

**CONSERVATION STRATEGY FOR
SAGE-GROUSE (*Centrocercus urophasianus*)
WITHIN THE BUFFALO – SKEDADDLE
POPULATION MANAGEMENT UNIT**

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CHAPTER I INTRODUCTION

I.A. Background

Sage-grouse (*Centrocercus urophasianus*) is a sagebrush obligate species found in all the western states except Arizona and New Mexico. Breeding populations have declined by 17 – 47% throughout much of its range (Connelly and Braun 1997). The Washington populations, Gunnison subspecies, and Greater sage-grouse species have been petitioned for listing under the Endangered Species Act. To date these petitions have been found to not warrant listing by the U.S. Fish and Wildlife Service. The California Department of Fish & Game considers sage-grouse as a Species of Special Concern and an Upland Game Bird. The Bureau of Land Management (BLM), in California, considers the sage-grouse a BLM Sensitive Species. Within BLM policy (USDI 2001) the minimum level of protection must be consistent with the policy for protection of candidate species.

Since 1987, the estimated breeding sage-grouse population within the Buffalo-Skedaddle Population Management Unit (PMU) has been between about 1,500 and 4,500 sage-grouse, depending on the year. These estimates are based on expansions of peak males counted on California leks using methods in the published literature. The number of active leks in the California portion of the PMU was 21 in 2003. The last check of active leks in the Nevada portion showed 17 active leks in 1992 with 5 of these active in 1998. Populations fluctuate depending largely on habitat quality and precipitation. Population trend since 1987 has not markedly increased or declined but does cycle considerably.

Areas of the sagebrush ecosystem within the PMU that have the potential to support sage-grouse (1,475,506 acres) have declined over the past 100 years. Approximately 46% of potential habitat (mature sagebrush and seedlings present) is dominated by annual grass, annual forbs, bare ground, or 0-9% juniper cover. Approximately 19% of potential sagebrush habitat has crossed the threshold from sagebrush dominated (mature sagebrush and seedlings not present) to juniper or annual grass dominated communities.

Concern for sage-grouse prompted the Western Association of Fish and Game Agencies (WAFWA) to up date guidelines for the management of sage-grouse and their habitats (Connelly et al. 2000). A Memorandum of Understanding (MOU) between the BLM and WAFWA was signed on August 14, 2000 to undertake conservation planning to improve populations, reverse habitat declines, demonstrate the commitment of all involved to the long-term conservation of the species, and perhaps, to preclude the need to list sage-grouse as threatened or endangered.

The following entities have committed to implementation of the conservation strategy and are signatory to the conservation agreement:

- California Department of Fish and Game (CDFG)
- Nevada Division of Wildlife (NDOW)
- Bureau of Land Management (BLM)
- Lassen County Board of Supervisors (LCBS)
- Lassen County Fish and Game Commission (LCFGC)
- University of California Cooperative Extension (UCCE)
- U.S. Fish and Wildlife Service (USFWS)
- Natural Resources Conservation Service

The mission of CDFG is to manage California's diverse fish, wildlife, and plant resources. These are to be managed for their ecological values and for their use and enjoyment by the public.

The mission of NDOW is to protect, preserve, manage, and restore wildlife for their aesthetic, scientific, educational, recreational, and economic benefits to citizens of Nevada and the United States, and to promote the safety of persons using vessels on the waters of Nevada.

The BLM manages public 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;...*"

Through the Lassen County General Plan the Lassen County Board of Supervisors has established Goal L-22 addressing the *Protection and enhancement of important wildlife habitats to support healthy, abundant and diverse wildlife populations*. Policies developed to support this goal are:

LU49 Policy: The County supports the management of wildlife resources in ways that enhance the health and abundance of wildlife populations and the diversity of species and their habitats and which, at the same time, balance management policies and program objectives with the range of social and economic needs for which the County is responsible.

LU50 Policy: To support and protect the value and viability of areas having significant wildlife habitat resources, including migration corridors, such

areas should remain in relatively large parcel units. County zoning and subdivision regulations should protect these resources by not allowing isolated subdivisions intended primarily for residential development (excepted in limited circumstances pursuant to the County's zoning ordinance, e.g., segregation of home sites, parcels created in association with approved use permits, etc.) to be developed in areas which are not specifically designated in the General plan or an area plan for a community development land use (e.g., rural residential) and zoned accordingly.

The Lassen County Fish and Game Commission was reconstituted through Lassen County board of Supervisor's Resolution 91-44. The duties of the Commission are as follows:

- (a) To advise and keep abreast the Board of Supervisors on all policies and programs proposed in Lassen County on fish and game matters; and to recommend appropriate actions to be taken thereto; to investigate and report back to the Board of Supervisors on all matters referred to the Commission by the Board, to maximize the propagation of fish and game within and outside Lassen county.
- (b) To advise the Board of Supervisors on State Fish and Game Commission programs and policies affecting Fish and Game in Lassen County.
- (c) To work with the State Fish and Game Department on programs affecting fish and game matters in Lassen County. The Commission shall have no administrative authority and cannot expand nor authorize the expenditure of public monies, nor in any manner bind the County to a particular course of action or policy.
- (d) To confer with other individuals and/or groups concerning their desires regarding Lassen County fish and game policies and programs.

The University of California Cooperative Extension (UCCE) conducts county-based applied research, education outreach, and other creative activities to help local or regional clientele groups effectively solve problems or improve upon current conditions. UCCE programs are locally driven, but are coordinated regionally and statewide, and are linked with the University's land-grant campuses at Davis, Berkeley, and Riverside. In Lassen County, UCCE provides academic programs in natural resources, rangeland management, livestock management, weed ecology, and cropping systems.

The mission of the USFWS is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. The Fish and Wildlife Coordination Act (16 USC 661 *et*

seq.) authorizes the USFWS to review proposals for any actions requiring federal permits, including, but not limited to, the construction of structures in navigable waters. The Endangered Species Act of 1973, as amended (ESA) authorizes the USFWS to determine whether species are endangered or threatened because of threats to their continued existence. As such, the USFWS conducts periodic species status reviews.

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I.B. HISTORY OF SPECIES CONSERVATION

Each of the Land Use Plans (LUP) within the PMU, completed during the late 1970's and early 1980's contained decisions to manage for sage-grouse. In many cases the decisions did not encompass all sage-grouse needs but focused primarily on leks and nesting habitat within a two mile (3.2km) radius of the lek. This was based on the WAFWA Guidelines in place at that time. These LUPs were developed in coordination with NDOW and CDFG. CDFG and NDOW have monitored sage-grouse populations for approximately 50 years, both before and after the most recent BLM LUP decisions. Little was accomplished in habitat monitoring, and the available information was not adequately communicated between agencies until land management agency personnel were asked, by CDFG, to participate in lek counts, and it became obvious in 1999 that more coordination and cooperation were needed for successful sage-grouse conservation planning.

California Department of Fish and Game (CDFG):

Sage-grouse have been managed primarily as an upland game bird by the California Department of Fish and Game since the first hunting season was held in northeastern California in 1853. Daily limits were first proscribed in 1901 (25), reduced to 4 in 1911 and reduced to 2 in 1952. The season has been closed intermittently for 31 years since 1931. Since 1987, sage-grouse have only been hunted in a portion of the PMU, hunter numbers have been limited by variable numbers of yearly permits and season length has been 2 days. The take and use of sage-grouse has been regulated under provisions of the California Fish and Game Code and Title 14 of the California Code of Regulations (CCR). As an upland game bird, hunting regulations and monitoring within the CDFG have been administered by the Wildlife Programs Branch (WPB) with data collection primarily by regional staff and Habitat Conservation Program staff. Licensing and permitting has been administered by the License and Revenue Branch of the Department.

The Department's role in sage-grouse conservation is supported primarily through monitoring of populations. The basic data gathered each year include; (1) Peak seasonal counts of males on active leks, (2) searches for historic and new leks, (3) determining safe hunting harvest levels at not more than 10% of the estimated fall population based on expansions from males counted on all active leks and, (4) estimates of age, sex and successfully nesting female composition from hunter returned wings. Brood composition data are available for 1957 through 1997 but these data are not currently collected due to statistical problems. These monitoring functions are assisted by other agencies and volunteer staff.

A synopsis of all CDFG monitoring and regulatory data for the conservation of sage-grouse (statewide) was completed as a file report for the Department's Wildlife Programs Branch in 1995.

Nevada Division of Wildlife (NDOW):

Bureau of Land Management (BLM): 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 Standards and Guidelines were approved by the Secretary of the Interior, February 12, 1997. Standards for Rangeland Health (later changed to Standards for Land Health), 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. Bureau of Land Management policy (USDI, 2001), directs the BLM to undertake conservation actions for species not listed under ESA before listing is warranted or the designation of critical habitat becomes necessary. Beginning in 1995 ELFO has gathered basic wildlife habitat data during the Riparian Functional Assessment (RFA), and Land Health Assessment (LHA). These data are now used to determine the land's ability to support biological diversity, including sage-grouse.

Since 2001 the BLM has met regularly with NDOW, and CDFG as part of the Washoe-Lassen-Modoc Sage-grouse Working Group to develop conservation strategies for sage-grouse in the Nevada portion of the Buffalo-Skedaddle PMU. In 2002 BLM and CDFG began working with the Lassen-Modoc Sage-grouse Working Group to develop a conservation strategy for sage-grouse in the California portion of the Buffalo-Skedaddle PMU. After several coordination meetings with representatives of the public it has been determined this Conservation Strategy will guide sage-grouse management within the Eagle Lake, Alturas, and Surprise Field Offices portion of the Buffalo-Skedaddle PMU.

Since work began on this conservation strategy the Bureau of Land Management has developed a Draft BLM Sage-grouse Habitat Conservation Strategy which serves as a framework to address conservation of sage-grouse habitats on BLM public land. The vision of the national BLM Sage-grouse Habitat Conservation Strategy is to manage public land in such a manner as to maintain, enhance, and restore sage-grouse habitats while providing for multiple uses of BLM administered land. The following five goals will guide BLM's implementation of the national Strategy:

1. Develop a consistent and effective management framework for addressing conservation needs of sage-grouse on public lands.
2. Increase our understanding of resource conditions and priorities for maintaining and restoring habitat.

3. Expand available research and information that supports effective management of sage-grouse habitat.
4. Develop partnerships to enhance effective management of sage-grouse habitats.
5. Ensure leadership and resources are adequate to implement national and state-level sage-grouse habitat conservation and goals.

This conservation strategy is part of the state-level tiering described in the national Strategy.

Lassen County Board of Supervisors: In the fall of 2002 the Board provided a representative to the Northeastern California Sage-grouse Working Group who has worked as a member of the Sage-grouse Working Group in the formulation of this conservation Strategy.

Lassen County Fish and Game Commission: Since 2003 the Lassen County fish and Game Commission has stayed abreast of developments concerning the potential listing of sage-grouse, and the progress in developing this conservation strategy by providing time in each of the monthly meetings for sage-grouse updates.

University of California Extension: In the spring of 2002, UCCE offices in Lassen and Modoc Counties collaborated with CE colleagues at Oregon State University and University of Nevada to hold a series of educational meetings about sage-grouse conservation throughout the three states. In the fall of 2002, UCCE began working with key agencies and stakeholders in Lassen and Modoc Counties to form the Northeastern California Sage-grouse Working Group.

U.S. Fish and Wildlife Service:

Natural Resources Conservation Service:

CHAPTER II CONSERVATION STRATEGY

II.A. SAGEBRUSH ECOSYSTEMS AND SAGE-GROUSE

History

The obligatory relationship between sage-grouse and sagebrush ecosystems becomes more distinct through study of their evolution.

Most researchers believe that the genus *Artemisia* evolved in Eurasia. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), the most genetically primitive form evolved during the middle Pliocene Epoch approximately 5 million years before present or earlier. During pluvial times mountain big sagebrush almost had a continuous distribution. During warming and dryer climatic conditions, including into recent times, mountain big sagebrush retreated into mountains and foothills with deep, summer-moist, well-drained soils (Trimble 1989). As the temperature continued to rise, and ancient lakes, such as Lake Lahontan, began to decrease in size and elevation, other sagebrush species began to occupy the lower elevations, out into the valleys. The most dominant big sagebrush species were basin (*Artemisia tridentata* ssp. *tridentata*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Wyoming big sagebrush is believed to have evolved from the hybridization of basin big sagebrush, mountain big sagebrush, and black sagebrush (*Artemisia nova*). Chromosomes in the group behave similarly, though one or more extra sets of chromosomes is common. This big sagebrush complex is believed to have evolved during recent times, over the last 11,000 years during the Holocene Epoch (Trimble 1989).

Sage-grouse (*Centrocercus urophasianus*) are strictly Northern Hemisphere genera and a species that probably evolved in North America. Johnsgard (1973) believes that during the late Pliocene Epoch, approximately 2 million years before present or earlier, the extant genera *Centrocercus*, sage-grouse, and *Tympanuchus*, prairie chicken, evolved independently from forest-dwelling genera as arid habitats expanded. During the middle to late Pleistocene, and into the Holocene as the big sagebrush complex was expanding into drier sites sage-grouse probably completed their move from higher elevation mountain big sagebrush ecosystems into the lower elevations of the Great Basin (Trimble 1989).

Sagebrush Ecosystems Today

Sage-grouse range once nearly matched that of sagebrush. Today, sage-grouse inhabit much of that area but in greatly reduced numbers. Abundance of sagebrush within sagebrush communities has increased in some areas but a

pure stand of sagebrush with few grasses and forbs does sage-grouse little good (Trimble 1989).

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 of plants. 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 the year. Shrub cover sought by sage-grouse varies between 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 between 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 (soils, climate, etc.), 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"). Tisdale (1994) states shrub canopy cover varies between 5-25%. Higher canopy cover occurs in communities in declining ecological condition containing few perennial herbs in the understory. Goodrich et al. (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.

