrs., than every 5 – 10 yrs.

Risk 2: Direct excessive human activity disturbance during strutting.

Contributing Factors: Overzealous human observers venturing too close or onto leks (Risk Level - Moderate), and domestic sheep bedding and

grazing on leks (Risk Level – Low), Predator Control – aerial gunning (Risk Level – low), and Off-Highway Vehicle (OHV) activity (Risk Level – High).

Humans on, or too close to leks occurs when bird watchers, photographers, and students do not follow proper birding protocol. Some Nevada representatives have expressed concern that the use of untrained, or poorly trained volunteer observers to count leks has resulted in adverse impacts to strutting activity.

Bedding and grazing of sheep on leks normally occurs when the grazing plan does not direct these activities away from leks or the herder does not know the location of the leks.

Wildlife Services, a branch of USDA Animal Plant Health Inspection Service (APHIS) currently has an active coyote control effort in support of domestic sheep grazing within the PMU. Because strutting sage grouse are extremely sensitive to avian predators an aircraft flying over a lek during strutting will cause strutting activity to stop and the birds disperse. Continual fly over activity could result in the lek being abandoned.

Much of the strutting activity taking place on BLM administered lands is occurring in areas which carry an "open" designation which allows persons to travel wherever they wish. Based on observations of strutting sage grouse scattering when a band of pronghorn run through the lek has raised the concern that OHV use on or near the lek would surely cause the strutting activity to stop or, at worst, the lek be abandoned.

Conservation Measures: Two approaches can be taken for protection of leks. The first is to keep the location of all leks secret. This option does not, however, take into account that locations of leks are not normally protected from public disclosure by law. This will not help solve the problem of keeping domestic sheep from bedding or grazing on leks. The second alternative is to allow the public access to one, easily observable lek. Provide the public with appropriate educational material covering proper observation protocols, and establish a fixed observation platform or deck, while not openly disclosing the location of other leks (Connelly et al. 2000). This alternative has been initiated in the Eagle Lake Field Office area through cooperation between the BLM and CDFG. To date it has worked reasonably well without a viewing deck and educational material. But slips in protocol during 2002 indicate that to insure better success the viewing deck and educational material are needed, and are being developed.

Long time domestic sheep operators know where the leks are, and can direct their herders away from them. This is working cooperatively on BLM administered Lands and private lands grazed in cooperation with BLM lands, and is consistent with a condition stated on the annual grazing license. Maps are provided as needed.

An agreement between the Wildlife Service and BLM has restricted aerial gunning of coyotes to after 9:30 am, and requires that they stay at least two miles away from a lek. Wildlife Services field representatives know the locations of the leks, and are currently abiding by the agreement.

Research has been undertaken by the PRBO in cooperation with the BLM, CDFG, and the State of California Off-Highway Vehicle (OHV) Commission to determine the impacts, if any, from OHV use on avian courtship, nesting success, and demographics. Their findings will assist in the preparation of appropriate mitigation measures, if found to be necessary. All current Land Use Plans within the Eagle Lake, Alturas, and Surprise Field Offices are being updated to Resource Management Plans. Direction from BLM's Washington Office is to convert all "open" categories to an acceptable form of "limited" category, at least limited to existing roads and trails.

Responsible Parties: BLM, CDFG, NDOW, Livestock Operators

Monitoring: Ongoing monitoring of compliance to conservation measures occurs during strutting season, and grazing season supplemented by an occasional law enforcement presence.

Risk 3.: Excessive aerial predation.
Contributing Factor: Transmission lines and structures constructed too close to the lek (Risk Level – High).

Recent research (*Frank Hall is to provide citations)* indicates that the presence of raptors, such as golden eagles, perching on overhead lines cause cessation of strutting on those leks in sight of the overhead lines or structures. The sight of an overhead line or structure within the viewshed of the lek will result in cessation of strutting and potential abandonment of the lek. This risk is considered high because of the infancy of the research. NOTE: Preliminary research does indicate this is a highly adverse impact. Over the long- term conservation measures in the past have been too little to prevent reductions in use, or lek abandonment.

Conservation Measures: Currently the responsible parties are avoiding routing overhead lines or placing structures within lek viewsheds and no closer than 3.2 kilometers (2 miles). A condition of right-of-way grants will require the operator to remove all crossarms and structures upon termination of right-of-way use. Remove existing raptor perches used by the BLM during seeding operations.

Responsible Parties: BLM, CDFG, NDOW, Other Permitting Agencies including the Public Utility Commission, County Governments, and others.

Monitoring: Review all overhead line and structure construction proposals. After establishing the conservation measures, monitor sage grouse response to determine if additional restrictions are necessary.

Risk 4: Direct loss of lek.

Contributing Factors: Paving, surface mining, land exchanges, converting native lands to cultivated agriculture(Risk Level – Low).

There is anecdotal information that sage grouse will continue to strut on leks that have been paved, mine tailings, and in plowed fields. Sage grouse conservation cannot, realistically, be considered sound based solely on limited strutting habitat. The increase in human activity which accompanies each of these risks, and the potential loss of ability to see each other in a cultivated field with crops makes these activities best described as direct loss of lek habitat.

Conservation Measures: BLM will not exchange lands that have an active or inactive lek within them. Converting native lands to cultivated agriculture is an activity tied primarily to private lands. Private land owners will be contacted by the appropriate State Wildlife Agency and advised of leks located on their lands. The private land owner and appropriate agency will coordinate on potential conservation, as well as any of the other activities listed that will harm a lek. This is an educational process. Funding is available through the Farm Bill to assist private landowners in conserving sagebrush habitat on their lands. Another option for assistance is the State of California Wildlife Conservation Board providing funding to private landowners for conservation easements.

Paving on BLM administered lands is a potential which will be excluded from leks, or from areas which will affect lek activities. Mining such as material pits where it is the option of the permitting agency to approve or deny a lease will not be allowed on or around a lek. Mining for locatable minerals such as gold, under the 1872 Mining Law is not as easily controlled. Conservation measures will be made a part of the mine's operations plan.

Responsible Parties: BLM, CDFG, NDOW, Private Land Owners, Permitting Agencies, NRCS.

Monitoring: Should one of the risk activities be permitted, a monitoring plan to insure all mitigations of the permit are being met will be part of the permit.

Risk 5: Loss of a lek due to excessive vegetation growth dominating the open area.

Contributing Factors: Normal site dynamics or encroachment of native increasers and invasive species such as big sagebrush and juniper, and non-native invasive, as well as noxious weeds. Risk Level – Low.

Lek sites have the potential for naturally occurring species such as sagebrush and others to fill an opening. Any open space with soil moisture present is a growing medium for native invasive species such as juniper, and non-native species including annual noxious weeds such as yellow star thistle, Mediterranean sage, and perennial noxious weeds such as the knapweeds. Any form of overgrowth prevents the visual contact between birds necessary for successful and continued strutting activity.

Conservation Measures: Conservation measures for this risk deal, primarily, with sagebrush ecosystem dynamics and will be discussed below as part of conservation measures affecting nesting, brood rearing, and winter habitat. Uses of herbicides, grubbing, or biological control are all alternatives to be considered in finding the best treatment for treating nonnative invasive and noxious weeds to benefit sage grouse. Recent discoveries that biological control of nonnative invasive and noxious weeds has also adversely impacted native species of the same genera dictate that biological control in sage grouse habitat will only be considered after the treatment is proven, through scientific research, to be beneficial to native vegetation.

