

**April 23, 2003**

## **Buffalo / Skedaddle Population Management Unit Population Conservation Plan**

### **INTRODUCTION**

The Buffalo / Skedaddle sage grouse Population Management Unit (PMU) includes about 1.6 million acres in north-central Lassen County, California and northern Washoe County, Nevada. About 70% of the area is administered by the Bureau of Land Management (BLM), about 28% is private lands and about 2% is administered by the state of California (State Lands Commission and Department of Fish and Game). The exact acreages and general descriptions are included in the Buffalo / Skedaddle PMU Habitat Risk Assessment Narrative.

### **CONSERVATION ASSESSMENT**

Elevations within the PMU range from about 4,000 to 8,000 feet and yearly precipitation ranges between 6 and 16 inches. Sagebrush is the most abundant habitat and includes about 81% of the area as existing stands or former stands. Most of this is Wyoming big sagebrush but significant areas of low sage, basin big sagebrush, mountain big sagebrush, and Lahontan sagebrush are also included. These habitats are more fully described in the Buffalo / Skedaddle PMU Habitat Risk Assessment Narrative.

This population management risk assessment includes 5 broad topics related to sage grouse conservation biology within this PMU; hunting harvest, population status and trend, predation, bird health and genetics. For each of these, The Western Association of Fish and Wildlife Agency (WAFWA) sage grouse guidelines, risk assessments, conservation actions and monitoring are described below. This narrative expands on a matrix or check list of the same items and should also be read in conjunction with Habitat Risk Assessment Narrative for the same PMU.

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 males counted (peaks) 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.

***FACTOR: Harvest***

**WAFWA Guideline**

Where populations are hunted, harvest rates should be 10% or less than the estimated fall population to minimize negative effects on the subsequent year's breeding population.

**RISK: Over Harvest of the Population. Rated Low.**

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.

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. From the table below it can be seen that males counted, permits issued and estimated harvest have been closely associated.

**Table 1**

Year	Males on Leks (peak) (California)	Permits Issued (California)	Estimated Harvest (California)	Estimated Harvest (Nevada)	Total Estimated Harvest
2002	316	140	nd	nd	nd
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
<b>AVG. (1988-2001)</b>	<b>542</b>	<b>359</b>	<b>298</b>	<b>136</b>	<b>434</b>

nd = no data 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.

**RISK: Over Harvest of Females and Young. Rated Low.**

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. 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.

**RISK: Over Harvest of Marginal and Isolated Populations. No identified risk.**

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.

**RISK: Over Harvest of Genetically Unique Populations. No identified risk.**

Genetic sampling of sage grouse in both California and Nevada has been completed in several years beginning in 1998. These samples show little genetic differentiation between sage grouse in this PMU and contiguous populations in northwestern Nevada, Southern Oregon and adjacent Idaho.

**RISK: No Harvest Data for Population Estimates. Rated Low.**

The primary method of monitoring trends or changes in populations should be annual peak counts of males on each active lek. California has completed these counts each year since 1987. Historic and not recently checked leks should be monitored for presence-absence at least once every 3<sup>rd</sup> year. Active leks should be counted for peak male attendance at least 3 to 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.

**RISK: Crippling Loss. No identified risk.**

A yearly estimate of sage grouse hit but not retrieved by hunters is made from California's returned permits and questionnaires. In addition, 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.

**RISK: Poaching. Rated Low.**

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.

***FACTOR: Population Status and Trend***

**WAFWA Guideline:**

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.

**Risk: Unable to Determine Population Trend. Rated Medium**

**Risk: Unable to Determine Effects of Conservation Measures of Plan. Rated Medium**

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.

***FACTOR: Predation***

**WAFWA Guideline:**

The impacts of predation on survival and production should be assessed for small, isolated and declining populations. Predator management should be implemented only if

the available data (e.g., nest success <25%, annual survival of adult hens <45%) support the action.