Welch and Criddle (2003) disagree with the previous statements and contend scientific data does not support statements that a high percent of canopy cover reflects rangeland deterioration. As pointed out by Brackley (2003), Welch and Criddle (2003) did not address several important environmental factors when reporting the results of their literature review. These environmental factors include the differences in climate, soils, and ecological site variability across the region occupied by Wyoming big sagebrush communities. The Buffalo-Skedaddle PMU occupies portions of Natural Resources Conservation Service (NRCS) Major Land Resource Areas (MLRAs) 23 – Malheur High Plateau, 21 – Klamath and Shasta Valleys and Basins, and 22 – Sierra Nevada Range. These MLRAs differ in topography, precipitation, and general climate to the extent that ecological site potential between MLRAs is diverse. MLRA 23 makes up the greatest portion of the Buffalo - Skedaddle PMU. Twelve of the 102 ecological sites described in this MLRA are Wyoming big sagebrush sites. Potential differs between these ecological sites because of soil parent material, local precipitation, local temperature ranges, etc. In each case, however, it has

been shown by NRCS that as ecological condition declines sagebrush canopy cover increases. Land Health Assessment work performed by the Eagle Lake Field Office since 1999 also indicates that the shift in above ground canopy structure results in a decline of grass and forb understory. Development and implementation of this conservation strategy will, therefore, be accomplished following the work of those whose work was questioned by Welch and Criddle (2003).

High quality nesting cover in Wyoming big sagebrush types occupies the $\leq 15\%$ 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 and 18% (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 $> 1\text{ m}$ (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 higher elevation sites than the other two big sagebrush subspecies. These cooler and wetter sites can provide important nesting and brood rearing habitat. Soils are normally moderately deep to deep (Jensen 1989). Shrub canopy cover in undisturbed communities varies between 15-40% but can reach up to 50% in wetter 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), can provide excellent nesting cover, and an abundance of succulent forbs. Mountain big sagebrush is not,

however, a very commonly used nesting habitat in this PMU, especially when compared with Wyoming big sagebrush. Nesting habitat shrub canopy cover in this type represents the greater than 15% through 25% cover range in Table 2. The growing season is longer than the other two big sagebrush types, providing succulent forbs later into the summer.

Low sagebrush (*Artemisia arbuscula* ssp. *arbuscula*) 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 often 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 stature sagebrush sites into Wyoming big sagebrush community types (Barrington and Back 1984). Greater forb abundance in the wetter 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 or Wyoming big sagebrush.

Lahontan sagebrush (*Artemisia arbuscula* ssp. *longicaulis*) has only recently been described (Winward and McArthur 1995). Previously it was referred to as an ecotype of Wyoming big sagebrush. 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. Growth characteristics are very similar to low sagebrush. Lahontan sagebrush can grow in pure stands or in association with Wyoming 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 for 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.

Each sagebrush type has its own set of limitations, and management potential. Sage-grouse found in the Buffalo-Skedaddle PMU are found throughout a variety of sagebrush dominated communities. Younger sagebrush of all species and types is usually more nutritious than older aged plants and can play an important role in both the distribution and pre-breeding condition of sage-grouse on winter ranges.

II.B. BIOLOGICAL OVERVIEW OF SAGE-GROUSE

Genetics

Recent application of molecular analysis using mitochondrial markers from sage-grouse DNA samples has facilitated a better understanding of sage-grouse genetic relationships (Benedict et al 2001 and Benedict et al 2003).

Haplotypes (Clade I and Clade II) are a useful parameter for determining genetic limitations within a sage-grouse population (Benedict et al 2001 and Benedict et al 2003). Percent individuals with novel haplotypes from Lassen and Washoe counties available from the literature include; Lassen 9.5%, Washoe 10% (Benedict et al 2003) and Washoe 10.5% (Benedict et al 2001). These data were determined mostly from samples collected within the Buffalo / Skedaddle PMU (all of the Lassen samples and an unknown portion of the Washoe samples). When compared with samples from other sage-grouse populations in Oregon, Washington and elsewhere in California and Nevada, the percent of novel haplotypes in the Buffalo / Skedaddle PMU is relatively low. Some haplotypes from this PMU are present in Idaho, Montana and Colorado. This information indicates that there are few genetic limitations that might affect future conservation of sage-grouse within this PMU.

II.C. Sage Grouse Population Monitoring and Assessment

Sage grouse population trends cannot be effectively monitored without rigorous field inventories of key indicators such as peak male lek counts and recruitment. An important component of this monitoring is standardization of methodology (Connelly et al 2000b, 2003). It is unlikely that changes in populations and effects of conservation measures (habitat enhancement or protection) could be evaluated unless some measures of trends of populations are made. Monitoring and assessment are fundamental to conservation evaluations.

Monitoring trends

Efforts to monitor sage grouse trends and abundance in the Buffalo / Skedaddle PMU have taken place over the past 50 years. Earlier efforts were often anecdotal or not standardized. Monitoring efforts have become much more standardized in the California portion since 1987. The types of monitoring methods employed in this PMU include:

Leks

Searches and detections of active leks, follow-up surveys for active leks, and counts of males on active leks, ideally for peak male attendance each year, have been the specific lek monitoring efforts.

Lek Locations: Breeding populations cannot be evaluated unless lek locations are known (Connelly et al 2003). Most leks in this PMU were identified between the early 1950s and 1987 by non-standardized or anecdotal detection. At least one lek in this PMU was noted as active in 1937 (Moffitt, unpub. data) and was still active in 2004. Intensive lek searches for both “new” and historically active leks were carried on by helicopter (1998) and by ground surveys for 3 consecutive years beginning in 2000 in the California portion. All surveys and searches in the California portion have identified 149 lek sites through 2003. However, only 21 (14%) of these were known to be active in 2003. Lek locations have been determined by intermittent helicopter surveys in the Nevada portion of the PMU. Thirty-five (35) lek sites have been identified in the Nevada portion which accounts for 19% of a total of 184 known lek sites in the PMU. It is unknown how many of the Nevada leks were active in 2003. However, only 17 were known to be active since 1990 and an additional 12 were known not to have been active since 1980.

Lek Counts: All active leks known to be present in the in the California portion of the PMU have been counted for peak male attendance (≥ 4 counts) since 1987. However, not every historically active lek site has been checked every year. Only two leks (1%) of 149 historically active leks (before 1987) checked in the California portion were found to be active in 2002 and 2003. Most inactive leks now have immediately adjacent habitats that will not support breeding sage grouse due conversion to agriculture, loss of adjacent sagebrush, juniper invasion, overhead lines, newer fences, or other habitat changes. A recent estimate of the numbers of active and inactive leks in the Nevada portion of the PMU is not available.

Lek counts have formed the basis of California’s estimates of changes in trend since 1987. A portion of these data have been used as “Index” leks to guide the level of hunting. Index leks were developed from a consistently applied subset ($n=13$) of the largest active leks within the two California hunt management zones (East Lassen and Central Lassen).

Brood Counts: Brood counts were collected from the California portion of the PMU from the early 1950s through the early 1990s. This information is no longer collected because of difficulties in replication, standardization of samples, and year to year comparisons (Connelly et al 2003).

Wing Analysis: Sage grouse wings collected during September hunting seasons may be used to determine age, gender, and reproductive status of yearling and adult females. This is currently considered to be the most useful technique for assessing sage grouse production (Connelly et al 2003).

Table 1. Age and gender composition (%) of the sage-grouse harvest, Lassen Management Zones, CA

Year	Immatures			Yearlings			Adults			Sample Size
	M (%)	F (%)	Tot.(%)	M (%)	F (%)	Tot.(%)	M (%)	F (%)	Tot.(%)	
2003	47	53	64	0	100	6	36	64	30	83
2002	50	50	47	0	100	7	32	68	47	73
2001	38	63	46	13	88	8	22	78	47	105
2000	75	25	7	30	70	43	44	56	50	110
1999	53	47	50	8	92	5	41	59	45	223
1998	43	57	44	-	-	-	33	67	56	201
Mean	51	49	43	10	90	12	35	65	46	133

Table 2. Sage-grouse production data, Lassen Management Zones, CA to 2003

Year	No. Wings	% Young	Chicks/hen	Chicks M:F
2003	83	64	2.52	25:28
2002	73	47	1.21	17:17
2001	105	46	1.07	18:30
2000	110	7	0.13	6:2
1999	223	50	1.59	11:52
1998	201	44	1.19	14:51

Table 3. Estimated annual turnover (%) of adult sage-grouse, Lassen Management Zones, CA.

Since 1998, wing analysis from the California portion of the PMU has included an estimate of nesting success. The average annual nesting success for all females was 51% for 1998 through 2003 (Table XX).

Table 4. Sage grouse nesting success from wing analysis, Lassen Management Areas

Year	Adults		Yearlings		All females	
	N	%	n	%	n	%
2003	4/12	33	3/3	100	7/15	47
2002	8/23	35	3/5	60	11/28	39
2001	30/38	79	2/7	29	32/45	71
2000	13/31	42	30/30	100	43/61	71
1999	26/59	44	6/11	55	32/70	46
1998	24/75	32	0/0	0	24/75	32
Average	105/238	44	44/56	79%	149/294	51%

Lek count data used in conjunction with wing analysis provides the basis for

Year	Males		Females	
	Young	Adults + Yearlings	Young	Adults + Yearlings
2003	30	11	34	25
2002	23	15	23	38
2001	17	11	29	43
2000	5	35	2	58
1999	26	19	23	31
1998	19	18	25	37
Mean	20	18	23	39

comprehensive trend and monitoring information for most of the sage grouse in the PMU (California portion) and constitutes comparative data for inferring population status. These data will continue to be relied upon for conservation strategies.

Hunting:

Hunting is the most obvious form of direct mortality to sage grouse populations and one of the easiest to manage. Harvest data for the Nevada portion of the PMU has been estimated from a hunter questionnaire returned from 10% of all upland game hunters and some check station data. Most of the California portion of the PMU has been open to permit only hunting since 1987. For those areas in California where hunting has been open, a permit system with 100% of hunters receiving a questionnaire has been in place. California harvest estimates have been based on returned permits. Prior to 1987, California harvest estimates were based on a statewide questionnaire similar to Nevada's.

Sage grouse hunting in the California portion of the PMU was closed for 9 years over 3 periods between the 1950's and 1987. The Nevada portion was closed to hunting in 1994 but open in all other years since 1987. Prior to 1987, harvest for most years when hunting was open was about 1,000 to 3,000 grouse in the California portion of the PMU and less than 1,000 in the Nevada portion. Harvest since 1987 has averaged between about 200 and 700 sage grouse per year within the Buffalo – Skedaddle PMU. Most of this has taken place in the California portion and year to year variation largely follows changes in the numbers of permits issued (Table 5, below).

California adjusts the numbers of hunting permits annually within two hunting zones in this PMU. An index from leks counted each spring (peak male attendance) is used to determine annual trends, changes in abundance, and permit numbers. In the California portion of the PMU, the total harvest has been regulated each year based on an estimate of changes in abundance from lek counts. The assumption has been made that the numbers of males counted (peaks) on leks cannot increase or decrease without a corresponding change in the breeding population of sage grouse. The numbers of males counted on leks does not include females and males not attending leks. The males counted on leks are about ¼ to 1/3 of the estimated breeding population. Annual production from nesting usually increases the fall population to at least double the breeding population based on wing surveys (Table 4). Males counted on index leks, permits issued and estimated harvest have been closely associated (Table 5).

Table 5. Harvest history for California and Nevada

Year	Males on Index Leks (peak) (California)	Permits Issued (California)	Estimated Harvest (California)	Estimated Harvest (Nevada)	Total Estimated Harvest
2003	333	140	138	nd	nd
2002	316	140	106	51	157
2001	569	275	206	59	265
2000	582	350	237	122	359
1999	653	425	462	68	530
1998	602	425	351	67	418
1997	591	400	252	84	336
1996	366	350	213	146	359
1995	469	350	149	92	241
1994	487	350	298	ns	298
1993	336	250	193	113	306
1992	537	250	197	39	236
1991	798	400	253	364	617
1990	790	400	436	291	727
1989	455	400	485	219	704
1988	346	400	443	236	679
1987	221*	400	362	220	582

AVG. (1988- 2001)	542	359	298	136	434
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nd = no date or data not yet available

ns = no season

* = incomplete counts

California's sage grouse hunting seasons have been 2 days with a daily and season limit of 2 birds since 1987, starting on the second Saturday in September since 1999. Recent Nevada seasons have been 16 days (3 weekends) beginning in mid-October with a daily limit of 2 grouse and a season limit of 4. Nevada has not limited total harvest. However, Nevada harvest has been low relative to California, primarily due to inaccessibility, larger sage grouse populations in other nearby PMU's, seasons overlapping with other more desirable species, and lower hunter populations than California. Sage grouse hunting in Nevada is closed to non-residents and this also acts to limit yearly hunting harvest.

Hunting seasons in Nevada were moved to October to reduce harvest of the female segment of the population. For similar reasons, California's season was moved to the second weekend in September. Hunter success generally declines as seasons are moved to later in the fall and female percentages of total harvest usually declines as seasons are moved later. Overall harvest rates are targeted to be less than 10% of the fall population in both states, consistent with WAFWA Guidelines. However, without an annual index of abundance from lek counts in Nevada, harvest rates from the Nevada portion are not known. Hunter collected wings from both states are analyzed each year for age, sex and nesting success of females. This provides annual monitoring data on harvest of females and young.

Sage grouse populations throughout the Buffalo – Skedaddle PMU are considered to be contiguous based on movements of 79 sage grouse fitted with radio transmitters from the California portion 1998-2000. Approximately 50% of these grouse used Nevada winter ranges. None of the radio marked birds left the PMU during the study. Approximately 10% of the sage grouse range in the California part of the PMU (areas with small, isolated populations) is closed to hunting. It is possible that some sage grouse in the northeastern part of the PMU leave it for part of the year. Additional small, isolated populations exist in California, especially north and west of this PMU. However, these populations are also closed to hunting and are included in the separate California Lassen-Modoc PMU Conservation planning process.

A primary method of monitoring trends or changes in populations is the annual peak counts of males on each active lek. California has completed these counts each year since 1987. In addition, historic and not recently checked leks should

be monitored for presence-absence at least once every 3rd year. Active leks should be counted for peak male attendance at least 4 times each season. In addition, estimates of female nesting success from wings are used to monitor annual nesting success in both California and Nevada. Maintaining limited hunting opportunities is the most efficient way of obtaining a sample of wings to monitor the composition of young and nesting female success, provided harvest does not exceed recommended guidelines.