Monitoring: Vegetation monitoring on and around the lek is a part of the ongoing lek counts. Once vegetation overgrowth is detected quantitative monitoring of the lek will be completed outside of strutting season. Once a treatment is applied appropriate monitoring studies will be initiated to measure treatment objectives and success.

Responsible Parties: BLM, CDFG, NDOW, Private Landowners

Risk 6: Collisions with new fences constructed in sage grouse flight paths to and from the lek.

Contributing Factors: Construction of a new fence too close to a lek or moving an existing fence in the wrong direction. Risk Level – Low.

Sage grouse fly into leks in the dark using a low trajectory. Sage grouse have adapted to existing fences that do not exhibit evidence of being a hazard. Evidence of a hazard is sage grouse parts, feathers, and carcasses resulting from a collision with a particular fence.

Conservation Measures: Do not construct new fences or move existing fences to within 1.6 kilometers (1 mile) of a lek. If fence construction cannot be avoided within the lek's buffer zone the fence will consist of "let-down" panels which are let down during the strutting season. All braces, gateposts, or wooden posts used are required to have anti-perch structures.

Responsible Parties: BLM, CDFG, NDOW, Private Land Owners

Monitoring: Insure standards just described are put in place. Monitor anti perch devices to insure they are working properly, and insure "let-down" panels are down during strutting season.

Risks for Nesting, Brood-Rearing, and Winter Habitat will be addressed together because the risks discussed for one applies to the others. Successful management criteria may change slightly for the different habitats. These differences will be addressed as needed.

NOTE: The description of nesting habitat in the Habitat Risk Matrix defined the necessary distance from leks as being 1 to 6km (0.6 – 3.75 miles). In the WAFWA Guidelines Connelly et al. (2000) described average distances between nesting habitat and leks as varying from 1.1 to 6.2 km (0.7 to 3.85 miles). Connelly et al. (2000) went on to suggest that for non-migratory birds nesting habitat should be protected at ≤ 5km (3 miles) distance from active leks. For migratory populations nesting habitat within 18km (11 miles) of active leks should be protected. Based on radio telemetry work performed by CDFG within this PMU Frank Hall, CDFG, (personal communication) felt that protecting nesting habitat 6km (3.75 miles) from all leks, active and inactive would be an accurate distance for sage grouse conservation. This results in protecting 697,329 acres, or 47%of the PMU**.**

Nesting, Brood Rearing, and Winter Habitats

Risk 1. Sagebrush and associated grass/forbs densities and heights which are not consistent with seasonal habitat needs (Nesting, Brood Rearing, and Winter Habitat).

This risk occurs as a result of several factors. Each factor is discussed separately.

Contributing Factor: Natural Ecosystem Dynamics (Risk Level – Moderate).

Three subspecies of big sagebrush, and two subspecies of low sagebrush are the dominant sagebrush found within the Buffalo-Skedaddle PMU. Where each of these occurs is a product of soil depth, elevation, and precipitation (Table 3). These variations of precipitation, elevation, and soil depth limit the structure, and species diversity within sagebrush communities. This in turn limits the sagebrush community's ability to provide sage grouse habitat.

Table 3. General ranges of precipitation, elevation, and soil depth for sagebrush cover types found in the Buffalo-Skedaddle PMU (from Miller and Eddleman 2001).

Species	PPT Mm (in.)	Elev. M (ft)	Soil Depth (in.)
Artemisia tridentata tridentata Basin big sagebrush	200-400 (8-16)	<2,300 (<7,546)	deep (30-60+)
Artemisia tridentata vaseyana Mountain big sagebrush	350-450 (14-18)	1,200-3,200 (3,937-10,500)	mod.-deep (20-60)
Artemisia tridentata wyomingensis Wyoming big sagebrush	180-300 (7-12)	150-1,676 (490-5,500)	moderate (20-50)
Artemisia arbuscula arbuscula Low sagebrush	200-400 (8-16)	1,000-3,000 (3,280-10,830)	shallow (5-30)
Artemisia arbuscula longicaulis Lahontan sagebrush	175-350 (7-14)	1050-2000 (3,445-6,562)	shallow (5-30)
Artemisia nova[1] Black sagebrush	200-300 (8-12)	1,400-2,550 (4,593-8,366)	shallow (5-30)

1. Black sagebrush does occur within the PMU but is not a major sagebrush community.

Floristic diversity in sagebrush steppe communities is usually considered to be moderate (West 1983). Jensen (1989) while evaluating 372 ecological sites in Nevada encountered 218 species. Thirty-nine were shrubs, 35 were grasses, and 140 were forbs. Within 112 mountain big sagebrush communities in the northern Great Basin, 247 of the total 337 plant species were forbs. Forbs, however, generally account for less than 10% of the total plant cover or biomass in shrub steppe communities (Miller and Eddleman 2001).

Shrub canopy cover desired by sage grouse changes throughout their annual life cycle. Shrub cover varies from open small areas for leks, moderately dense (15-25%) for nesting, moderate (10-25%) for brood rearing habitat, and open to dense (10-30%) for wintering (Connelly et al. 2000). Shrub heights preferred for nesting vary from 30-80 cm (12”-31”), brood rearing 40-80 cm (16”-31”), and winter habitat 25-35 cm (10”-14”). Shrub cover, density, and height are determined by site factors, species of *Artemisia*, and past history of disturbance.

Wyoming big sagebrush occupies the more arid sites and is the dominant sagebrush community in the Buffalo-Skedaddle PMU. This subspecies normally varies between 40 cm-55 cm (16”-22”) in height (Tisdale 1994). On highly productive sites Wyoming sagebrush can exceed 80 cm (31”). Shrub canopy cover usually varies between 5-25%. The higher occurs in communities in poor ecological condition containing few perennial herbs in the understory. Goodrich (1999) found that once Wyoming big sagebrush reaches 15% canopy cover herbaceous understory production declines 3.8% with every 1% increase in sagebrush canopy cover. High quality nesting cover in Wyoming big sagebrush

types occupies the ≤ 15% portion of cover range presented in Table 2 (Winward 2001). Winward (2001) also reported that Wyoming big sagebrush communities with a preponderance of sagebrush plants reaching above approximately 60 years of age have outlived their prime and are in a declining condition. Wyoming big sagebrush communities exposed to no or minimal Eurasian impact in southeastern Oregon with an intact native herbaceous understory, had a shrub canopy cover that varied between 5-10% on the dry end of its distribution (20 cm (8") ppt). The same communities found on the wet end (30 cm (12")ppt) of its distribution had a shrub canopy cover of between 13 and18% (Kindschy 1991). Sites approaching or exceeding 20% shrub canopy usually have been overgrazed and contain depleted understories. In areas of high winter concentrations of deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*) sagebrush cover was <5%)Goodrich et al. 1999). Wyoming sagebrush communities often contain a high percentage of bare ground and sparse but variable forb cover (Tisdale 1994). Perennial forb cover is usually <10% and highly dependent on amount and timing of precipitation (Kindschy 1991).