**Risk: Nest Losses by Avian Predators that Limit the Population. No identified risk.**  
**Risk: Nest Losses by Mammals that Limit the Population. No identified risk.**

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 2  
 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	%
<b>Unknown</b>	<b>8</b>	<b>67%</b>	<b>28</b>	<b>76%</b>	<b>36</b>	<b>74%</b>
<b>Golden Eagle</b>	<b>3</b>	<b>25%</b>	<b>2</b>	<b>5%</b>	<b>5</b>	<b>10%</b>
<b>Coyote</b>	<b>0</b>	<b>-</b>	<b>2</b>	<b>5%</b>	<b>2</b>	<b>4%</b>
<b>Bobcat</b>	<b>0</b>	<b>-</b>	<b>1</b>	<b>3%</b>	<b>1</b>	<b>2%</b>
<b>Hunting</b>	<b>1</b>	<b>8%</b>	<b>4</b>	<b>11%</b>	<b>5</b>	<b>10%</b>

The WAFWA guidelines (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. Monitoring data for nesting success (Table 3) in the California portion of the PMU and annual female survival rates (Table 4) from the 1998-2000 Lassen radio telemetry project are shown below.

Table 3

Sage grouse nesting success from wing analysis, Lassen Management Areas

Year	Adults		Yearlings		All females	
	N	%	n	%	n	%
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	101/226	45%	41/53	77%	142/279	51%

The average annual nesting success for all females in the California portion of the Buffalo / Skedaddle PMU was 51 % from 1998 through 2002 (Table 3) which exceeds the WAFWA guideline of < 25% .

Table 4

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).

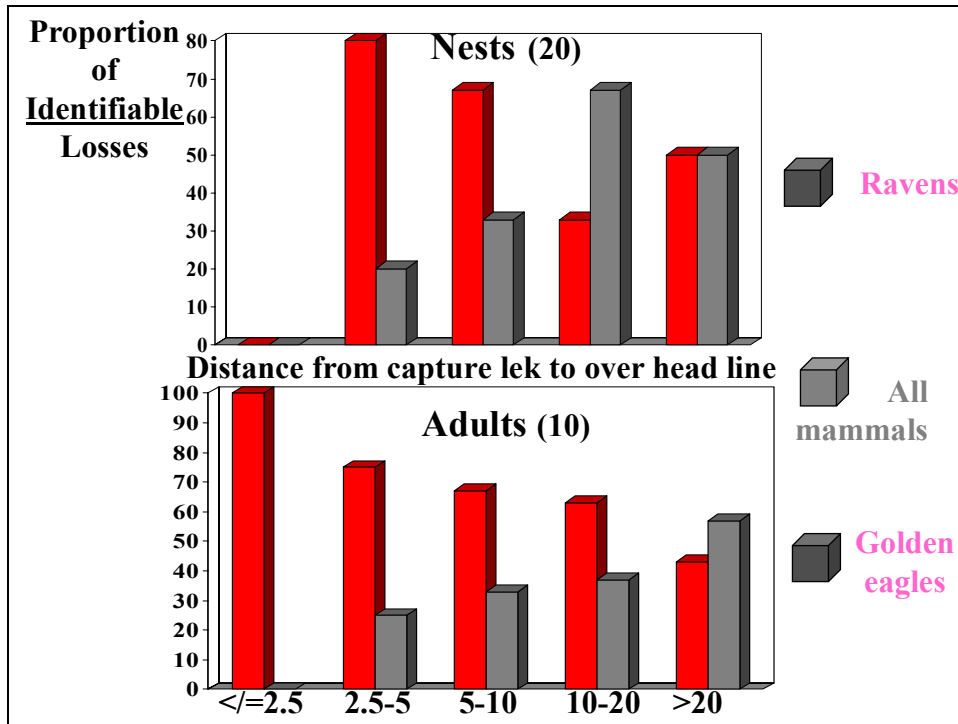


Figure 1

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 losses).

**Risk: Losses of Broods by Avian Predators that Limit the Population. Low.**

**Risk: Losses of Broods by Mammals that Limit the Population. Low.**

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.

**Risk: Population Limiting Losses of Adults by Avian Predators. Low.**

**Risk: Population Limiting Losses of Adults by Mammals. No identified risk.**

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 ( $\leq 5$  km; 3 miles) existing overhead lines and towers (fig.2).