A yearly estimate of sage grouse hit but not retrieved by hunters is made from California's returned permits and questionnaires. Monitoring of 79 sage grouse fitted with radio transmitters from the California portion during the 1998-2001 hunting seasons provided an independent check on both harvest levels and crippling loss. Data from both these sources indicated the numbers lost from this risk are considered negligible.

Both California and Nevada Wildlife Protection Officers routinely patrol throughout the PMU. As with crippling loss, radio telemetry data showed no poaching losses of any of the 79 marked grouse 1998-2001. While there is some anecdotal information that a few sage grouse may be taken illegally, there is no evidence that any more than rare illegal take of sage grouse occurs within the PMU.

Patterns of Persistence and Presence:

While no data are available to speculate about original or early historic age grouse populations within the Buffalo / Skedaddle PMU, we know that the most essential breeding component (leks) have undergone a decline of greater than 80% since the 1950s. Many of the reasons for the loss of these leks are obvious. Loss of adjacent and essential sagebrush components to fire and conversion to agriculture, overhead power and telephone lines, fence construction, juniper invasion and increasing distribution of cheat grass and other non-native annuals are among these obvious changes which have accompanied loss of breeding populations. Increases in fire frequency and acres burned within the PMU (BLM 2003, unpub. data) are pervasive threats to Wyoming big sagebrush habitats in the PMU.

The possibility of enhanced sage grouse populations must start with protection of existing quality habitats, especially active leks and adjacent nesting habitats. Identifying conservation actions which direct where and when priority restorations and enhancements will take place are covered in subsequent sections of this Conservation Strategy.

Predation, Production and Survival:

Predation is an on-going and widespread phenomenon for sage grouse populations. All sage grouse eventually die from some cause and being killed

by a predator is among the most common and visible forms of mortality. However, predation is no more significant than any other mortality factor unless it limits (or controls) the size of a population.

Predation rates are generally higher if habitat quality has been degraded. For example, nest failure rates from predation are higher if screening grasses are too low to adequately hide eggs. Similarly, overhead lines constructed close to leks may introduce perches and/or nest sites for raptors, eagles and ravens that can severely impact adult sage grouse and nests. In these degraded habitats, predation is likely limiting the population. However, it is unclear if the cause and effect relationship points to “habitat” or “predation” as the larger problem even in these more dramatic examples.

Sources of adult mortality, including predation and hunting, were evaluated (where possible) from the 1998-2000 Lassen radio telemetry project. Most mortality sources could not be identified due to rapid scavenging (or multiple scavengers) which made predator and scavenger identification impossible. Where sources of predator mortality were determined, golden eagles, coyotes, and bobcats accounted for 10%, 4%, and 2%, respectively, of the known predator losses (Table 2). However, sample sizes were very small and unknown mortality factors accounted for about 3/4ths of all mortality.

Table 6. Composition of adult sage grouse mortality, 1998-2000 Lassen radio telemetry project

Probable Mortality Factor	Males (n=12)		Females (n=37)		Total (n=49)	
	n	%	N	%	N	%
Unknown	8	67%	28	76%	36	74%
Golden Eagle	3	25%	2	5%	5	10%
Coyote	0	-	2	5%	2	4%
Bobcat	0	-	1	3%	1	2%
Hunting	1	8%	4	11%	5	10%

Connelly et al. (2000) (thresholds) for predator control are based on monitoring nest success and annual survival of adult females for small, isolated and declining populations. Predator control programs may be of particular benefit where good quality habitats have been reduced or while habitat is recovering. Annual female survival rates (Table XX) from the 1998-2000 Lassen radio telemetry project are shown below.

Table 7. Annual female survival rates and hunting mortality rates, 1998-2000 Lassen radio telemetry project.

	1998		1999		2000		Total	
	n	%	n	%	n	%	n	%

Marked	20		36		46		102	
Non-hunt mortality	4	20%	13	36%	16	44%	33	32%
Hunting mortality	1	6%*	1	3%*	2	6%*	4	5%*
Total mortality	5	25%	14	39%	18	39%	37	36%
Annual Survival	15	75%	22	61%	28	61%	65	64%

* Hunting mortality is expressed here as a percentage of the number of marked birds taken during the hunting season from the pre-hunt population, not those taken from the original marked population. For example, in 1998 there were 20 grouse marked by April but 16 remaining at the start of hunting in September. Calculated hunting mortality was 1/16 (6%) not 1/20 (5%).

The average annual female survival rate from the radio telemetry project was 64% which exceeds the WAFWA guideline of <45% for predator control.

The available data for the Buffalo / Skedaddle PMU does not show that predation is limiting the size of the population. However, data from the 1998-2000 California telemetry study does show that both nests and adults from leks closest to overhead lines are lost at a higher rate to avian rather than mammalian predators. These effects were detectable at up to 20+ km (12+ miles) from leks (fig.1).

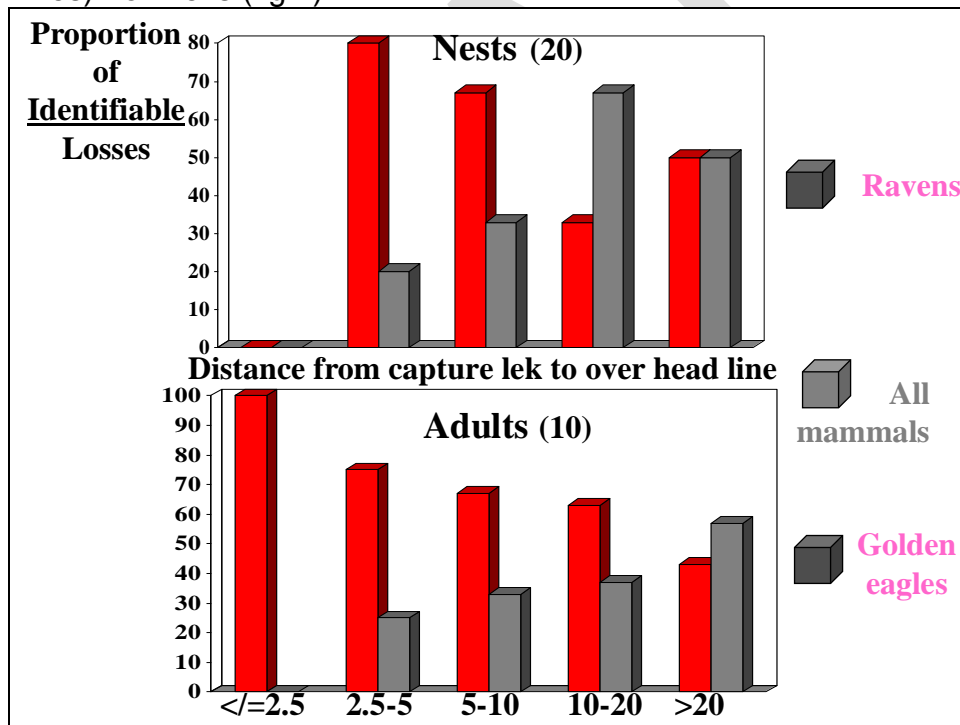


Figure 1

These data imply that some advantage for avian predators is introduced by the presence of overhead lines and towers, most likely as perch sites for golden eagles (adult grouse losses) and as nest and perch sites for ravens (sage grouse nest and chick losses).

Losses of chicks from most broods begin at hatching. As broods disperse and travel to forb and insect rich sites, mortality for individual chicks takes place from a variety of causes, including predation. These losses can limit the population if too few young are recruited to replace adult mortality over time. Too few data exist to indicate that this is or is not occurring in the Buffalo / Skedaddle PMU. Based on recruitment rates observed from the composition of young of the year in fall from wing samples, risks from both avian and mammalian predators are considered low in this PMU. Based on proportions of nest losses to ravens (55%) and all mammals (45%) from the Lassen telemetry project, avian predators should be considered of slightly more concern than mammals as nest predators in this PMU.

Information from the 1998-2000 California telemetry study indicated that adult sage grouse losses were higher to avian rather than mammalian predators (Table 2). Golden eagles were the primary predator, especially near leks, and were the only source of predator mortality determined for marked male sage grouse. The data also showed that mean survival of adult sage grouse increased as distance from leks to overhead lines and towers increased. These effects were detectable at up to 20+ km (12+ miles). This is consistent with the role that lines and towers can play as perches and nest sites for golden eagles and ravens, respectively. However, these data do not indicate that these losses may be limiting the population except near (≤ 5 km; 3 miles) existing overhead lines and towers (fig.2).

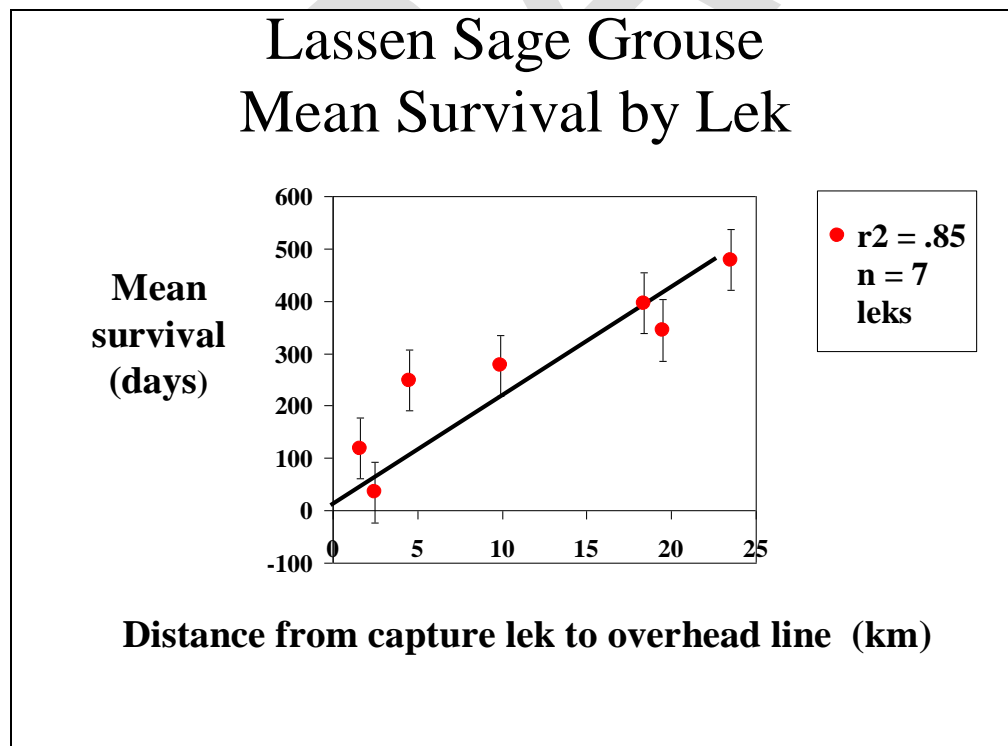


Figure 2

The Number and Size of Populations:

Sage-grouse populations in the Buffalo – Skedaddle Population Management Unit (PMU) are fairly well understood, especially in the California portion and in relation to adjacent populations. The fundamental unit of monitoring data that provides the best information on population status is peak male attendance at leks. Coupled with the number of active and inactive leks, an estimate of the total population can be made which provides the highest quality information available for both trends of population and absolute numbers.

Since 1987, the estimated breeding sage-grouse population within this PMU has been between about 1,500 and 4,500 sage-grouse, depending on the year. These estimates are based on expansions of peak males counted on California leks using methods in the published literature. The number of active leks in the California portion of the PMU was 21 in 2003. The last check of active leks in the Nevada portion were 17 in 1992 and 5 of these were active in 1998. Populations fluctuate depending largely on habitat quality and precipitation. For example, the highest recent breeding population was in 1990 but the population almost doubled between 1996 and 1999 based on California lek data. Population trend since 1987 has not markedly increased nor declined but does cycle considerably. This suggests that potential risks from predation and hunting, for example, have not had a recent significant impact on population trend.

Sagebrush Ecosystem Health, and Condition as it Relates to Sage-grouse

Sagebrush ecosystem health in relation to sage-grouse requires a discussion of community 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 of 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 effective 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.

The 1,475,506 acres of sagebrush complexes within the Buffalo-Skedaddle PMU have been rated based on their ability to respond (R-Value) positively to management with the following constraints. These R-value categories were developed initially by the BLM in Idaho and adapted through coordination between the Nevada State Office and the Eagle Lake and Surprise Field Offices

for use in this conservation strategy effort. The BLM in Idaho has since developed a finer scale for describing their habitat. For development of the Buffalo-Skedaddle PMU Conservation strategy we will continue to use the “R” Values listed below in order to provide a broad assessment of existing and potential sage-grouse habitat within the PMU.

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 (mature sagebrush and 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 (mature sagebrush and seedlings present) whose understories are currently dominated by annual grass, forbs, or bareground.

X4 – 175,041 acres (12%)

Areas that 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

These acreages indicate that slightly more than 46% (R-3 and R-4) of the PMU currently has a high percentage of cheatgrass or juniper invasion.

Approximately 19% (18.6% X-3 and X-4) of the sagebrush ecosystem within this PMU has crossed a threshold to being dominated by cheatgrass or juniper.

DRAFT

II.D. CONSERVATION ON PUBLIC AND PRIVATE LANDS

Private Lands

Any meaningful conservation strategy for sage grouse in the Buffalo / Skedaddle PMU must include measures that apply to private lands. Regulations and management guidelines applied to public lands cannot be expected to be implemented on adjacent private lands without substantial economic incentives for private owners. Even with such incentives, it is unlikely that conservation measure would take the same form or be as consistently applied due to the desires of individual owners.

Important seasonal habitats for sage grouse within the PMU do not occur in the same proportions on private lands as they do on public lands. Most of the better and more accessible soil and free water sites within the PMU are on private lands. Relative to private land, few springs and flowing waters exist on public lands in the PMU. Most of the sage grouse winter range and breeding sites are on public lands. By contrast, most of the late brood rearing and forb – rich summer habitats are on private lands, often as crop land or irrigated pasture.