Basin big sagebrush, normally > 1m (39") tall, is usually found on deep, sandy or loamy textured soils (Miller and Eddleman 2001). Plant cover, like other sagebrush types, is highly variable depending on site characteristics. The shrub overstory can range from fairly open to >30% cover. The understory is usually dominated by perennial grasses with a moderate forb layer. Structure of the herbaceous layer can vary greatly in response to which grass species dominates the site.

Mountain big sagebrush communities usually occupy the zone immediately above the other two big sagebrush subspecies on cooler and wetter sites providing important nesting and brood rearing habitat. Soils are normally moderately deep to deep (Jensen 1989). Shrub canopy cover in undisturbed communities usually varies between 15-40% but can reach up to 50% in mesic communities with deep loamy soils and north aspects. The shrub layer in mountain big sagebrush communities is typically 80-100 cm (31"-39") tall. A well developed perennial grass and forb layer usually characterizes a mountain big sagebrush community. This cover type, often the most preferred sagebrush type by sage grouse during nesting (Gregg 1991), provides excellent nesting cover, and an abundance of succulent forbs. Nesting habitat shrub canopy cover in this type represents the greater than 15% through 25% cover range in Table 2. The growing season is usually longer than the other two big sagebrush types, providing succulent forbs later into the summer.

Low sagebrush is the most common low sagebrush species in northwestern Nevada, and northeastern California. Shrub canopy cover varies between 5 and 25%. Shrub height (30-50 cm (12"-20"))and herbaceous production is highly variable within this type. On shallow rocky soils shrub stature does not usually

exceed 30 cm (12”). Sandberg bluegrass is the dominant herbaceous plant, forb species are usually diverse, and bare ground is commonly >50% (Passey et al. 1982). On deeper poorly aerated soils, however, shrub height is closer to 50 cm (20”), bare ground is commonly <50% and Idaho fescue or bluebunch grass usually dominate the understory. Low sagebrush types are often preferred by sage grouse during winter when availability is not limited by snow depth (Klebenow 1985). In years when snow depth exceeded 25- 30 cm (10”-12”), sage grouse moved from low statured sagebrush sites into Wyoming big sagebrush community types (Barrington and Back 1984). Greater forb abundance in the more mesic low sagebrush communities correlates with preferred use by sage grouse over Wyoming big sagebrush communities. Low sagebrush can provide excellent habitat for sage grouse when it forms a mosaic with mountain big sagebrush.

Lahontan sagebrush has only recently been described (Winward and McArthur 1995). Until that time it was referred to as an ecotype of Wyoming big sagebrush. Growth characteristics are very similar to low sagebrush. Lahontan sagebrush can grow in pure stands or in association with big sagebrush. Little will be known about its capabilities as sage grouse habitat until biologists revisit those sites initially evaluated as ecotypes of Wyoming big sagebrush, or low sagebrush, and correct their habitat evaluations as being within lahontan sagebrush types. Work performed by the Eagle Lake Field Office Land Health Assessment Interdisciplinary Team has found that these communities resemble low sagebrush communities under the same environmental conditions. One very healthy site was dominated by a herbaceous cover of bluebunch wheatgrass, and a variety of forbs. Lahontan sagebrush occupies several thousand acres within northwestern and central Nevada, and northeastern California. It is the second most common low sagebrush found within the Buffalo-Skedaddle PMU.

We understand that each sagebrush type has its own set of limitations, and that the sage grouse found in the Buffalo-Skedaddle PMU are found throughout this variety of communities. The best anyone can do has been stated most succinctly by Swanson (2002). *Where R-0 values are achieved, sustain them over the long term by periodic disturbances as needed to maintain vigor in the understory grasses and forbs and retain or replace an appropriate sagebrush canopy*.

Conservation Measures:

Nesting Habitat	**Brood Rearing Habitat**	**Winter Habitat**
Manage sagebrush ecosystems to their potential in R-1 and R-2 areas. Where R-0 values are achieved sustain them over the long term.	Manage big sagebrush ecosystems to the highest possible level of health as described in Technical Reference 1734-6, 2000, *Interpreting Indicators of Rangeland Health*. Low sagebrush sites either in association with big sagebrush or standing alone will be managed for R-0 value and land health.	Sustain R-0 value habitat over the long term. Apply intense fire suppression. Rehabilitation activities will include sagebrush in the seed mixture. No treatments should be allowed unless they are shown to be beneficial to sage grouse habitat. Continue fire planning on BLM administered lands to develop risk factors for protection activities.

Responsible Parties: BLM, CDFG, NDOW, Private Land Owners

Monitoring: Continue to monitor for land health.

Timeline: Yearly as part of normal landscape monitoring.

Contributing Factor: Levels of Grazing – Livestock (Risk Level – Moderate).

Call and Maser (1985) list three primary effects from livestock grazing on sage grouse habitat. These are: (1) changes in composition, density, and structure of vegetation; (2) disturbance of nesting hens and possible trampling of nests; and (3) removal of brood forage and cover in meadows.

Connelly et al. (2000) concluded *there is little experimental evidence linking grazing practices to sage grouse population levels. However, grass height and cover affect sage grouse nest site selection and success. Thus, indirect evidence suggests grazing by livestock or wild herbivores that significantly reduces the herbaceous understory in breeding habitat may have negative impacts on sage grouse populations.*

Miller and Eddleman (2001) report that poor livestock grazing practices can have a large negative impact on sage grouse habitat. Probably the most significant long-term adverse impact of excessive livestock grazing on sage grouse is the degradation of sagebrush, meadow, and riparian communities. Poor grazing

practices change the proportion of the shrub, grass, and forb functional groups, increase opportunity for invasion and dominance of introduced annuals, shorten the growing season, and can cause an overall decline in site potential through loss of topsoil. A decline in site condition often decreases the ability of soils to capture, store and release water causing sites to become more arid. This in turn provides less green plant material for shorter periods of time. Excessive grazing also increases the potential of direct competition between livestock and sage grouse.

Grazing management practices, which maintain the integrity of sagebrush communities can have positive, neutral, or negative impacts on sage grouse habitat. Season, duration, distribution, and intensity of use, as well as class of livestock will determine the affects of grazing on sage grouse food and cover. Plant composition and structure at the community and landscape levels will also affect potential interactions between livestock and sage grouse. Spatial and temporal heterogeneity of the landscape will affect length of the growing season, regrowth following herbage removal, herbage abundance, and grazing distribution. Topography, size and shape of pastures, and distribution of salt and water will also influence grazing distribution. All of these factors must be considered when developing grazing management plans sensitive to sage grouse habitat requirements (Miller and Eddleman 2001). Grazing management plans will be designed to address site specific issues.

Possibly the greatest potential conflict under proper grazing practices is the reduction of herbaceous cover, particularly in nesting areas. Gregg (1991) reported the combination of both aerial and horizontal cover were important in determining nesting success. Nesting success is greater on sites that have higher residual cover of tall grasses (≥ 15-18cm (6”-7”)) (Connelly et al. 2000). Diet overlap between cattle and sage grouse under moderate grazing is minimal since cattle graze primarily grass rather than forbs. The potential, however, for diet overlap with sheep is considerably greater. The spatial distribution of use by livestock and sage grouse will influence the relationship between these animals.