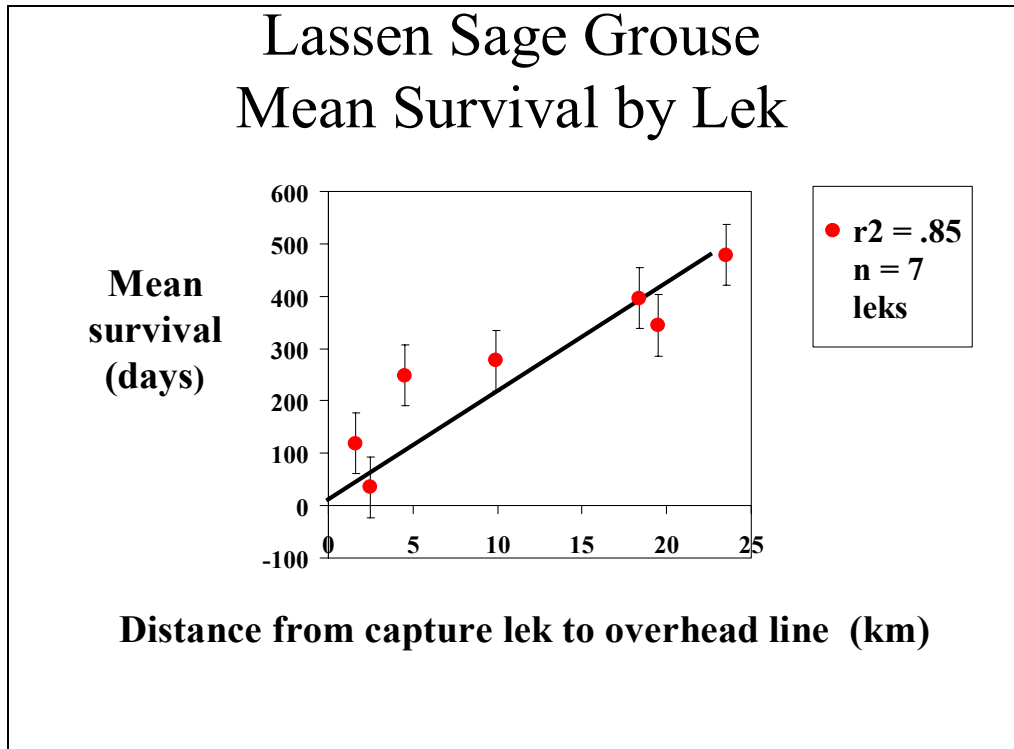


Figure 2

***FACTOR: Bird Health***

**WAFWA Guideline:**

Breeding habitats should be managed to support 15-25% canopy of sagebrush and perennial herbaceous cover should average > 18 cm in height with > 15% canopy cover for grasses and a diversity of forbs.

**Risk: Disease. No identified risk.**

There is no data to show that disease is a problem in the Buffalo / Skedaddle PMU at this time and this issue is not considered a risk.

**Risk: Low production Rates Caused by Poor Nutrition. Rated Medium.**

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

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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.

***FACTOR: Genetics***

**Risk: Unique Population Not Viable. No identified risk.**

**Risk: Unique Population. No identified risk.**

**Risk: Genetic Mixing. No identified risk.**

The population of sage grouse in the Buffalo / Skedaddle PMU is not considered to be at risk from a lack of genetic mixing or from isolation. Exchange of populations between California and Nevada is common in winter. Radio telemetry information shows that sage grouse from multiple leks gather on common winter ranges and brood – rearing sites. However, no exchange between leks was noted in the 1998-2000 telemetry project and all radioed grouse showed 100% fidelity to their original lek of capture between years. One explanation for how genetic mixing can be taking place if lek fidelity is so high is that a 3 year project pales in time when compared to the millennia of opportunity for cross-lek interchange that insures genetic mixing. This long-term, cross-lek interchange requires that contiguous ranges remain so.