The majority of traditional private land economic uses in the PMU include grazing for both sheep and cattle, agricultural crops, primarily as irrigated alfalfa and irrigated pasture. Eight (8) of the 21 active leks (2003) in the California portion of the PMU are on, or immediately adjacent to, private land. Similarly, two (2) Nevada leks are on, or immediately adjacent to, private land. Virtually all of these lek sites are subject to livestock and/or wild horse grazing but these are not necessarily incompatible uses. In many cases, ungulate grazing may be helping to maintain an open visual aspect needed for continued lek display sites and breeding. However, leks are linked to important adjacent nesting habitats in which grazing can play a larger role in reducing screening cover for nest sites.

Late summer brood rearing sites are commonly on private lands within this PMU, especially in the California portion which has higher precipitation and more agricultural land. Sage grouse commonly seek forbs and insects in irrigated pastures and alfalfa in late summer. Especially important sites are in the Secret Valley and Madeline Plains areas.

Incentive Programs for Sage Grouse Habitat Enhancement on Private Lands:

Developing actions for Sage Grouse conservation on private land needs the full support of the landowner and won't work without it. The most important type of incentive for private landowners is to involve them early in the planning process, and to include their suggestions and interests. Ask them what they think would

work for them on their land with their operation. This done early and sincerely is the first step, followed by continued involvement.

The goals for Sage Grouse conservation on private lands in the Washoe-Modoc plan are focused on landowner education and incentives, which differs from the administrative approach taken on the public lands. Regulations on public lands managed as part of an allotment could easily influence how the landowner uses the associated private lands. For instance, the landowner with restrictions on their allotments may choose to attempt more intensive agriculture on the private lands, which is likely to fail and create further habitat loss. The Washoe-Modoc plan attempts to find a workable balance for Sage Grouse conservation on both public and private lands.

Educational information is available to landowners concerning the habitat needs of Sage Grouse: The Nevada Wildlife Federation publishes a booklet entitled "*Enhancing Sage Grouse Habitat...A Nevada Landowners Guide*". A copy of the booklet is available on-line at www.nvwf.org/sagegrouse/guide or by calling (775) 885-0405 or (775) 677-0927.

Farm Bill 2000: The Natural Resources Conservation Service (NRCS) is a federal agency under the United States Department of Agriculture www.nrcs.usda.gov/programs/ NRCS offers landowners financial, technical, and educational assistance to implement conservation practices on privately owned land. Using this help, farmers, ranchers, and forest landowners apply practices that reduce soil erosion, improve water quality, and enhance cropland, forestland, wetlands, grazing lands, and wildlife habitat. Conservation plans are developed with individual landowners to suit their specific situation. The landowner is the decision-maker, but conservation practices must meet NRCS standards and specifications. Participation in a cost-share program is not required to receive assistance. Landowners interested in technical assistance or cost-share programs are encouraged to contact the local NRCS field office for assistance. Contact Jim Gifford, Resource Specialist jim.gifford@nv.usda.gov. Listed below are the two most utilized NRCS programs.

- Environmental Quality Incentives Program (EQIP) was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill) to provide a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land.
- Wildlife Habitat Incentives Program (WHIP) is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Through this program the Natural Resources Conservation

Service (NRCS) provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. WHIP agreements between NRCS and the participant generally last from 5 to 10 years from the date the agreement is signed. WHIP has proven to be a highly effective and widely accepted program across the country. By targeting wildlife habitat projects on all lands and aquatic areas, WHIP provides assistance to conservation minded landowners who are unable to meet the specific eligibility requirements of other USDA conservation programs.

County Tax Sale property: Under certain circumstances a Nevada county can acquire parcels of privately owned land that individuals have decided to stop paying taxes on. The property to be acquired must be within the boundaries of an adopted Open Space Plan. In Washoe County this tool for potential acquisition of Sage Grouse habitat is presently only available in the Pah-Rah Population Management Unit (PMU) and a portion of the Virginia Range PMU. Contact Bill Whitney at Washoe County Department of Community Development bwhitney@mail.co.washoe.nv.us

Conservation Easements: A conservation easement is a legal agreement a property owner makes to restrict the type and amount of development that may take place on his or her property. Each easement's restrictions are tailored to the particular property and to the interests of the individual owner. The purchaser/recipient is required to make periodic inspections to assure the conditions of the easement are being applied. For properties where long term protection is important but where private ownership and management make sense, easements can be the right tool. The easement can be donated by the landowner (usually with a tax benefit for the value of development that is precluded), or purchased by a public or non-profit entity. Presently, easements may not be a popular option for most landowners simply because there is a critical lack of information for them to feel confident in what the "fair" value of the easement actually is and any type of regulatory tool that includes a "perpetuity" clause is not likely to be popular with private landowners. Contact Roy Leach at Nevada Division of Wildlife rleach@ndow.org

The **Endangered Species Act** includes components that can be used as incentive mechanisms for landowners. Most importantly, these include contractual assurance agreements. These essentially specify what land use practices the landowner will adhere to in return for assurance that the land will continue to be used for production purposes. Getting these agreements in place assures the landowner that there will be no changes in their use of the land. These are likely to be important incentives for traditional ranchers. There needs to be adequate support for landowners to negotiate these agreements with the U S Fish and Wildlife www.fws.gov Service and the time to negotiate

these agreements is sooner than later. Laurie Sada is the contact at (775) 861-6300.

The **United States Fish & Wildlife Service** Joint Venture programs, traditionally directed at wetlands improvement, have expanded to include all birds. Small grants of \$10,000-\$50,000 are available for habitat improvement. Applications for these funds require partnerships and shared costs. The improvements should be tied to increased numbers of Sage Grouse. Tina Nappe is a member of the small grant Joint Venture program for Nevada; Laurie Sada is the contact for the Partnership program, phone: (775) 861-6300. Information on grants and partnerships is available at www.fws.gov.

Southern Nevada Public Lands Management Act (SNPLMA) is one of the tools that could be used to purchase private properties or potential conservation easements for Sage Grouse habitat conservation. SNPLMA is a source of funding for Nevada created by the sale of federal lands (BLM) in Clark County. While the majority of the revenue generated is stipulated for expenditure in Clark County, a small percentage of the proceeds are available to purchase “environmentally sensitive” properties statewide. All proposals submitted for SNPLMA acquisition require the landowner’s consent, involvement of a federal agency partner and endorsement by the local government. www.nv.blm.gov/snplma Contact Tina Nappe at tnappe@nvbell.net

Q1 - Conservation and Natural Resource Protection Bond was passed by the voters of Nevada in November 2002. This bond provides \$27.5 million for the Nevada Division of Wildlife to enhance, protect, and manage wildlife and wildlife habitat, \$20 million for local governments and \$15 million for nonprofit conservation organizations to acquire land and water to protect and enhance wildlife habitat critical properties (both require 50% match). Purchase of conservation easements is allowable under this bond. Contact Pam Wilcox at Nevada Division of State Lands pwilcox@lands.nv.gov or Roy Leach at Nevada Division of Wildlife rleach@ndow.org

National Fire Plan: This plan is the US Congress response to the severe wildfires of 2000 with the intent of reducing their impacts on rural communities and enhancing the firefighting capabilities in the future. The National Fire Plan assists in the implementation of five key areas: firefighting resources, rehabilitation and restoration, hazardous fuels reduction, accountability and community assistance. Funding is administered through the Bureau of Land Management and the Nevada Division of Forestry (NDF). Where Sage Grouse habitat improvement can also be tied to fuels reduction projects and Multi-Resource Stewardship, funding through the NDF or BLM may be available. (Contact: Jenny Scanland, NDF jennys@ndf.state.nv.us or Pat Murphy, BLM state office www.pmurphy@nv.blm.gov).

Additional landowner incentive options for conservation of sage- grouse in California include the following which was excerpted and modified from a portion of the California Department of Fish and Game home page <http://www.dfg.ca.gov/habitats/private.html>

Conservation Banking: A [Conservation Bank](#) (may also be called a Mitigation Bank) is a biological bank account. Instead of dollars in the bank, the "bank" owner has biological mitigation credits to sell to developers. Under state and federal laws, development projects that propose to remove or harm biological resources must assess the level of impact. If judged to be significant, those impacts must be compensated for. One means of doing so is through establishment of conservation banks which attempt to set aside larger blocks of natural habitat needed for long term conservation. [A recent report on conservation banking is available](#). Contact the Department of Fish and Game for more information.

• **Enhancement and Management of Fish and Wildlife and their Habitat on Private Lands (PLM program):** The PLM program offers ranchers and farmers an opportunity to increase their profits by improving habitat for wildlife. Through 1996, there were 52 PLM properties encompassing approximately 645,000 acres. The economic incentive provided is in the form of offering fishing and hunting opportunity to the public beyond the traditional seasons, and issuing tags or permits directly to individuals you allow to hunt or fish on your land. The landowner sets and collects whatever access and service fees they wish. The landowner pays a fee to be in the program, pays for the tags/permits, develops an approved management plan, and implements the agreed upon wildlife habitat improvements. While most of the habitat enhancements under this program are for increased hunting opportunity for big game animals, many of the enhancements and protections can be designed to benefit other species of wildlife including sage- grouse.

The specific laws for the program are described in [Sec 3400-3409 Fish and Game Code](#). Contact the Department of Fish and Game's PLM coordinator for more information and a brochure on the program (916) 653-7203.

The following 3 are primarily wetlands programs but could have some application to sites that include habitat for sage grouse populations, especially when brood-rearing in summer:

• The [California Wetlands Information System](#) is a program of the California Resources Agency. The Wetlands Information System is designed to provide comprehensive wetlands information to the general public, the educational community, and government agencies. It is a compilation of public and private sector information, including maps, environmental documents, agency roles in wetlands management, restoration and mitigation activities, regulatory permitting, and wetland policies.

• The Department's role in wetlands management is to meet the wetlands protection, restoration, and enhancement goals of the Intermountain Habitat Joint Venture, a component of the North American Waterfowl Management Plan. These habitat goals are achieved on state-administered wildlife areas and on private land enrolled in the Department's voluntary wetland incentive or easement program:

California Waterfowl Habitat Program: This program pays private landowners for following practices in department approved management plans. Activities include increasing food supplies, providing optimal water depth for foraging birds, and offering summer wetlands for breeding birds.



A guidebook- *Farming for Wildlife: Voluntary Practices for Attracting Wildlife to your Farm* is a collaborative effort and wonderful resource available from the Department.

• The [Inland Wetlands Conservation Program](#) of the Wildlife Conservation Board has made significant contributions toward achieving the specific objectives outlined in the CVHJV Plan. These contributions will ultimately result in the restoration, enhancement and protection of critical habitat necessary to support the millions of migratory waterfowl dependent upon the Central Valley of California. The [language establishing the program](#) is available. A similar program, focusing specifically on riparian areas is the WCB's recently established California Riparian Habitat Conservation Program (CRHCP).

• *Natural Communities Conservation Program (NCCP):* The Natural Community Conservation Planning (NCCP) program of the California Resources Agency and the Department of Fish and Game is an unprecedented effort by the State of California, and numerous private and public partners, that takes a broad-based ecosystem approach to planning for the protection and perpetuation of biological diversity. An NCCP identifies and provides for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. The program seeks to involve public and private landowners/administrators in large-scale conservation planning efforts to ensure the long-term integrity of natural communities and accommodate compatible land use. The pilot program involves coastal sage scrub habitat in Southern California, home to the California gnatcatcher and approximately 90 other potentially threatened or endangered species.

• *Riparian Habitat Joint Venture:* RHJV is a statewide, cooperative endeavor to enhance, conserve, and restore riparian habitats. It is part of Partners in Flight, an international bird conservation effort. The RHJV program works to provide information and education on riparian conservation projects, restoration efforts, and local planning efforts in working towards a goal to increase the amount of

riparian habitat for wildlife, in particular songbirds. Contact the Department of Fish and Game's RHJV coordinator for more information.

- The widely known *Williamson Act* lands program also supports maintaining agricultural lands and wildlife habitat in California by providing incentives decreasing property tax liability for private land owners.

- *National Fish and Wildlife Foundation*: NFWF supports projects that conserve the nation's wetland resources, in particular habitat for wetland-dependant fish and wildlife. NFWF generally funds three program types: acquisition of wetland resources, both in fee-title and conservation easements; wetland restoration and enhancement projects, particularly those on private lands; and applied research on wetland management techniques, restoration or enhancement practices, or other wetlands-related applied conservation.

- *Partners for Wildlife*: A program in the U.S. Fish and Wildlife Service that started in the Midwest. This link provides some background, but contact the Fish and Wildlife Service for information related to California. Also, a [map and text](#) description of USFWS facility locations is online.

- *The Wildlife Habitat Incentives Program (WHIP)* is a component of the 1996 USDA Farm Bill and is voluntary program for people who want to develop and improve wildlife habitat on private lands. It provides both technical assistance and cost sharing to help establish and improve fish and wildlife habitat.

- This link provides information about Conservation Programs offered by the USDA's [Farm Service Agency](#) along with links to associated news releases and Program Fact Sheets. One program, the [Conservation Reserve Program](#) (CRP) is the Federal Government's single largest environmental improvement program -- and one of its most effective. Today, the CRP is safeguarding millions of acres of American topsoil from erosion, increasing wildlife habitat, and protecting ground and surface water by reducing water runoff and sedimentation. Countless lakes, rivers, ponds, and streams are cleaner and more vital in part because of the CRP.

Conservation Easements and Acquisition through the Wildlife

Conservation Board: In close cooperation with the California Department of Fish & Game, this board provides oversight for acquisitions and easements to protect important and threatened wildlife habitats in California. Acquisitions are generally more common than easements and most have targeted listed species or complex habitats with many high value species (i.e., coastal wetlands, critical habitats, etc. Funding of various bond measures passed under the California Initiative process intermittently provide very large increases in the funds available for such easements and acquisitions.

Specific types of incentives for landowner that will be sought within the Buffalo / Skedaddle PMU include:

1. Conservation Easements

Nevada Landowner Incentive Program (LIP)

(note: 1 project is now underway to protect 4 lek sites in California by LIP easements)

California Wildlife Conservation Board (WCB)

2. Incentives for maintenance (protection) and management (enhancement)

California Private Lands Wildlife Management Program (PLM)

Farm Bill 2000:

EQIP Program

WHIP Program

Section 6 funding under the USFWS administered Endangered Species Act

USFWS Joint Venture Program

National Fire Plan

Conservation Banking options (CDFG)

California Wetlands Information System

California Waterfowl Habitat Program

Inland Wetlands Conservation Program (CDFG/WCB)

Riparian Habitat Joint Venture (CDFG, under Partners in Flight [PIF])

Williamson Act (Lassen County / CDFG)

National Fish and Wildlife Foundation (NFWF)

Partners for Wildlife

WHIP (see above but under the 1996 Farm Bill)

USDA Conservation Reserve Program (CRP)

3. Land Acquisition

Land Exchange by state/federal agency at fair market value / willing seller basis.