Season of use by livestock also influences use in uplands versus adjacent riparian areas. If availability of succulent forbs is an objective, early use might be considered. Several studies have reported grouse prefer meadows grazed by cattle over ungrazed meadows early in the spring (Neel 1980, Klebenow 1985). Evans (1986) reported birds did not select for grazed or ungrazed meadows in mid-summer but selected for grazed areas in late summer. Attraction to grazed meadows during late summer was attributed to delayed phenological development. Evans (1986) also reported grazing increased the abundance of succulent leaves favored by grouse. The season and duration of grazing can influence phenology, leafiness, and regrowth of plants. However, overgrazing of meadows can lead to a shortening of the growing season through an increase in meadow desiccation, and loss of palatable food plants for sage grouse.

When developing grazing plans for areas used by sage grouse, it is extremely important to identify potential conflicts between sage grouse and livestock, and spatial and temporal heterogeneity of the management unit. Management solutions will vary if the problem is habitat degradation, season of use, stocking rates, or animal distribution. Most of these problems can be solved with sound creative management (Miller and Eddleman 2001).

Conservation Measures:

Nesting Habitat	**Brood Rearing Habitat**
Establish & maintain a stubble height of 18cm (7") within the drip line of sagebrush. This primary objective will be achieved through use of the following applications: 1. Sustain R-0 rated nesting habitat over the long term. 2. In R-2 areas where existing species of perennial grass cannot normally reach 18cm (7") of growth reintroduce native grass species that have greater vertical structure. 3. In areas where the 7" stubble heights under sagebrush should, but do not occur, manage livestock grazing to ensure the objective can be met.	1. Sustain R-0 rated habitat over the long term. 2. Graze existing vegetation in a manner that provides an opportunity for herbaceous perennial plant seedling establishment (grass and forbs), and facilitates understory vigor.

Responsible Parties: BLM, Livestock Operators, Wild Horse and Burro Management

Monitoring: Nesting Habitat: Monitor *existing vegetation* stubble height within sagebrush canopy dripline in each pasture being used-annually. Nesting & Brood rearing Habitat: Seedings shall be monitored to determine success, and determine when the seeding may be used for grazing. Brood rearing Habitat: Monitoring should include sampling for herbaceous vigor, and seedling establishment.

Timeline: 2004 (The Land Use Plan updates will establish stubble heights under sagebrush in sage grouse nesting habitat as part of Guideline 16.)

Contributing Factor: Levels of grazing – Wild Horses and Burros (Risk Level – High).

The statement from Connelly et al. (2000) provided above applies to wild horses and burros as well as livestock. The entire discussion of grazing impacts applies

equally to wild horses and burros. Limiting season of use, and distribution of wild horse and burro uses is not consistent with the regulations for managing wild horse and burros. Wild horses and burro are to be afforded a free roaming status, limited as little as possible by fencing, and their use of the land is year round. Appropriate Management Levels (AMLs) have been set for the Buffalo-Skedaddle PMU through the BLM's land management planning process. The management tool for maintaining AMLs is removal of wild horse and burros from the land when it is shown that their numbers have lead to ecological imbalance. Wild horses and burros are also removed from burned areas to facilitate recovery of the burn to an appropriate level of land health. Limited funding within the BLM's wild horse and burro program combined with a 17% overall recruitment rate confounds the ability of the agency to maintain a healthy ecological balance.

Conservation Measures: Nesting Habitat: Maintain WH&B numbers to Appropriate Management Levels (AML).

Responsible Parties: BLM, Wild Horse and Burro Groups

Monitoring: Monitor using counts to determine if AMLs are being maintained. Monitor utilization in pastures rested from livestock grazing to insure an ecological balance is being maintained.

Timeline: On going. During preparation of the upcoming RMP appropriateness of existing AMLs will be revisited.

Contributing Factor: Fire (Risk Level – High).

Nesting Habitat. Some have suggested that fire may benefit sage grouse populations (Connelly et al. 2000). In contrast, however, Connelly et al. (1994) reported that prescribed burning in Wyoming big sagebrush during a drought period resulted in a >80% decline in a nesting population in southeastern Idaho. Hulet (1983) documented loss of leks from fire. Nelle et al. (2000) found that burning mountain big sagebrush communities has long-term adverse impacts on sage grouse nesting as well as brood rearing habitats. Shrub canopy cover in mountain big sagebrush had not provided appropriate nesting habitat 14 years after burning (Nelle et al. 2000). Cheatgrass may occupy sites following disturbance, especially fire (Valentine 1989). Repeated burning, or burning during late summer appears to be a major cause for expansion of cheatgrass. The ultimate result may be a loss of sage grouse populations because of long-term conversion of sagebrush habitat to rangeland dominated by an annual nonnative grass (Vallentine 1989).

Brood rearing habitats. Pyle and Crawford (1996) suggested fire may enhance brood rearing habitat in montane settings but cautioned that its apparent usefulness requires more investigation. A 9 year study in a Wyoming big sagebrush habitat did not support the contention that prescribed fire, conducted

during late summer, improved sage grouse brood rearing habitat (Connelly et al. 2000). The amount of forbs did not increase in burned areas compared to unburned areas, and resulted in decreased insect populations (Fischer et al. 1996, Nelle et al. 2000). Based on information to date fire may adversely impact brood rearing habitat rather than improve it in Wyoming big sagebrush habitats (Connelly and Braun 1997). Fire's effect on grouse habitats in mountain big sagebrush habitats requires further investigation (Pyle and Crawford 1996, Nelle et al. 2000).

Winter habitat. Sage grouse use of a burned area declined following fire but the sage grouse adapted by moving 1-10 km (0.6-6.2 miles) outside the burn to habitat with greater sagebrush cover (Robertson 1991). This latter point supports the need to maintain healthy, diverse habitat patches across the entire landscape rather than focusing attention on just those areas recognized as current sage grouse habitat.

Conservation Measures: Nesting and Brood Rearing Habitat: Seed appropriate native sagebrush into each fire rehabilitation to accelerate recovery of R-1 lands to R-0, and keep R-4 lands from moving to X-4. Seed appropriate native grasses, **and forbs** into each fire rehabilitation to accelerate recovery of R-2 lands to R-0, and keep R-4 lands from moving to X-4. Establish high priority wildfire suppression response in Wyoming big sagebrush ecosystems.

WAFWA Guidelines (Connelly 2000) provide additional direction for protection of breeding habitat (leks and nesting habitat) as follows:

4) *Do not use fire in sage grouse habitats prone to invasion by cheatgrass and other invasive weed species unless adequate measures are included in restoration plans to replace the cheatgrass understory with perennial species using approved reseeding strategies. These strategies could include, but are not limited to, use of pre-emergent herbicides (e.g., Oust, Plateau) to retard cheatgrass germination until perennial herbaceous species become established.*

5) *When restoring habitats dominated by Wyoming big sagebrush, regardless of the techniques used (e.g., prescribed fire, herbicides), do not treat >20% of the nesting breeding habitat (including areas burned by wildfire) within a 30-year period (Bunting et al. 1987). The 30-year period represents the approximate recovery time for a stand of Wyoming big sagebrush.*

6) *When restoring habitats dominated by mountain big sagebrush, regardless of the techniques used (e.g., fire, herbicides, etc.), treat ≤ 20% of the breeding habitat (including areas burned by wildfire) within a 20-year period (Bunting et al. 1987). The 20-year period represents the approximate recovery time for a stand of mountain big sagebrush.*

Responsible Parties: BLM, CDFG, NDOW

Monitoring: Quantitatively monitor for seeding success using existing rehabilitation guidelines established for the Eagle Lake Field Office (ELFO). Standard statistical reliability for quantitative monitoring of seeding is 80% confidence interval +/- 10%.