The most complete analysis of the genetic composition of sage grouse within the Buffalo / Skedaddle PMU has been DNA samples of hunter collected wings beginning in 1998. At least 20 wings were collected and analyzed from Nevada check stations that year. All California hunter collected wings (> 400) from 1998 through 2002 have been analyzed for DNA composition. The results of these tests show that there is little genetic differentiation across sage grouse populations from western Nevada, northeastern California, southern Oregon and southern Idaho. This indicates that genetic mixing has occurred across this relatively contiguous sage grouse range especially given that the length of time for such mixing has been so long, probably at least throughout the Pleistocene era (> 11,000 to <=500,000 years ago).

### **CONSERVATION STRATEGY**

**Goals:**

**Maintain limited harvest program to allow for recreation use and data collection at levels below population thresholds.**

**Determine reliable population estimates and trends.**

**Complete Wildlife Services project to determine predator impact on sage grouse population.**

**Complete research on Sheldon Wildlife Refuge to determine bird health**

**Objectives:**

**Keep harvest levels below 10 percent of fall population estimate.**

**Collect necessary harvest data for population estimates by 2006.**

**Provide recreational opportunities for sport harvest.**

**Survey and inventory leks to determine 25 trend leks by 2006.**

**Determine predator criteria for application of treatments by 2006.**

**Determine bird health and disease with blood samples by 2006.**

**Conservation Actions:**

- The California Department of Fish and Game and Nevada Division of Wildlife will continue to use season timing, bag limits and permit hunting systems to carefully limit harvest.
- Seasons will continue to be structured to minimize the possibility that harvest could exceed 10% of the estimated fall populations.
- 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 complete one helicopter flight to look for new leks within the Nevada portion of the PMU in 2003.
- 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.
- Both states will continue law enforcement patrols to help insure that illegal harvest remains minimal.
- The number of active leks in the Nevada portion of the PMU will be determined on an annual basis.
- California will continue to issue hunter questionnaires to 100% of the permitted hunters.
- Nevada will continue to sample 10% of its hunters unless adoption of a permit system by Nevada allows for a higher level of hunter sampling.
- California Department of Fish and Game and Nevada Division of Wildlife will develop spring breeding population and fall population estimates for sage grouse in the Buffalo / Skedaddle PMU.
- California Department of Fish and Game and Nevada Division of Wildlife will gather production and recruitment data in the Buffalo / Skedaddle PMU using hunter – harvested wings.

- Nevada Division 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.
- California Department of Fish and Game will continue to count all active leks for peak male attendance within the Buffalo / Skedaddle PMU.
- California Department of Fish and Game and Nevada Division 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.
- Nevada Division of Wildlife will implement counts of all active leks for peak male attendance within the Buffalo / Skedaddle PMU by 2004.
- Any conservation actions to enhance sage grouse populations through predator control will be implemented from the monitoring and adaptive management functions (see below), provided there is an opportunity to realize and measure benefits.
- 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.
- Evaluation of female nesting success (from hunter collected wings) will continue in both California and Nevada portions of the Buffalo / Skedaddle PMU.
- Results of predator control experiments with ravens in northern Washoe County will be monitored to determine if any future benefits for sage grouse may take place.
- 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.
- Extend an analysis of female weights and nest production as part of any future Nevada capture effort.

### **Adaptive Management:**

Monitoring implies that the data collected will be applied to make management decisions. Changes will be proposed as warranted by the data. Appropriate conservation actions will be implemented to respond to the WAFWA guidelines.

Both California and Nevada will continue to closely monitor populations of sage grouse within the Buffalo / Skedaddle PMU.

If significant, repeatable, and cost effective benefits are demonstrated from the NDOW raven control efforts in northern Washoe County those methods may be applied in the Buffalo / Skedaddle PMU. Similarly, if benefits meeting the same criteria are developed from other sage grouse related predator management programs in other states and locations, these may also be implemented in this PMU. Predator control projects to benefit sage grouse in other PMUs in Lassen and Modoc Counties may be more clearly justified than in the Buffalo / Skedaddle PMU.

Information gathered from investigations of disease and nutrition issues from throughout sage grouse range will be applied to the Buffalo / Skedaddle PMU.