Acquisition by state/federal agency at fair market value / willing seller basis.

County (Lassen or Washoe) acquisition / disposal from default property taxes.

4. Combinations of two or more above (easement, Incentives, Acquisition)

Southern Nevada Public Lands Management Act (SNPLMA)

Nevada Conservation and Natural resources Protection Bond (Q1, 2002)

Natural Communities Conservation Program (NCCP/CDFG)

Public Lands

Conservation on public lands is policy driven pursuant to the ESA means use of all methods and procedures which are necessary to improve the status of federally listed species and their habitats to the point where the provisions of the ESA are no longer necessary. Conservation of special status species means the use of all methods and procedures which are necessary to improve

the condition of special status and their habitats to a point where their special status recognition is no longer warranted (USDI 2001). Sage-grouse are BLM special status species in California and Nevada.

The objectives of the special status species policy are:

1. To conserve listed species and the ecosystems on which they depend.
2. To ensure that actions requiring authorization or approval by the Bureau of Land Management (BLM) are consistent with the conservation needs of special status species and do not contribute to the need to list any special status species, either under provisions of the ESA or other provisions of this policy (USDI 2001).

Special Status Species: State Directors, generally in cooperation with State agencies that are responsible for fisheries, wildlife and botanical resources and State Natural Heritage programs, shall designate BLM sensitive species. The Director in some cases, may designate BLM sensitive species. The protection provided by the policy for candidate species shall be used as the minimum level of protection for BLM sensitive species. The State Director shall establish the process for developing, reviewing, maintaining and coordinating with other agencies, organizations, and States to ensure accuracy and completeness of the state's BLM sensitive species list. The sensitive species designation is normally used for species that occur on BLM administered lands for which BLM has the capacity to significantly affect the conservation status of the species through management. The State Director may designate additional categories of special status species as appropriate and applicable to his or her state's needs. The sensitive species designation, for species other than federally listed, proposed, or candidate species, may include such native species as those that:

1. could become endangered in or extirpated from a state, or within a significant portion of its distribution in the foreseeable future,
2. are under status review by FWS and/or NMFS,
3. are undergoing significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution,
4. are undergoing significant current or predicted downward trends in population or density such as that federally listed, proposed, candidate, or State listed status may become necessary,
5. have typically small and widely dispersed populations,
6. are inhabiting ecological refugia, specialized or unique habitats, or
7. are State listed but which may be better conserved through application of BLM sensitive species status. Such species should be managed to the level of protection required by State laws or under the BLM policy for candidate species, whichever would provide better opportunity for its conservation.

II.E. CONSERVATION GOALS, OBJECTIVES, AND ASSOCIATED ACTIONS

The following conservation goals, objectives, and associated actions shall guide and be the target for conservation and management actions for sage-grouse and the sagebrush ecosystem upon which they rely. These goals and objectives are prioritized based on the level of habitat or population risk involved. The establishment of risk levels is a result of interagency and stakeholder coordination between the Washoe-Modoc Sage-grouse Working Group and the Northeastern California sage-grouse Working Group. A copy of the Habitat and Population Risk Factor Matrices is provided in Appendix B. Successful implementation of the Conservation Strategy (CS) may preclude the need to federally list the species as well as provide grounds for changing the legal status of this species at the California and Nevada state levels. The CS are not intended to alter the current regulatory requirements of each agency, or, is the protection afforded this species through existing policies and guidelines negatively affected by this CS. These goals and objectives are intended to provide additional direction to successfully conserve sage-grouse and the sagebrush ecosystems upon which they rely.

Associated with each objective is a set of actions intended to achieve the goals. The actions described are general in nature. Site-specific actions for leks, and nesting habitat, brood rearing including summer brooding habitat, and winter habitat (high priority habitats) are listed in Appendix A.

All habitats are afforded equal protection. However, the value of this ranking is the ability to prioritize and expand conservation resources as effectively as possible. For the purposes of this section and the CS in general, Table 8 shall be maintained to reflect the current adopted ranking of the known habitats based on the best available information.

The adaptive management process will serve as *one of* the mechanisms by which these goals and objectives may be refined. *Using information from* future research and monitoring of sage-grouse population response to habitat protection and enhancement, along with a better understanding of which factors are limiting recruitment and survival, may change these priorities.

High Risk Factors

Goal 1H: PROTECT ACTIVE LEK HABITAT FROM AERIAL PREDATION

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. Conservation measures in the past have been too little to prevent reductions in use, or lek abandonment.

Objective 1H.A: BLM shall not grant rights-of-ways for overhead lines or placement of structures within lek viewsheds and no closer than 3.2 kilometers (2 miles).

Actions: Overhead transmission lines and structures have been shown to adversely affect lek use. The placement of high roosting sites, and visible raptor and raven perches increases aerial predation of male and female sage-grouse on and near leks. These structures also enhance the efficiency of ravens as sage-grouse nest and chick predators by providing nesting sites. Implement restrictions on the routing of overhead lines and their structures.

1) BLM shall not grant rights-of-way for overhead lines and structures, micro-wave towers, wind turbines, etc. within the lek viewshed and no closer than 2 miles (3.2 km) as was accomplished with the Alturas Intertie Transmission Line.

2) Require that the section of land management agency and state power commission right-of-way grants addressing abandonment of an overhead line, or any other structure, include direction for removal of cross arms and structures.

Goal 2H: RESTRICT OFF-HIGHWAY VEHICLE (OHV) USE DETRIMENTAL TO STRUTTING, NESTING, BROOD REARING, AND WINTER HABITAT USE.

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 there is concern that OHV use on or near the lek would surely cause the strutting activity to stop or, at worst, the lek be abandoned.

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, and closing of areas that are essential for sage-grouse survival.

Objective 2H.A: Limit OHV Use in Sage-grouse Habitat, as Necessary.

- Actions:
- 1) The Resource Management Plan (RMP) will contain a decision limiting OHV use within sage-grouse habitat to existing roads and trails, and trails can be subject to seasonal closures, as necessary.
 - 2) Incorporate studies completed during 2004 by the Point Reyes Bird Observatory (PRBO) concerning impacts to nesting birds from OHV use limited to designated roads and trails within the Fort Sage Mountains OHV Area for application within sage-grouse habitat.
 - 3) Continue closure of OHV trails illegally pioneered into Wilderness Study areas (WSA).

Goal 3H: MANAGE LIVESTOCK AND WILD HORSE AND BURRO GRAZING IN A MANNER THAT BENEFITS SAGE-GROUSE NESTING AND BROOD-REARING HABITAT

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.

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 led 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 an average 17% overall recruitment rate confounds the ability of the agency to maintain a healthy ecological balance.

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, re-growth 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.

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 re-growth 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).

This goal is consistent with and expands existing Land Use Plan decisions discussed below.

Willow Creek Management Framework Plan (MFP) and Record of Decision (ROD)

Range Management: Limit utilization of key forage to 40-50% on continuously grazed ranges and 50-65% on ranges which are periodically rested or deferred for livestock grazing.

Soil and Watershed: Restore wetlands in Willow Creek Planning Unit that show the greatest potential to improve and provide most benefit as wildlife habitat.

Maintain grazing intensity and duration on public lands such that adequate residue remains on soil, allowing for rest to develop litter for ground cover when feasible. Grazing regulations should permit survival of existing grass and forbs. Consider various methods of revegetation with needed erosion control devices.

Wildlife: Develop and implement grazing systems that will improve meadow conditions throughout the Planning Unit by allowing for the periodic test/deferment from livestock grazing. Monitor to determine effectiveness of improving meadow

conditions. In cases where important meadows are not covered by a grazing system or where the goal to improve important meadows is not being achieved through a grazing system, exclude livestock through direct fencing of meadow habitat.

Where feasible and necessary for improvement of livestock management practices and range condition, implement grazing systems which allow for periodic rest/deferment from livestock grazing.

Develop and implement grazing systems that will promote increased production of succulent vegetation and willows in the stringer meadow and willow riparian habitat types throughout the planning unit. Monitor to determine effectiveness of improving meadow conditions. In cases where important meadows are not covered by a grazing system or where the goal to improve important meadows is not being achieved through a grazing system, exclude livestock through direct fencing of meadow habitat.

Cal Neva MFP and ROD:

General Decisions: Implement livestock grazing program including: Establish Grazing seasons to meet plant and soil needs. Moderate use limitations or 40-60% during grazing seasons. Adjust future stocking levels as range condition and trend improves and production increases.

Soil and Water: Develop a grazing system to enhance wetland and meadow restoration in the Little Mud Flat area and in Pilgrim Flat. Establish a monitoring system to determine to what degree the system is working.

Consider growth requirements of key species when establishing the grazing capacity of an area. Also, develop grazing systems which allow for rest to develop litter for ground cover. In areas without sufficient watershed, consider various methods of revegetation with needed erosion control devices.

Wildlife: Develop livestock grazing systems to provide periodic rest to assure an improvement in range condition and trend and provide for the improvement of and/or protection of riparian vegetation.

Establish grazing systems to provide periodic rest from livestock grazing on all allotments in the Cal-Neva. Develop monitoring systems to determine if goals are being met.

Implement grazing systems to improve perennial grasses without a major vegetation type change.

Objective 3H.A: Maintain Wild horse and Burro (WH&B) numbers to AML.

Actions: 1) Manage the following Herd Management Areas (HMA) influencing sage-grouse management in the Buffalo-Skedaddle PMU to the following AMLs.

Table 9. Wild Horse and Burro Management Areas

Area Name	Area Number	Acreage (BLM/Other)	Midpoint of AML (head)	Estimated Population (10/1/03)
New Ravendale HMA	(CA-243)	18,500 / 9,060	15	95
Twin Peaks HMA	(CA-242)	653,425 / 144,502	603 (h) 94 (b)	927 (h) 80 (b)
Coppersmith HMA	(CA-261)	60,274 / 13,273	63	200
Buckhorn HMA	(CA-262)	67,392 / 9,388	72	59
Fort Sage HMA	(CA-241)	15,759 / 0	38 (est.)	36
Totals		815,350 / 176,223	791 (h) 94 (b)	1,317 (h) 80 (b)

(h) = horses
(b) = burros

2) Establish a priority within the Eagle Lake RMP to develop an Implementation Plan to manage Twin Peaks HMA as a meta-population, and the appropriate AML for maintaining the Standards for Land Health (Appendix F).

Objective 3H.B: Adjust grazing to allow perennial grasses and forbs to compete in R-4 habitat.

Actions: In areas where annual non-native grass species have invaded a site but the site has not crossed a threshold (R-4 to X-4) appropriate conservation actions will include the following:

- 1) Adjust grazing levels, increase the length of rest, and other measures to allow existing perennial grasses and forbs to compete.
- 2) Seek opportunities for vegetation treatment and reseeding with native perennial grasses and forbs.

Objective 3H.C: Sustain R-0 habitat.

- Actions:
- 1) 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 cover.
 - 2) Graze existing vegetation in a manner that provides an opportunity for herbaceous perennial plant seedling establishment (grass and forbs), and facilitates understory vigor.

Goal 4H: STABILIZE AND REHABILITATE WILDLAND FIRES IN 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 (Valentine 1989).

This goal is consistent or defines improved succession of decisions within existing Land Use Plan decisions discussed below.

Willow Creek MFP and ROD:

Area Wide Decisions: Establish a fire management plan which addresses limited suppression techniques on vegetation communities benefiting from fire and active suppression techniques on high value lands which would be damaged by fire.

Wildlife: Wildfires should be vigorously suppressed in sage grouse breeding complexes and winter ranges. Include the sage grouse breeding complexes and winter ranges to show a high wildlife value at risk in the Willow Creek P.U. normal year Fire Plan.

Where prescribed fire is used to improve range and watershed conditions on sage grouse range, include wildlife objectives in the burn plan. Strive to create irregular burn configuration and leave unburned islands. On sage grouse winter ranges, strive for minimal burning of sagebrush.

Cal Neva MFP and ROD:

General Decisions: Establish a modified suppression plan for the unit and identify control burn areas to enhance vegetative condition and reduce wildfire hazards.

Objective 4H.A: 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 appropriate management response for wildfire suppression in Wyoming big sagebrush ecosystems. Priority will be given to sites burned within 18 km (11 miles) of leks.

Actions: WAFWA Guidelines (Connelly et al. 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.*

Goal 5H: DETERMINE POPULATION COUNTS AND TRENDS IN REMOTE LOCATIONS OF NEVADA IN THE BUFFALO-SKEDADDLE PMU.

This goal is consistent with decisions within existing Land Use Plan decisions discussed below.

Willow Creek MFP and ROD:

Wildlife: Continue sage grouse strutting ground inventories so as to find new breeding complex areas of importance.

Objective 5H.A: Establish a Lek Monitoring Plan for Active Leks in Nevada in the Buffalo-Skedaddle PMU

Determining sage grouse abundance and changes in populations are critical to making proper management decisions and evaluating the effectiveness of conservation measures. These risk levels are currently judged to be “Low” in California and “High” in Nevada. Differences in lek monitoring between California and Nevada mean that the ability to determine trends in the population are substantially different between states. All active leks in the California portion of the PMU (23 in 2002) have been counted for peak male attendance each year since 1987. The 35 known lek sites identified in the Nevada portion of the PMU have not been monitored for activity or numbers of peak males on a regular basis due to remoteness and staff limitations. It is possible that less than 50% of **these** leks are currently active. Only 17 have been detected as active since 1990 and an additional 12 are not known to have been active since 1980. Changes in lek monitoring will be needed in the Nevada portion of the

PMU to evaluate the current population status or any future changes in sage grouse abundance.

Table 10. Leks, Active and Historical, Within the Buffalo-Skedaddle Population Management Unit.