Timeline: Each year for 3 years following first growing season after fire, then every other year until determined to be recovered by the Field Office ID Team.

Contributing Factor: Herbicide Treatments (Risk Level – Low).

Prior to the early 1980s herbicide spraying (primarily 2,4-D) was the prevalent method used to reduce sagebrush on large tracts of rangeland (Connelly et al. 2000).

In virtually all documented cases, herbicide application to blocks of sagebrush types resulted in severe declines in sage grouse breeding populations (Connelly et al. 2000). These impacts are even more severe if the removal of sagebrush is followed by planting of agricultural crops. Carr (1968) reported that using herbicide to remove sagebrush from a lek, did remove the sagebrush, but the dense growth of grass which followed still eliminated use of the lek. It should be obvious that treatment of a sagebrush obligate's habitat to remove or severely limit sagebrush cover has a very high potential for adversely impacting sage grouse populations. Klebenow (1969) however, did find that thinning high sagebrush cover stands in a manner which restores the balance of forbs and grasses can enhance sage grouse habitat. In Wyoming, application of tebuthiuron reduced sagebrush cover and increased grass production 2 to 4 fold but forbs remained relatively constant (Olsen and Whitson 1999). Because tebuthiuron and other similar herbicides appear to have the potential for reducing but not eliminating sagebrush cover within sage grouse breeding habitats, while stimulating herbaceous development, their use should be closely examined for use as sage grouse habitat management tools (Connelly et al. 2000).

With the spread of invasive nonnative weeds (also referred to as noxious weeds) has come a return to increased use of herbicides. The herbicides selected for use, however, are those that are most target species specific and least environmentally damaging. There are increasing efforts to use biological control to eliminate larger, almost pure stands of noxious weeds. More work is needed to insure these controls are truly species specific and do not pose a threat to native species of the same genus.

Conservation Measures:

Nesting Habitat	**Brood Rearing Habitat**
No broadcast herbicide treatments will occur within nesting habitat unless they are shown to be beneficial to the sagebrush ecosystem. Noxious weeds will be controlled using methods focused on the specific infestations.	No broadcast herbicide treatments will occur within nesting habitat unless they are shown to be beneficial to the sagebrush ecosystem. Noxious weeds will be controlled using methods focused on the specific infestations.

In addition to the above conservation measures the following from the WAFWA guidelines is incorporated into this effort.

> 8) *Until research unequivocally demonstrates that using tebuthiuron and similar-acting herbicides to control sagebrush has no long-lasting negative impacts on sage grouse habitat, use these herbicides only on an experimental basis and over a sufficiently small area that any long-term negative impacts are negligible.*

Responsible Parties: BLM, CDFG, NDOW, SWAT, CWMA, Nevada Agriculture, NRCS, Private land owners

Monitoring: A quantitative monitoring plan will be part of the Environmental Assessment.

Timeline: Each year for 3 years following first growing season after treatment, then every other year until the treatment is determined to be recovered by the Field Office ID Team.

Contributing Factors: Juniper encroachment (Sagebrush seedlings present)(R-3). Risk Level – Moderate. Annual non-native grass invasion (Sagebrush seedlings present)(R-4). Risk Level – High. Areas that have crossed the threshold from sagebrush communities (sagebrush seedlings absent) into juniper woodlands (X-3). Risk – Moderate. Areas that have crossed the threshold from sagebrush communities (sagebrush seedlings absent) into annual grasslands (X-4). Risk – Moderate.

These four contributing factors are lumped into a single discussion because juniper encroachment and eventual domination of a normally sagebrush dominated community, and the invasion and eventual domination by annual nonnative grass, or grasses, are both steady states in rangeland succession.

F. E. Clements of the University of Nebraska, Lincoln developed a theory of vegetation dynamics. To Clements, the climax theory rested on the assumption that vegetation could be classified into formations that represented a group of plant species that acted together as if they were a single organism (Committee on Rangeland Classification 1994). Clements (1916) wrote "As an organism, the formation arises, grows, matures, and dies….each climax formation is able to reproduce itself, repeating with essential fidelity the stages of its development." The climax formation was "the climax community of a natural area in which essential climatic relations are similar or identical." A climax community is the assemblage of plant species that most nearly achieves a long-term steady state of productivity, structure, and composition on a given site (Tueller 1973). Clements believed that all successional units within a climatic region developed along one linear path toward a plant community climax that was determined by climate (a climatic climax community).

In 1949, E. J. Dyksterhuis published a paper that was to solidify the contribution of successional theory to the assessment of rangelands. Dyksterhuis refined the climatic climax community described by Clements, proposing that different climaxes coexist as a function of soil or topographic or geographic differences within a similar climate. Those areas that support a unique climax community are defined as range sites (Dyksterhuis 1949). Each site, defined by its climax plant community, soil, and climatic environment, would support a characteristic assemblage of plants, and this vegetation would persist unless it was disturbed by grazing, fire, drought, or other factors. Vegetation would develop toward this climax plant community through successional stages once disturbances (wind, drought, fire) ceased. Grazing drove the plant composition toward the early stages of succession, whereas natural successional processes drove plant composition toward a climax community. By adjusting the grazing pressure or the duration or season of use, rangeland managers could maintain rangelands at any stage of succession (Dyksterhuis 1949). This theory is referred to as the Succession –Regression model.

In less than twenty years after Dyksterhuis' theory was accepted by land management agencies the ecological community began to question the single linear approach to climax. Margalef (1969) reasoned that if stability is resistance to change imposed by external forces, then a system is stable if it returns to the original steady-state after being disturbed or deflected. An unstable state does not return to the original level after disturbance but rather crosses a "Threshold" and continues to be deflected toward some new state (Hurd and Wolf 1974). The discussion of multiple steady states: *A plant community that is resistant to change, remaining or returning to its current state following disturbance. However, a major disturbance(s) may change it to a new steady state, in which the community will not return to its former steady state even if the disturbance is removed* (Westoby et al. 1989, Laycock 1991) did not begin in range management until approximately 1988 (Friedel 1988, 1991).

Lower successional steady states are common in the sagebrush-grass type which covers at least 81% in the Buffalo-Skedaddle PMU. Original sagebrush communities probably consisted of a fairly open stand of sagebrush with a productive understory of grasses and forbs (Laycock 1978). Periodic natural fires would have temporarily reduced the amount of sagebrush in local areas. Sagebrush types have apparently not been subjected to heavy herbivore grazing pressures since the Pleistocene (Young et al. 1976). When large numbers of domestic herbivores were introduced in the late 19th century, the palatable herbaceous plants were not able to withstand the grazing pressure (Young et al. 1979). Heavy grazing during the short growing season caused rapid deterioration of the understory species and sagebrush increased. Thus a threshold was crossed into steady state dominated sagebrush (Laycock 1991).

Examples, on the ground and in the literature, indicate that once a stand of sagebrush (especially the various subspecies of big sagebrush) become dense with a reduced understory, the sagebrush can dominate a site for very long periods. Robertson (1971) found that 30 years of protection from grazing on an eroded sagebrush-grass site in northern Nevada resulted in increased vegetal cover of all life forms, including sagebrush. Sagebrush made up 68% of the total plant cover at the end compared to 64% at the beginning of the period.

The dominance of sagebrush represents a stable state which resists changes in livestock grazing management to move it across the threshold, possibly toward a grass/sagebrush state. We need to identify and understand the factors which can force a stable community across a threshold into a transitional phase moving it toward another stable state. Most of the stable state communities in North America appear to involve either a change in fire frequency or introduction of an alien species in addition to other factors such as grazing (Laycock 1991).

A major change in fire frequency may be one the factors preventing a community from re-crossing a threshold. Fires in Wyoming big sagebrush types, which have cheatgrass in the understory (R-4), can result in the cheatgrass beginning to dominate the understory if the burn is not aggressively revegetated. With the finer fuels produced by cheatgrass can come a higher frequency of fire which continues the development of a cheatgrass dominated site, pushing the sagebrush/grass community across the threshold to an annual grass dominated site (X-4).

Improper grazing practices can lower a sagebrush community's ability to compete with encroachment by juniper. The lowering of competitiveness within the sagebrush community combined with overactive fire prevention programs in the past have led to juniper out competing big sagebrush and converting these sites to juniper dominated woodlands (Miller et al. 2000). As shrub steppe communities are converted to juniper woodlands, community structure, composition, function, disturbance patterns, and wildlife habitat are altered. During the early phases of woodland development, transition is easily reversed

with fire (R-3) (Miller et al. 2000). Juniper cutting is also affective at reversing the transition (Bates et al. 2000). As community structure changes during woodland development, management options also change. Crossing an ecological threshold from shrub steppe to woodland not only results in a significant reduction in the role of fire, but may also result in loss of native plant species and loss of soils (X-3) (Miller et al. 2000). Once the threshold from shrub steppe to woodland is crossed, cutting of juniper becomes more feasible than the use of fire to help remove juniper competition(Bates et al. 2000). Any treatment at this stage, however, would have to be accompanied with revegetation of the site using local native species.

Conservation Measures:

Nesting Habitat	**Brood Rearing Habitat**	**Winter Habitat**
Juniper encroachment (Sagebrush seedlings present)		
Areas which are reaching R-3 value (<10% juniper cover) will be treated to reduce juniper competition and retain the sagebrush ecosystem at an R-0 value. Treatments should start prior to juniper cover reaching 10%, and will usually address seedling and sapling trees leaving some mature juniper for use by native species who require the tree structure.	Areas that are reaching R-3 value (<10% juniper cover) will be treated to reduce juniper competition and retain the sagebrush ecosystem at an R-0 value. Treatments should start prior to juniper cover reaching 10%. Encourage wood and biomass cutting with reseeding of native perennial species.	Areas which are reaching R-3 value (<10% juniper cover) will be treated to reduce juniper competition and retain the sagebrush ecosystem at an R-0 value.
Areas that have crossed the threshold from sagebrush communities (sagebrush seedlings absent) into juniper woodlands.		
These X-3 sites will require highly expensive mechanical treatments. Conservation measures will include taking advantage of grant, or large project initiative funding to complete site treatments which include removal of dominant species, and reseeding with a mix of native	These X-3 sites will require highly expensive mechanical treatments. Conservation measures will include taking advantage of grant, or large project initiative funding to complete site treatments which include removal of dominant species, and reseeding with a mix of native	These X-3 sites will require highly expensive mechanical treatments. Conservation measures will include taking advantage of grant, or large project initiative funding to complete site treatments which include removal of dominate species, and reseeding with a mix of native

species.	species. Encourage wood and biomass cutting with reseeding of native perennial species.	species.
Non-native grass invasion (Sagebrush seedlings present)		
Areas where annual non-native grass species have invaded a site but the site has not crossed a threshold (R-4) - appropriate conservation measures will include adjusting grazing levels, increased length of rest to allow existing perennial grasses and forbs to compete, and treatment with reseeding.	Areas where annual non-native grass species have invaded a site but the site has not crossed a threshold (R-4) - appropriate conservation measures will include adjusting grazing levels, increased length of rest to allow existing perennial grasses and forbs to compete, and treatment with reseeding with a mix of native perennial species.	Areas where annual non-native grass species have invaded a site but the site has not crossed a threshold (R-4) - appropriate conservation measures will include adjusting grazing levels, increased length of rest to allow existing perennial grasses and forbs to compete, and treatment with reseeding.
Areas that have crossed the threshold from sagebrush communities (sagebrush seedlings absent) into annual grasslands.		
These X-4 sites will require highly expensive mechanical treatments. Conservation measures will include taking advantage of grant, or large project initiative funding to complete site treatments which include removal of dominant species, and reseeding with a mix of native species.	These X-4 sites will require highly expensive mechanical treatments. Conservation measures will include taking advantage of grant, or large project initiative funding to complete site treatments which include removal of dominant species, and reseeding with a mix of native species.	These X-4 sites will require highly expensive mechanical treatments. Conservation measures will include taking advantage of grant, or large project initiative funding to complete site treatments which include removal of dominant species, and reseeding with a mix of native species.

Responsible Parties: BLM, CDFG, NDOW, Private Land Owners.

Monitoring: Quantitative monitoring will be part of the planned action.

Timelines: Each year for 3 years following first growing season after treatment. Every other year until determined to be recovered by the Field Office ID Team.

Risk #2. Indirect Limiting of Habitat Values (Nesting, Brood Rearing, and Winter Habitat).

Contributing Factors: Off-Highway Vehicle (OHV) Use. Risk Level – High.

Call and Maser (1985) report that Off-Highway Vehicles (OHV) do occasionally run over nests, but the amount of loss is probably insignificant. Organized OHV events across sage grouse nesting habitat, however, can cause substantial loss of production from direct destruction of nests, from abandonment of nests during egg-laying, from destruction of young chicks, or from a combination of all three (Call and Maser 1985). Several ways of mitigating these potential impacts are available. Restricting OHV use to designated trails, timing of organized events to seasons when any potential harm is at its minimum, closing of areas that are essential for sage grouse survival. The Eagle Lake Field Office through a Cooperative Agreement with the Point Reyes Bird Observatory (PRBO) is currently researching the possible impacts of OHV use on nesting birds, and their demographics within the Fort Sage Mountains OHV Area. The research began during 2002 and will continue at least through 2004.

Conservation Measures:

Nesting Habitat	**Brood Rearing Habitat**	**Winter Habitat**
Determine if activity is an adverse affect. If necessary, special buffering will lower or remove the adverse impact. New RMP will provide for a management level more restrictive than "open." Roads illegally pioneered into WSAs are being recovered.	If a cause and effect relationship exists adjust or eliminate the adverse impact.	Adjust use or close areas based on conclusions from quantitative monitoring that properly measures activity impacts. Closure and reclamation of roads illegally pioneered into WSAs continues.