California			Nevada		
Number ¹	Name	Last Active	Number ¹	Name	Last Active
LAS0001	Shinn Ranch	2003	1	Antelope Basin	?
LAS0002	Madeline Prairie	2003	2	Buckhorn	1977
LAS0003	Mad. West/Ostrich	2001	3	Burnt Lake	1979
LAS0004	Shaffer Mtn.	2003	4	Butte Ground	1979
LAS0005	Hall Spring		5	Cedar Canyon	1979
LAS0006	Little Blacks Mtn.		6	Chicken Canyon	1980
LAS0007	Coyote Flat	1994	7	Chimney Bench	?
LAS0008	Eastside Sat.	2002	8	Dobe	1998
LAS0009	Eastside Sat.		9	Eagle Head 1	1979
LAS0010	Telephone Sat.	1995	10	Eagle Head 2	1979
LAS0011	Gilman	2003	11	Five Spring	1998
LAS0012	Gilman		12	Garden Lake	1992
LAS0013	Wildhorse	1994	13	Garden Lake, East	1979
LAS0014	Sage Hen Spr. (Shinn)	1987	14	Granite Canyon	1998
LAS0015	Madeline Robin	1996	15	Horse Corral	1979
LAS0016	Spencer Sat.	1972	16	Jones Flat	1980
LAS0017	Spencer Sat.	1990	17	Middle Fork Buffalo Crk.	?
LAS0018	Spencer Sat.		18	Middle Fork Buffalo Crk.	?
LAS0019	Mad. Prairie /Canary	1996	19	Mixie Flat	1992
LAS0020	Pea Creek	1991	20	N. Rye patch Canyon	?
LAS0021	Jenkin's Spring	1991	21	North Sawmill	1998
LAS0022	W. of Bull Flat	1991	22	North Skedaddle	?
LAS0025	W. of Little Mud Flat	1991	23	Parker Canyon	1992
LAS0026	Skedaddle Sat.	1991	24	Parsnip 1	1992
LAS0028	East Mad. (Buckhorn)	1989	25	Parsnip 2	1992

LAS0030	Madeline	Historic	26	Red Rock Canyon	1992
LAS0032	Red Rock Valley	Historic	27	Rush Creek	1992
LAS0040	Mad. SE of Anderson Mtn.	Historic	28	SOB Lake	1979
LAS0041	Dodge Springs	2003	29	South Red Rock Canyon	?
LAS0042	Maiden Flat	Historic	30	South Rye Patch Canyon	?
LAS0043	Brinn Marr Ranch	Historic	31	South Sawmill	1998
LAS0044	E. Grasshopper (Dry Valley)	Historic	32	South Skedaddle	?
LAS0045	Shinn Ranch (#2)	1997	33	Stockade Flat	?
LAS0046	Shinn Sat.	Historic	34	Stone Corral	1979
LAS0047	Pete's Crk. (#1)	Historic	35	W. Buffalo Crk.	?
LAS0048	Pete's Crk. (#2)		California (contd)		
LAS0049	Karlo Mesa	Historic	LAS0050	W. of Pea Crk.	Historic
LAS0051	W. Skedaddle Sat.	Historic	LAS0052	Demolition area	1972
LAS0053	Demolition Area	Historic	LAS0055	W. of Bull Flat	1973
LAS0056	SW of Ravendale	1997	LAS0057	Hall Spring	2003
LAS0058	5 Springs	1992	LAS0059	5 Springs	1992
LAS0060	Madeline West	1994	LAS0061	Madeline (Incident)	1994
LAS0062	Madeline East	2001	LAS0063	Wildhorse	1994
LAS0064	Gilman	1994	LAS0065	N. Gilman Sat.	2002
LAS0066	Skedaddle Sat.	1993	LAS0067	Skedaddle Sat.	1993
LAS0068	Skedaddle Sat.	1994	LAS0069	Dill field	2003
LAS0070	Coyote Flat	1994	LAS0071	Chalk Bluff	2003
LAS0072	Chalk Bluff Sat.	1994	LAS0073	N. of LMF (Bru#1)	
LAS0074	N. of Little Mud Flat		LAS0075	E of LMF (Bru#2)	
LAS0076	NE of Little Mud Flat		LAS0077	Little Black Mtn. N	2003
LAS0078	Dill Butte	1990	LAS0079	Flemming Spring	2003
LAS0080	Spanish Springs	2003	LAS0081	Ball's Canyon	1992
LAS0082	Buckwheat		LAS0083	Viewland	

	Ridges			(BLM Water tank)	
LAS0084	Viewland		LAS0085	Viewland	
LAS0086	Mud Flat Sat.		LAS0087	Mud Flat	
LAS0088	Cassiano Cabin (Shaffer)		LAS0089	Shaffer Sat.	
LAS0090	Gilman Spring (Shaffer)	2003	LAS0091	Shaffer Sat.	
LAS0092	Shaffer Mtn.	1994	LAS0093	Spencer Canyon	1992
LAS0094	Spencer Canyon	1992	LAS0095	Spencer Canyon	1994
LAS0096	Spencer Canyon	1994	LAS0097	Spencer Canyon	1992
LAS0098	Eastside Reservoir		LAS0099	Eastside Sat.	1994
LAS0100	Eastside Sat.	1992	LAS0101	Eastside Reservoir	2003
LAS0102	Telephone Sat.	1991	LAS0103	Little Black Mtn. S	1994
LAS0104	Mad. West /Ostrich	1974	LAS0105	Grasshopper	2003
LAS0106	Horse Lake	1994	LAS0107	Shinn Satellite	1994
LAS0108	Shinn Ranch	1992	LAS0109	Horse Lake Rd. & 395	
LAS0110	Dodge Springs	2001	LAS0111	Madeline WMA	1950's
LAS0112	Rush Creek	2003	LAS0113	Filson Road	1950's
LAS0114	Juniper Creek	Historic	LAS0116	Horse Lake (Nancy's)	2002
LAS0117	Moon Valley Rd.	1974	LAS0118	Crest	2003?
LAS0119	Popham (Spencer)	2000	LAS0120	Look Out	
LAS0121	Horse Lake West	2002	LAS0122	Cherry Mt.	
LAS0123	Pete's Creek	2003	LAS0127	Gilman Spring	2003
LAS0128	Dorsey Butte	2003	WAS0001	Telephone Springs	1996
WAS0002	Skedaddle	2003	WAS0003	Skedaddle Sat.	
WAS0004	Skedaddle Sat.		WAS0005	Skedaddle Sat.	1991
WAS0006	Skedaddle Sat.	1991	WAS0007	Skedaddle Sat.	1991

WAS0008	Telephone Sat.	1990	WAS0009	E. of Telephone Spring	Historic
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1. Leks known or believed to be Active are presented in **bold**.

- Actions:
- 1) Nevada Department of Wildlife will implement counts of all active leks for peak male attendance within the Buffalo / Skedaddle PMU by 2004.
 - 2) Lek counts for peak male attendance will be completed by Nevada Department of Wildlife on an annual basis.

Objective 5H.B: Determine Production and Harvest Composition.

- Actions:
- 1) Nevada Department of Wildlife will continue to determine production and harvest composition from wing surveys on an annual basis.

Moderate Risk Factors

Goal 1M: STABLIZE AND REHABILITATE WILDLAND FIRES IN BROOD-REARING AND WINTER HABITAT.

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.

Objective 1M.A: Protect patches of sagebrush within burned winter habitat from disturbance and manipulation.

Actions: Unburned patches of sagebrush within burns may provide the only winter habitat for sage-grouse and their loss could result in the extirpation of the grouse population.

- 1) During fire-suppression activities do not remove or burn any remaining patches of sagebrush within the fire perimeter.
- 2) In areas of large-scale loss (\geq 40% of original winter habitat), protect all remaining sagebrush habitats.

Objective 1M.B: 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 appropriate management response for wildfire suppression in Wyoming big sagebrush ecosystems.

- Actions:
- 1) Reseed former winter range with the appropriate subspecies of sagebrush and herbaceous species unless the species are recolonizing the area in a density that would allow recovery within 15 years (sagebrush canopy cover of 10- 30% and height of 25 – 35cm (10 – 14 inches)).
 - 2) Discourage prescribed burns > 50 ha. (123 acres), and do not burn > 20% of an area used by sage-grouse during winter within any 20-30 year interval (depending on estimated recovery time for the sagebrush habitat).

Goal 2M: MANAGE GRAZING TO THE BENEFIT OF SAGE-GROUSE NESTING HABITAT.

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).

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 ($\geq 15\text{-}18\text{cm}$ (6"-7")) (Connelly et al. 2000). Popham and Gutierrez (2003) found the average residual grass height associated with successful nests within this PMU is 22 cm (9 in.). An 18 cm height will be used as a starting point for application of adaptive management. All sagebrush ecological sites within the Buffalo-Skedaddle PMU have the potential for producing and supporting herbaceous species capable of meeting the residual grass height standard (USDA 1974, 1990, 2001). The 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.

Objective 2M.A: Maintain 18 cm (7 inches) of Residual Grass Height Within the Dripline of Sagebrush in Nesting Habitat.

- Actions:
- 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 reestablish 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.

Goal 3M: MANAGE SAGEBRUSH ECOSYSTEMS, AND WETLANDS, TO MAINTAIN R-0 HABITAT VALUES IN BROOD-REARING HABITAT, AND PROVIDE PROPER NUTRITION FOR SAGE GROUSE.

By definition R-0 habitat are 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). Maintenance of these habitats is critical to maintaining current sage grouse populations and initiating recovery of sage grouse populations to a level of health that has been lost.

Objective 3M.A: Manage Big Sagebrush Ecosystems, Low Sagebrush Ecosystems, and Low Sagebrush/Big Sagebrush Ecosystems for R-0 Value Habitat.

Actions: 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 11. 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 $\leq 15\%$ 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 and 18% (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 stature 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). Prior to description 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.

- 1) Manage sagebrush ecosystems to be consistent with the Biodiversity Standard For Land Health (Appendix ?). Technical Reference 1734-6, 2000, *Interpreting Indicators of Rangeland Health* will be used as one tool to evaluate whether Objective is being met.
- 2) 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.
- 3) Seed native sagebrush of the subspecies and ecotype that previously existed at the site, native grass and forb species into each fire to accelerate recovery of R-1 lands to R-0, and keep R-4 lands from degrading to X-4 (Section II.D). Establish appropriate management response wildland fire suppression in Wyoming big sagebrush ecosystems.

Objective 3M.B: Maintain meadows (lentic wetlands) in a healthy state.

Actions: 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 (Appendix F). 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 in Actions for Objective 3.A 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.

Damage has been recorded to several unfenced 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.

- 1) 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 or burning the meadows as necessary to maintain appropriate vegetation structure, diversity, density, composition and vigor as described in Land Health Standards 3 – Water Quality and 4 – Riparian and Wetland Sites.
- 2) Maintain or achieve Proper Functioning Condition (PFC), consistency with Land Health Standards 3 – Water Quality and 4 – Riparian and Wetland Sites, 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.

Objective 3M.C: Counter low production rates by meeting sage-grouse proper nutrition needs.

Actions: Sage grouse nutritional needs vary considerably throughout the year. However, sagebrush is vital for forage year – round;

especially younger, more nutritious sagebrush. Pre-breeding nutrition for female sage grouse is **critical** for determining the size and health of egg clutches and broods. The size and health of chicks at hatching is entirely dependant on female pre-laying nutrition and a correct intake of vitamins, amino acids, minerals and proteins. This may be one of the most critical issues in sage grouse population maintenance. Winter forage (pre-breeding) is composed almost entirely of sagebrush. Sage grouse actually gain weight during the winter months when forage is of high quality. Forbs begin to be more and more important as snow cover recedes and ground temperatures increase in early March. In some years, forb availability is restricted due to late snow cover and cold temperatures well into the breeding season. Forbs become more and more important in the diet during nesting season and insects begin to be more important for both hens and chicks as temperatures warm. Forbs and insects remain very important throughout the brood rearing period (March-August). In the fall, sage brush begins to compose a larger percent of the diet and forbs become less important due to drying of the vegetation and cooler temperatures.

Research from 1998-2000 in the California portion of the PMU showed a strong relationship between mass of females at breeding and persistence and ultimate success of nesting females. Many smaller and lighter females either did not attempt to nest or attempted to nest but did not re-nest as persistently as heavier females. This relationship was found to be independent of the age of females (yearlings or adults). Re-nesting can be considered to be crucial to recruitment in this population because re-nesting females were almost twice as likely to be successful in hatching a brood on their second, rather than first, nesting attempt. These relationships are likely habitat based and are also likely to be strongly influenced by forage quality available to females from pre-breeding (winter) through hatching.

- 1) Research conducted in the California portion of the PMU should be extended to any captures of adult females associated with any radio telemetry project in the Nevada portion.
- 2) Measures to protect and restore sagebrush quality (age) and quantity should be considered a high priority on winter and breeding ranges within this PMU.

Goal 4M: TREAT JUNIPER ENCROACHMENT (R-3 AREAS) AND NESTING, BROOD-REARING SHRUB HABITATS THAT HAVE CROSSED THE THRESHOLD INTO JUNIPER WOODLAND (X-3 AREAS) AND RESTORE HEALTHY (R-0) HABITAT.

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.

Objective 4M.A: Thwart Juniper Encroachment Into Nesting, Brood-Rearing, and Winter Habitat to a Level That Maintains Healthy (R-0) Shrubland Ecosystems.

Actions: Juniper encroachment areas being addressed here are those habitats that have a response value of R-3 (<10% juniper cover). Treatments should start prior to juniper cover reaching 10%

- 1) In nesting habitat remove primarily seedling and sapling trees leaving some mature juniper for use by native species that require the tree structure except within 6km (3.85 miles) of leks..
- 2) In brood-rearing habitat encourage wood and biomass cutting with reseeding of native perennial species.

- 3) In winter habitat should be treated using a mixture of mechanical and prescribed fire treatments followed with reseeding of native perennial species.

Objective 4M.B: Treat those areas where juniper encroachment has been severe enough to cause the site to cross the threshold into juniper woodland (X-3).

Actions: Recovery of X-3 areas is a highly expensive human intervention using mechanical treatments. Conservation actions apply to nesting, brood-rearing, and winter habitats.

- 1) Conservation measures 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 perennial native shrubs, grasses and forbs.

Goal 5M: TREAT ANNUAL NON-NATIVE GRASS INVASION INTO (R-4 AREAS) AND NESTING, BROOD-REARING SHRUB HABITATS THAT HAVE CROSSED THE THRESHOLD INTO ANNUAL GRASSLANDS (X-4 AREAS) AND RESTORE HEALTHY (R-0) HABITAT.

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).

Objective 5M.A: Thwart Annual Non-Native Grass Into Winter Habitat to a Level That Maintains Healthy (R-0) Shrubland Ecosystems.

Actions: In areas where annual non-native grass species have invaded a site but the site has not crossed a threshold (R-4 to X-4) appropriate conservation actions will include the following:

- 1) Adjust grazing levels, increase the length of rest, and other measures to allow existing perennial grasses and forbs to compete.

- 2) Seek opportunities for vegetation treatment and reseeding with native perennial grasses and forbs.

Objective 5M.B: Treat those areas where annual non-native grass invasion has been severe enough to cause the site to cross the threshold into annual grassland(X-4).

Actions: Recovery of X-4 areas is a highly expensive human intervention using mechanical treatments. Conservation actions apply to nesting, brood-rearing, and winter habitats.

- 1) Conservation measures include taking advantage of grant, or large project initiative funding to complete site treatments which include removal or severe set back of dominant annual non-native grass species, and reseeding with a mix of perennial native shrubs, grasses and forbs.

Goal 6M: ELIMINATE SAGE-GROUSE DIE-OFFS FROM INSECTICIDE POISONING.

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).

Objective 6M.A: Eliminate or Adjust Insecticide Use in Brood-Rearing Habitat

- Actions:
- 1) Discourage use of highly toxic organophosphorus and carbamate insecticides as well as methamidiphos in potato fields and dimethoate through identification and use of less toxic alternatives.
 - 2) Federal and state agencies will ensure and insecticide response to naturally occurring defoliation is necessary before allowing insecticide use on lands they administer.
 - 3) Where insecticides must be used on federal and state administered lands limit use to spot applications of the least toxic chemicals or biological treatment.
 - 4) Private landowners will be advised if brood-rearing occurs and their lands and efforts will be made to assist landowners to acquire the least toxic chemicals or biological controls.

Goal 7M: CONTINUE SAGE-GROUSE POPULATION TREND MONITORING.

Populations should be monitored to assess trends and identify problems for all hunted and non-hunted populations. Check stations, wing collections and questionnaires can be used to obtain harvest information. Lek counts and production data from wings can be used to monitor breeding populations and recruitment of young.

Determining sage grouse abundance and changes in populations are critical to making proper management decisions and evaluating the effectiveness of conservation measures. These risk levels are currently judged to be “Low” in California and “High” in Nevada. Differences in lek monitoring between California and Nevada mean that the ability to determine trends in the population are substantially different between states. All active leks in the California portion of the PMU (23 in 2002) have been counted for peak male attendance each year since 1987. The 35 known lek sites identified in the Nevada portion of the PMU have not been monitored for activity or numbers of peak males on a regular basis due to remoteness and staff limitations. It is possible that less than 50% of **these** leks are currently active. Only 17 have been detected as active since 1990 and an additional 12 are not known to have been active since 1980. Changes in lek monitoring will be needed in the Nevada portion of the PMU to

evaluate the current population status or any future changes in sage grouse abundance.

Objective 7M.A: Determine Population Trend

- Actions:
- 1) California Department of Fish and Game and Nevada Department of Wildlife will develop spring breeding population and fall population estimates for sage grouse in the Buffalo / Skedaddle PMU on an annual basis.
 - 2) California Department of Fish and Game and Nevada Department of Wildlife will gather production and recruitment data in the Buffalo / Skedaddle PMU using hunter – harvested wings on an annual basis.
 - 3) Nevada Department of Wildlife will implement a radio telemetry project by 2007 to determine seasonal movement and use areas of sage grouse using Nevada leks in the Buffalo / Skedaddle PMU.

Objective 7M.B: Monitor to Ensure Success in Determining Population trends.

- Actions:
- 1) California Department of Fish and Game will continue to count all active leks for peak male attendance within the Buffalo / Skedaddle PMU on an annual basis.
 - 2) California Department of Fish and Game and Nevada Department of Wildlife will monitor all known lek sites for activity by either aerial or ground checks by 2005 and each 5 years thereafter. The California portion was last completed in 2002.
 - 3) Nevada Department of Wildlife will implement counts of all active leks for peak male attendance within the Buffalo / Skedaddle PMU by 2004, and continue on a annual basis.
 - 4) California Department of Fish and Game and Nevada Department of Wildlife will continue to determine production and harvest composition from wing surveys from as many grouse as possible on an annual basis.

Low Risk Factors

Goal 1L: MONITOR HUMAN ACTIVITY IN AND AROUND LEKS, AND RESTRICT POTENTIALLY HARMFUL ACTIVITIES.

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 there is concern that OHV use on or near the lek would surely cause the strutting activity to stop or, at worst, the lek be abandoned.

Objective 1L.A: Protect leks from human associated disturbances that interfere with breeding at leks.

Actions: Continue to implement visitor education, restrictions, and management oversight and control by appropriate landowners, land management and state wildlife agencies to support.

1) Protect against overzealous human observers venturing too close or onto leks by establishing one viewing lek with a marked viewing platform or site. Use educational signs with suggested protocol while observing strutting activity.

2) Continue to protect against domestic sheep bedding and grazing on leks through continued operator/BLM cooperation and citing this restriction as a part of the grazing license (Cal-Neva Planning Unit Management Framework Plan III Wildlife Decision 11.2).

3) Continue to restrict aerial gunning for the control of predators by the USDA Wildlife Services to after 9:30 am within two miles (3.2 km) of a lek. This has been incorporated by Wildlife Services into their Animal Damage Control Plans for work in the Eagle Lake Field Office area.

4) When monitoring data confirms that OHV use is a disturbance to lek activity, restrict OHV use as necessary. The 2005 Eagle Lake Field Office RMP shall install more closely managed use in what is now an “open” area within 2 miles (3.2 km) of leks.

Goal 2L: NO HERBICIDE BROADCAST SPRAYING AROUND LEKS, AND WITHIN NESTING AND BROOD-REARING HABITAT.

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.

This goal is consistent with decisions within existing Land Use Plan decisions discussed below.

Willow Creek MFP and ROD:

Area Wide Decisions – Wildlife Habitat: Prohibit sagebrush eradication projects within verified sage grouse breeding complexes.

Wildlife: Consider the impacts of any sagebrush control projects in sage grouse winter concentration areas on sage grouse populations. Consult with the California Department of Fish and Game. If, under a mitigated land treatment program, the habitat cannot be maintained or improved and if other resources are jeopardized (i.e. accelerated erosion and water pollution), sagebrush eradication should not be allowed on verified sage grouse winter concentration areas.

Consider impacts of individual sagebrush eradication projects on breeding sage grouse complexes. Where detrimental, eradication should not occur on breeding complexes. When designing eradication projects, stream-side buffer strips should be considered for inclusion in treatment project.

Cal Neva MFP and ROD:

General Decisions: Prohibit sagebrush eradication projects within sage grouse breeding complexes....

Objective 2L.A: Limit Herbicide Use Within Nesting and Brood-Rearing Habitat to Treatments That Proven Beneficial to Sage-Grouse.

- Action:
- 1) No broadcast herbicide treatments will occur within nesting and brood-rearing habitat unless they are shown to be beneficial to the sagebrush ecosystem and sage-grouse.
 - 2) Noxious weeds will be controlled using spot treatments focused on the specific infestations.

- 3) No herbicide broadcast spraying within 6km (3.75 miles) of leks,
- 4) From Connelly et al. (2000): *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.*

Goal 3L: PROTECT AGAINST DIRECT LOSS OF LEKS.

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.

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.

Objective 3L.A: Protect Against Direct Loss of Leks Due to Paving, Surface Mining, Land Exchanges, Converting Native Lands to Cultivated Agricultural.

Actions: 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 advised of any important sage grouse habitat on their property. Protection will be implemented by site - specific and seasonal use-specific methods identified within. State wildlife agencies (in conjunction with the appropriate federal and/or county agencies) will normally be the responsible agency for contacts and implementation. 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.

Objective 3L.B: Treat Excessive Screening Vegetation Growth on Leks.

Actions: Conservation actions for this objective are tied primarily to sagebrush ecosystem dynamics. Monitoring existing conditions is, therefore, an initial action.

- 1) Vegetation is visually monitored during each annual lek count.
- 2) If visual monitoring detects an increase in screening vegetation on the lek appropriate action is taken after strutting activity is completed.
- 3) Once a treatment is applied quantitative monitoring will be established to measure treatment success.

Goal 4L: MAINTAIN SAFE FLYWAYS FOR SAGE-GROUSE INTO LEKS.

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.

Objective 4LA: Insure Fences Within Lek Flyways do not Pose a Hazard for Sage-Grouse.

- Actions:
- 1) Do not construct new fences or move existing fences to within 1.6 kilometers (1 mile) of a lek.
 - 2) 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.

- 3) All braces, gateposts, or wooden posts used are required to have anti-perch structures.

Goal 5L: INSURE NESTING SUCCESS IS NOT BEING LIMITED THROUGH GRAZING PRACTICES, HUNTING OR POACHING, OR PREDATION.

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.

Losses of chicks from most broods begin at hatching. As broods disperse and travel to forb and insect rich sites, mortality for individual chicks takes place from a variety of causes, including predation. These losses can limit the population if too few young are recruited to replace adult mortality over time. Too few data exist to indicate that this is or is not occurring in the Buffalo / Skedaddle PMU. Based on recruitment rates observed from the composition of young of the year in fall from wing samples, risks from both avian and mammalian predators are considered low in this PMU. Based on proportions of nest losses to ravens (55%) and all mammals (45%) from the Lassen telemetry project, avian predators should be considered of slightly more concern than mammals as nest predators in this PMU. For a more detailed discussion of this topic refer to Section II.C.

Objective 5.A: Investigate Potential Nest Trampling by Grazing Livestock, Focusing Primarily on Domestic Sheep.

Actions: Establish and fund research to investigate if trampling of nests by domestic sheep does occur, and if it is an issue of adverse affect.

Objective 5.B: Monitor Potential Predation Impacts and Limit as Necessary.

- Actions:
- 1) Aerial gunning of coyotes under federal animal damage control programs for domestic sheep protection takes place near many active leks in the PMU. This may provide some benefit for sage grouse and is expected to continue.
 - 2) Evaluation of female nesting success (from hunter collected wings) will continue in both California and Nevada portions of the Buffalo / Skedaddle PMU.
 - 3) Evaluation of female nesting success (from hunter collected wings) will continue in both California and Nevada portions of the Buffalo / Skedaddle PMU.
 - 4) Should nesting success fall below 23% aggressive predator control measures will be implemented.

Objective 5.C: Manage Hunting and Poaching to Avoid Adverse Impacts to Sage-Grouse Populations.

- Actions:
- 1) The California Department of Fish and Game and Nevada Department of Wildlife will continue to use season timing, bag limits and permit hunting systems to carefully limit harvest.
 - 2) Seasons will continue to be structured to minimize the possibility that harvest could exceed 10% of the estimated fall populations.
 - 3) NDOW will complete one annual helicopter flight to count males on the 17 known leks in the Nevada portion of the PMU for each of the next 5 years to determine trends in populations. NDOW will also completed one helicopter flight to look for new leks within the Nevada portion of the PMU in 2003.
 - 4) NDOW will implement volunteer monitoring of 5 accessible leks and complete at least 3 counts of males attending leks for each year 2003 through 2007.
 - 5) Both states will continue law enforcement patrols to help insure that illegal harvest remains minimal.

Table 12: Summary of Conservation Measures in Association with Levels of Risk to Sage-Grouse and Sagebrush Ecosystem

CONSERVATION MEASURE GOALS
High Risk Factors
1. Protect active lek habitat from aerial predation.
2. Restrict off-highway vehicle (OHV) use detrimental to strutting, nesting, brood-rearing, and winter habitat use.
3. Manage livestock and wild horse and burro grazing in a manner that benefits sage-grouse nesting and brood-rearing habitat.
4. Stabilize and rehabilitate wildland fires in nesting habitat.
5. Determine population counts and trends in remote locations of Nevada in the Buffalo-Skedaddle PMU.
Moderate Risk Factors
1. Stabilize and rehabilitate wildland fires in brood-rearing and winter habitat.
2. Manage grazing to the benefit of sage-grouse nesting habitat.
3. Manage sagebrush ecosystems, and wetlands, to maintain R-0 habitat values in brood-rearing habitat, and provide proper nutrition for sage-grouse.
4. Treat juniper encroachment (R-3 Areas) and nesting, brood-rearing shrub habitats that have crossed the threshold into juniper woodlands (X-3 Areas) and restore healthy (R-0) habitat.
5. Treat annual non-native grass invasion into (R-4 areas) and nesting, brood-rearing shrub habitats that have crossed the threshold into annual grasslands (X-4 Areas) and restore healthy (R-0) habitat.
6. Eliminate sage-grouse die-offs from insecticide poisoning.
7. Continue sage-grouse population trend monitoring.
Low Risk Factors
1. Monitor human activity in and around leks, and restrict potentially harmful activities.
2. No herbicide broadcast spraying around leks, and within nesting and brood-rearing habitat.
3. Protect against direct loss of leks.
4. Maintain safe flyways for sage-grouse into leks.
5. Insure nesting success is not being limited through grazing practices, hunting or poaching, or predation.