Responsible Parties: BLM, CDFG, NDOW, and OHV groups

Monitoring: If the current research indicates there is an issue changes in use will be made, and an adaptive management monitoring program will be put in place to test results of the changes, and adjust the management of OHV activity, if needed.

Timelines: The research began in 2002. The RMP should be signed and in affect by 2004. Adaptive management adjustments, if needed, will begin in 2004.

Contributing Factor: Grazing (primarily domestic sheep – nest trampling). Risk – Low.

Paterson (1952) reported that on two occasions bands of sheep were noted to have caused hens to flush and simultaneously to flip eggs out of their nests. These eggs were subsequently stepped on by sheep. Sheep have also destroyed nests by stepping on them. There is no indication that livestock are a serious factor in destruction of nests. Desertion of nests, however, can frequently occur because of livestock activity under certain conditions. Desertion of nests by sage grouse is most prevalent in the vicinity of sheep bed-grounds. Bands of 2,000 – 3,000 sheep seriously disturb nesting activities. Patterson (1952) noted that a period of nest desertion coincided with several thousand sheep being moved into his study area en route to their summer ranges. Nests were most likely to be deserted during the periods of pre-incubation or early incubation. Nests were seldom deserted after incubation was well underway.

Conservation Measures: Nesting Habitat: Not bedding or grazing on leks appears to be a benefit to sage grouse. Little scientific data exists which indicates nest trampling by sheep is an issue. We will determine, through research, if nest trampling by domestic sheep does occur, and if it is an issue.

Responsible Parties: BLM, CDFG, NDOW, Domestic Sheep Operators

Monitoring: If a cause and affect is established adaptive management actions will be taken and monitored accordingly to insure management actions taken are appropriate.

Timelines: Work will begin in 2004 or if funding is available prior to 2004.

Risk #3: Increasing Permanent or Long-Term Loss of Nesting, Brood Rearing, and Winter Habitat.

Contributing Factors: Conversion to cultivated agriculture, Surface mining, Utility development, Urbanization, and sale of Riparian habitat. Risk Level – Low.

Structures such as telephone and power transmission lines pose hazards to sage grouse because they provide additional perch sites for raptors. Conversion of sagebrush communities to cultivated crops usually results in habitat fragmentation or loss. Broods have been known to utilize cultivated crops during brood rearing activities. The use of insecticides on these crops, however, has the potential to kill sage grouse. This is discussed below. Overall effects of mining, oil, and gas developments on sage grouse are not well understood (Braun 1998). These activities negatively impact sage grouse over the short term (Braun 1986) but research suggests some recovery of populations following initial development and reclamation of affected sites. Sage grouse may repopulate an area following energy development but may not attain population levels that occurred prior to development (Braun 1998). Therefore, short-term and long-term habitat loss appears to result from energy development and

mining (Braun 1998). Development of springs for the exclusive use of livestock or domestic water sources has resulted in the loss of essential sage grouse habitat (Call and Maser 1985).

Conservation Measures:

Nesting Habitat	**Brood Rearing Habitat**	**Winter Habitat**
Do not allow utility development which will adversely impact sage grouse nesting, and as much as possible do not allow surface mining in nesting habitat. Conversion to cultivated agriculture and sales of riparian habitat only occur on private lands and will be addressed with private landowners. Private landowners will be advised if nesting occurs on their property.	Do not allow utility development which will adversely impact sage grouse nesting, and as much as possible do not allow surface mining in brood-rearing habitat. Conversion to cultivated agriculture and sales of riparian habitat only occur on private lands and will be addressed with private landowners	Do not allow utility development which will adversely impact sage grouse winter habitat, and as much as possible do not allow surface mining in winter habitat. Conversion to cultivated agriculture and urbanization will be addressed with private landowners.

Responsible Parties: BLM, CDFG, NDOW, Private Land owners, NRCS, University extension.

Monitoring: If the actions do not take place monitoring will not be required. If actions do take place monitoring and mitigation will be part of the permitting process.

Timelines: As they occur.

Risk #4: Overgrowth and stagnation of over protected meadows (Brood Rearing Habitat).

Contributing Factors: Overprotection of springs and meadows by agencies and land owners. Risk Level – Moderate.

Land management agencies use fencing of springs and associated meadows/wetlands as a tool for protection from overgrazing, and trampling by wild horses and burros, and livestock. Trampling of springs and associated meadows/wetlands can result in a violation of Land Health Standards 3 – Water

Quality and 4 – Riparian and Wetland Sites. At least 60% of the over 160 springs in the Eagle Lake Field Office are fenced. The intent of protection, however, can become a cause for stagnation if the protected areas are not treated to maintain the cover, density, diversity, and vegetative health of the site. As discussed under livestock grazing above, some use of meadows by livestock at the proper times is beneficial to sage grouse. Burning of meadows can also accomplish much in the way of habitat maintenance for sage grouse.

Conservation Measures: Brood Rearing Habitat: If agencies or land owners are enclosing a meadow to exclude over utilization or degradation the agency(s) involved must establish adaptive management goals and actions such as grazing the meadows as necessary to maintain appropriate vegetation structure, diversity, density, composition, and vigor.

Responsible Parties: BLM, CDFG, NDOW, and Private land owners.

Monitoring: Monitor enclosure objectives using quantifiable data.

Timelines: Establish baseline at the time each meadow is enclosed. Monitor annually to determine when thresholds needing action are reached. Revisit each spring, meadow or wetland already enclosed and establish maintenance schedules to insure proper habitat condition for sage grouse use.

Risk #5: Damage to unprotected springs and meadows (wetlands) (Brood Rearing Habitat).

Contributing Factors: Over grazing by livestock, and wild horses and burros resulting in loss of vegetation, and trampling of springs and meadows. Inappropriate use of OHVs causing damage to wet areas. Risk Level - Moderate.

Grazing issues related to springs and meadows have been discussed above. Damage has been recorded to several springs and meadows within sage grouse habitat as a result of improper OHV use primarily during wet seasons. Rutting springs and meadows with the tires from OHVs can result in the same lowering of the water table that can result from trampling.

Conservation Measures: Brood Rearing Habitat: Maintain or achieve Proper Functioning Condition (PFC) and proper sage grouse habitat criteria of wetlands through application of the utilization levels prescribed in Livestock Grazing Guideline 16. Manage OHV use to enhance healthy riparian/wetland conservation.

Responsible Parties: BLM, CDFG, NDOW, Private land owners.

Monitoring: Monitor wetlands for utilization and impacts to PFC and sage grouse habitat.

Timeline: This is an ongoing process.

Risk #6: Potential sage grouse die-offs (Brood Rearing Habitat).

Contributing Factors: Use of very toxic organophosphorus and carbamate insecticides as well as methamidiphos in potato fields, and dimethoate in alfalfa fields. Treatment of BLM administered lands for Mormon crickets, and the sagebrush defoliator moth *Aroga websteri*. Risk Level – Moderate.