II. F. DESCRIPTION OF MANAGEMENT ACTIONS

Essential components of the Conservation Strategy include protection, restoration, monitoring, research, and ongoing adaptive management. These efforts will be designed to secure current populations against extirpation and to increase their numbers; to expand the current distribution into historic habitat; to

sustain existing and newly established populations over the long-term; and direct future management action through adaptive responses informed by monitoring and research. The following actions provide the necessary support for the Sage-grouse Conservation Strategy and its goals and objectives. Criteria used to prioritize these actions are as follows:

1. Concentrate maintenance and enhancement on seasonal use areas depicted in the table below.

Seasonal Use Priorities and Areas

Priority	Maintenance	Enhancement
1	L, N	B, N
2	W	W
3	B	L

L= Leks
N = Nesting

B= Brood Rearing
W = Winter

2. Concentrate on habitats that support the most birds from the most leks on use maps which include: telemetry data, "R" value maps, habitat maps.
3. Can the projects be implemented: (from PECE)
 - Legal authority
 - Legal procedural requirements
 - Necessary authorizations obtained or will be obtained
 - Type and level of voluntary participation
 - Regulatory mechanisms are in place
 - Adequate funding will be obtained
 - Implementation schedule is provided
 - Plan is approved by all parties
4. Will the projects be effective?
 - The expected success will be based on experience of local resource managers and the scientific literature for habitat improvement
 - Threats are described and efforts to reduce the threat are described
 - Appropriate steps to reduce threats to the species are identified
 - Explicit objectives for conservation effort and dates for achieving them are stated.
 - Quantifiable performance measures to monitor for both compliance and effectiveness are included, i.e. plant community characteristics, sage-grouse use patterns, and lek counts

5. Take advantage of appropriate project opportunities when they present themselves. Some include:
- NDOW – Nevada Department of Wildlife
 - LIP Grant – Landowner Incentive Program Grant
 - CDFG – California Department of Fish and Game
 - GBH – Game Bird Heritage
 - BLM CCS – Bureau of Land Management Challenge Cost Share
 - BLM CCI – Bureau of Land Management Cooperative Conservation Initiative
 - GBRI – Great Basin Rehabilitation Initiative
 - NFWF – National Fish and Wildlife Foundation

Protect, and maintain active leks, and nesting habitats.

Continue yearly lek counts during strutting season to determine peak lek activity on 20 active leks in California and seven active leks in Nevada. Determination of peak activity requires at least a total of four visits to each lek separated by every eight to ten days. The 20 active leks in California are: Shinn Ranch, Madeline Prairie, Shaffer Mountain, Gilman, Dodge Springs, Hall Spring, Dill Field, Chalk Bluff, Little Black Mountain North, Flemming Spring, Spanish springs, Gilman Spring (Shaffer), Eastside Reservoir, Grasshopper, Rush Creek, Crest Pete's creek, Gilman spring, Dorsey Butte, and Skedaddle. The seven active leks in Nevada are: Dobe, Five Spring, Granite Canyon, North Sawmill, and South Sawmill.

Continue to inventory inactive and historical leks to substantiate if their status is accurate or if they are actually active. Protect currently inactive and historical leks that are in R-0 status to support potential expansion of sage-grouse back into those areas. Maintain R-0 value nesting habitat to support potential expansion of sage-grouse back into these areas. As funds become available enhance nesting habitats within the inactive and historical lek complexes.

Develop site-specific management/action plan for brood-rearing, nesting, and winter habitats.

A fundamental element of coordinating the conservation effort for sage-grouse and the sagebrush ecosystems upon which they depend is collectively planning for the future. Each entity will lend its expertise to assist other partners in formulating plans for high priority restoration sites. It is envisioned that each site-specific management/action plan will take a 3 to 5 year look into the future and discuss conservation actions in general terms. These plans will include site-specific ecology, potential restoration measures, monitoring efforts, and research needs. Because of the uncertainty in management and environmental conditions, detailed plans are not necessary or desirable. These plans will change as more knowledge is gained concerning conservation needs and management techniques. Activities will focus on maintaining R-0 habitat within

the nesting and brood-rearing habitats utilized by sage-grouse using the active leks. Restoration will be focused on those areas of R-2 (sagebrush dominated with little or no herbaceous understory), R-3 (juniper) and R-4 (annual non-native invasive species) value. A preliminary list of actions is provided in Appendix A.

The development of these plans will also serve as part of the coordination and cooperative process between agencies. By working together to develop and revise the plans, all participating entities will remain fully apprised of the actions of other agencies. This process will not only help increase the effectiveness of conservation efforts but will result in the streamlining of projects. Technical Sub-Committee (TSC) will provide technical assistance for each site plan, and in the spirit of collaboration each public agency will implement projects consistent with their authorities and available resources.

Through the incentive programs (Section II.I), assistance will be available to private landowners whose properties support high priority habitat restoration sites. Guidance will be provided, if requested, on development of site-specific plans, and the TSC members from regulatory agencies will assist with the regulatory requirements for landowners participating in the incentive programs.

Manage all currently occupied habitats.

All currently ranked and unranked that are occupied or have been occupied by sage-grouse will be managed to protect the species.

On public lands, unoccupied, potentially suitable habitat will be surveyed at least once every two years to identify new occupation events. Any newly occupied habitats would then be managed as currently occupied habitat (see above). In addition the following set of rules applies for unoccupied potentially suitable habitat:

- No alterations of R-0 value habitat, soil/site stability, biotic integrity, and hydrologic function without project review and protection of potentially suitable habitat;
- Consider management actions that encourage occupation;
- Restore R-1 (herbaceous cover but sagebrush overstory lacking), R-2 (sagebrush overstory but herbaceous understory lacking), R-3 (juniper encroachment) and X-4 (invasions of non-native herbaceous species) to benefit sage-grouse occupation; and
- No introduction of noxious weeds and control of these species, if present.

On private lands, the focus of management will be to encourage stewardship of sage-grouse and their habitat. A stewardship program will be developed to assist private landowners (Section II.I). Ideally private landowners will protect

sage-grouse and their habitat on a voluntary basis. The TSC will be available to provide assistance to private landowners whose properties support high priority restoration sites.

Need to add discussion of population management targets.

Monitor populations and habitats.

Population and monitoring systems are still in development.

Maintain a site ranking for every site.

Table 13 shows the initial adopted ranking of known sage-grouse leks. This table was derived from data and analysis in Sections II.C and II.D. This table and any subsequent modifications, will serve as the adopted site ranking for purposes of the goals and objectives, and actions addressed in Section II.E and II.F. This table relies entirely on the ranking outlined in Section II.D. By June 2004 the TSC will develop ranking criteria. The TSC will also rank newly occupied sites.

Table 13. Adopted Ranking of Known sage-grouse leks. Unranked sites will be ranked by May 2006. New sites will be ranked as found.

High Priority	Medium Priority	Low Priority
LAS0001 Shinn Ranch	LAS0003 Mad. West/Ostrich	NV1 Antelope Basin
LAS0002 Madeline Prairie	LAS0007 Coyote Flat	NV2 Buckhorn
LAS0004 Shaffer Mtn.	LAS0008 Eastside Sat.	NV3 Burnt Lake
NV8 Dobe	LAS0010 Telephone Sat.	NV5 Cedar Canyon
LAS0011 Gilman	NV12 Garden Lake	NV6 Chicken Canyon
NV11 Five Spring	LAS 0013 Wildhorse	NV7 Chimney Bench
NV14 Granite Canyon	LAS0015 Madeline Robin	NV9 Eagle Head 1
NV21 North Sawmill	LAS0017 Spencer sat.	NV10 Eagle Head 2
LAS0041 Dodge Springs	LAS0019 Mad. Prairie/ Canary	NV13 Garden Lake East
LAS0057 Hall Spring	NV19 Mixie flat	LAS0014 Sage Hen Spr. (Shinn)
LAS0069 Dill field	LAS0020 Pea Creek	NV15 Horse Corral
LAS0071 Chalk Bluff	LAS0021 Jenkins Spring	LAS0016 Spencer Sat.
LAS0077 Little Black Mtn. North	LAS0022 W. of Bull flat	NV16 Jones Flat
LAS0079 Flemming Spring	NV23 Parker Canyon	NV17 Middle fork Buffalo Crk.
LAS0080 Spanish Springs	LAS0025 W. of Little Mud Flat	NV18 Middle Fork Buffalo Crk.

LAS0090 Gilman Spring (Shaffer)	NV24 Parsnip 1	NV20 N. Rye Patch Canyon
LAS0101 Eastside Reservoir	LAS0026 Skedaddle Sat.	LAS0028 East Mad. (Buckhorn)
LAS0105 Grasshopper	NV25 Parsnip 2	NV28 SOB Lake
LAS0112 Rush Creek	NV26 Red Rock Canyon	LAS0030 Madeline
LAS0116 Crest	NV27 Rush Creek	LAS0032 Red Rock Valley
LAS0123 Pete's Creek	LAS0045 Shinn Ranch (#2)	LAS0040 Mad. SE of Anderson Mtn.
LAS0127 Gilman spring	LAS0056 SW of Ravendale	NV29 South Red Rock
LAS0128 Dorsey Butte	LAS0058 5 Springs	NV30 South Rye Patch Canyon
WAS0002 Skedaddle	LAS0059 5 Springs	NV32 South Skedaddle
	LAS0060 Madeline West	NV33 Stockade Flat
	LAS0061 Madeline (Incident)	NV34 Stone Corral
	LAS0062 Madeline East	NV35 W. Buffalo Crk.
	LAS0063 Wildhorse	LAS0042 Maiden Flat
	LAS0064 Gilman	LAS0043 Brinn Marr Ranch
	LAS0065 N. Gilman Sat.	LAS0044 E. Grasshopper (Dry Valley)
	LAS0066 Skedaddle Sat.	LAS0046 Shinn Sat.
	LAS0067 Skedaddle Sat.	LAS0047 Pete's Crk. (#1)
	LAS0068 Skedaddle Sat.	LAS0048 Pete's Crk, (#2)
	LAS0070 Coyote Flat	LAS0049 Karlo Mesa
	LAS0072 Chalk Bluff Sat.	LAS0050 W. of Pea Crk.
	LAS0078 Dill butte	LAS0051 W. Skedaddle Sat.
	LAS0081 Ball's Canyon	LAS0052 Demolition Area
	LAS0092 Shaffer Mtn.	LAS0053 Demolition Area
	LAS0093 Spencer Canyon	LAS0055 W. of Bull Flat
	LAS0094 Spencer Canyon	LAS0104 Mad. West /Ostrich
	LAS0095 Spencer Canyon	LAS0111 Madeline WMA

	LAS0096 Spencer Canyon	LAS0113 Filson Road
	LAS0097 Spencer Canyon	LAS0114 Juniper Creek
	LAS0099 Eastside Sat.	LAS0117 Moon Valley Rd.
	LAS0100 Eastside Sat.	WAS0009 E of Telephone Spring
	LAS0102 Telephone Sat.	
	LAS0103 Little Black Mtn. S	
	LAS0106 Horse Lake	
	LAS0107 Shinn Satellite	
	LAS0108 Shinn Ranch	
	LAS0110 Dodge springs	
	LAS0119 Popham (Spencer)	
	LAS0121 Horse Lake West	
	WAS0001 Telephone Springs	
	WAS0005 Skedaddle Sat.	
	WAS0006 Skedaddle Sat.	
	WAS0007 Skedaddle Sat.	
	WAS0008 Telephone Sat.	

Initial management and monitoring responsibilities

The signatories have developed a list of initial management and monitoring responsibilities (Table 14). Different entities have agreed to perform specific conservation actions. Some of these actions are clearly the responsibility of one or more entities, and some of the actions require consideration by the TSC and Northeast California Sage Grouse Working Group (NCSGWG) and Nevada’s Washoe-Modoc Sage Grouse Working Group (WMSGWG). This list represents commitments by those assigned to these actions within the confines of funding by the appropriate legislative authority.

Table 14. Five Year Plan for Management and Monitoring Responsibilities.

These responsibilities will be decided and the table completed no later than June 2004.

II.G. ADAPTIVE MANAGEMENT FRAMEWORK

The Buffalo-Skedaddle PMU Sage-Grouse and Sagebrush Ecosystems Conservation strategy depends upon the successful implementation of an adaptive management framework designed to bring new information immediately into new management direction. A step-down outline of the framework is presented in Figure 3. It briefly describes the key steps in acquisition, transfer, storage, analysis, and assessment of data from monitoring and research. It is important to recognize that agencies that have committed to implement the CS may chose to add further responsibilities or dissect described steps to better articulate intended tasks. Each of the steps presented in Figure 3 are requisite to ensure the success of the CS. It is critical that the signatories provide the resources necessary to ensure successful implementation of the adaptive management framework. Resources to implement the framework will be reconsidered by the TSC, NCSGWG, and WMSGWG for the fourth year and beyond. The TSC will report to the working groups. The TSC will serve to further develop the salient details of the adaptive management framework. It should also be noted that each entity within the PMU area has additional governmental structures and limitations of their authority. The authority granted to each agency limits the actions of that agency. In addition, a number of agencies have governing boards that ultimately set policies and allocate funding. Figure 3 does not show these additional structures.

The adaptive management framework largely describes the movement of information. Several boxes require expanded and explicit descriptions of responsibilities, authorities, and action plans that will need to be customized by each agency and amended both between and within years. Lines of responsibility and authority for each agency with sage-grouse and sagebrush ecosystem conservation obligations will be described and filed for each site and each year with the data manager.

The following descriptions by box number describe the adaptive management framework. The associated gant chart identifies calendar dates for completion of the annual activity cycle (Figure 4).

Figure 3 and its descriptive boxes as well as Figure 4 will be completed no later than July 2004.

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II.H. IMMINENT EXTINCTION CONTINGENCY PLANS

A necessary component of any conservation strategy and/or adaptive management framework is to define the types and degree of actions to be taken when the number of populations and/or size of populations become critically low. This kind of pre-planning for future action is necessary for the following three reasons:

1. There may be insufficient time between the identification of an imperiled population and need to take action;
2. the description of possible actions to be taken to save the species will be known to all stakeholders in advance; and
3. the level of effort and resource commitment is acknowledged by all agencies and stakeholders.

Any and all of these actions described below will be recommended by the TSC and reviewed by the NCSGWG and WMSGWG. The NCSGWG and WMSGWG will operate within the given authorities and procedures of their respective agencies.

The Imminent Extinction Contingency Plan will be completed no later than July 2004

II.I. STEWARDSHIP PROGRAM, PUBLIC EDUCATION, AND OUTREACH

The public education and outreach plans are being developed, and the stewardship program will be completed no later than July 2004.

DRAFT

II.J. MONITORING SCIENCE AND RESEARCH AGENDA

This section will be completed no later than August, 2004.

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CHAPTER III

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IV. Appendices

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Appendix B
Biological Methods Section

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Appendix D
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**VIII. MEMORANDUM OF
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