Blus et al. (1989) reported die-offs of sage grouse that were exposed to methamidiphos used in potato fields and dimethoate used in alfalfa fields. Dimethoate is used commonly for alfalfa, and 20 – 31 radio marked grouse (65%) died following direct exposure to this insecticide. Invertebrate herbivory of the dominant big sagebrush has been well documented for larvae of the sagebrush defoliator moth *Aroga websteri* (Hsiao 1986). One year after a prescribed burning experiment on the Likely Table in northeastern California in the 1960s the sagebrush defoliator killed most of the big sagebrush in an unburned control treatment (Longland and Young 1995). In this case the stand was apparently very even-aged and the insect infestation was as effective as fire as a stand renewal process. More typically, the sagebrush defoliator kills the oldest or largest big sagebrush plants, releasing younger, more vigorous plants. In such cases there is no break in sagebrush dominance of the site, but the herbivory affects the age and size structure of the local sagebrush population. The sagebrush defoliator moth can have a significant interaction with wildfires. If cheatgrass is present in the understory when big sagebrush plants are partially or totally defoliated, an extreme fire hazard develops (Longland and Young 1995).

Conservation Measures: Brood Rearing Habitat: Discourage use of very toxic insecticides in brooding-rearing habitats. Encourage use of less toxic agrochemicals or biological controls. The land management agencies must insure an insecticide response to naturally occurring defoliation is necessary before allowing insecticide use on lands they administer. Where insecticides must be used on BLM administered lands restrict use to less toxic chemicals, and only spot applications. Private landowners will be advised if brood-rearing occurs on their property.

Responsible Parties: BLM, CDFG, NDOW, Private land owners, and other insecticide regulatory agencies.

Monitoring: A monitoring plan is an integral part of any plan proposing treatment and the environmental documentation. NOTE: Scientifically based

insect infestation monitoring is required prior to submitting a treatment proposal to insure we understand the level of infestation.

Timelines: The timeline begins when a proposed application is approved.

PRIORITIZATION CRITERIA

Criteria to be used for prioritizing sage grouse habitat reclamation and conservation is listed below. Adapted from the United Federal Policy for a Watershed Approach to Federal Land and Resource Management (Federal Register 2000).

1. The percentage of sage grouse habitat within a 5th level watershed.

2. Issues identified, including possible adverse effects on sage grouse breeding (lek and nesting) habitat.

3. Magnitude of habitat impairment.

4. Vulnerability of the habitat to degradation.

5. Substantive public interest.

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APPENDIX 1

RANGELAND HEALTH EVALUATION SUMMARY WORKSHEET

APPENDIX 2

ABRIDGED GUIDELINE 16

FROM NORTHEASTERN CALIFORNIA AND NORTHWESTERN NEVADA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR LIVESTOCK GRAZING APPROVED BY THE SECRETARY OF THE INTERIOR JULY 13, 2000

Guideline 16: Utilization Levels to be Applied to those Allotments Not Meeting or Making Significant Progress Toward Meeting the Standards.

If monitoring or documented observation indicates that one or more of the standards is not being met, and if significant progress is not being made toward meeting all of these standards that are not being met, and if there is evidence that current grazing practices are causing or contributing to this unsatisfactory condition, then the following utilization levels will be applied.

Utilization of key upland herbaceous species

UTILIZATION GUIDELINES (adapted from Holechek 1988 and Holechek et al. 1998)	
Community Type	Percent of Use of Key Herbaceous Species
Salt desert Shrubland	25-35
Semi-desert grass and shrubland	30-40
Sagebrush grassland	30-40
California annual grassland	50-60*
Perennial grass communities within the California annual grassland vegetation type	30-40
Coniferous forest	30-40
Mountain shrubland	30-40
Oak woodland	30-40
Pinyon-juniper woodland	30-40
Alpine tundra	20-30

- Residual dry matter (RDM) guidelines will be used instead of these utilization levels for management of annual species in the California annual grasslands. These RDM levels correspond approximately with these utilization levels. The RDM levels given in the table in the final EIS under alternative 5, Ukiah RAC Recommended Standards and Guidelines (Section 2.92), will be used for those few annual allotments within the area covered by the Northeastern California and Northwestern Nevada Standards and Guidelines.

Utilization of key upland browse species

There will be no more than 20 percent utilization of annual growth on key browse species prior to October 1 within identified deer concentration areas. These concentration areas are those areas within mule deer habitat where mule deer numbers are most likely to be concentrated during the winter season (winter season normally occurs from December 16 through March 31). These areas have been identified through State Fish and Game Agency fall and spring counts

over a period of several years. Maps of these deer concentration areas are on file at the BLM Eagle Lake Field Office.

Utilization of key riparian species

A 4-6 inch minimum stubble height will remain at the end of the growing season in most riparian areas. There should be no more than 20 percent utilization on key riparian trees and shrub species in those areas where the presence of woody riparian species is necessary to meet standards.

NOTE: There is more discussion within Guideline 16. The portion provided above should suffice for the purposes of this Narrative. Anyone wishing a complete copy of Guideline 16 can request it from the office representative to the sage grouse conservation planning effort.

APPENDIX 3

GRASS HEIGHTS FOR GRASSES COMMONLY FOUND WITHIN SAGE GROUSE HABITAT WITHIN THE BUFFALO-SKEDADDLE POPULATION MANAGEMENT UNIT (PMU)

Appendix 3 – Heights For Selected Grass Species From The Jepson Manual Higher Plants of California, James C. Hickman, Editor

Scientific Name	Common Name	Height cm (Median)	Height In. (Median)
Achnatherum hymenoides	Indian ricegrass	25-70 (47)	10-27 (19)
Achnatherum lettermanii	Letterman's needlegrass	25-80 (52)	10-31 (20)
Achnatherum speciosum	Desert needlegrass	30-60 (45)	12-24 (18)
Achnatherum thurberianum	Thurber's needlegrass	30-75(52)	12-29 (21)
Achnatherum webberi	Webber's needlegrass	10-35 (22)	4-14 (9)
Bromus carinatus v. carinatus	California brome	45-150 (100)	18-59 (38)
Bromus inermis ssp. inermis	Smooth brome	45-100 (72)	18-39 (28)
Elymus elymoides ssp. elymoides	Squirreltail	10-65 (37)	4-25 (15)
Festuca idahoenis	Idaho fescue	30-100 (65)	12-39 (25)
Hesperostipa comata	Needle and thread grass	10-110 (60)	4-43 (24)
Leymus cinerus	Basin wild rye	70-210 (140)	27-83 (55)
Leymus triticoides	Creeping wild rye	45-130 (87)	18-51 (34)
Melica bulbousa	Onion grass	50-80 (65)	20-31 (25)
Pascopyrum smithii	Western wheatgrass	40-90 (65)	16-35 (25)
Poa bulbosa	Bulbous bluegrass	15-60 (37)	6-23 (15)
Poa cusickii	Cusick's bluegrass	10-60 (35)	4-24 (14)
Poa secunda ssp. secunda	Sandberg's bluegrass	15-100 (57)	6-39 (223
Pseudoroegneria spicata	Bluebunch wheatgrass	40-90 (65)	16-35 (25)

These heights may be adjusted based on data gathered during Eagle Lake Field Office's Land Health Assessment.