

Lesser Prairie-Chicken Population and Habitat Monitoring on the Cimarron and Comanche National Grasslands: 2006 Summary

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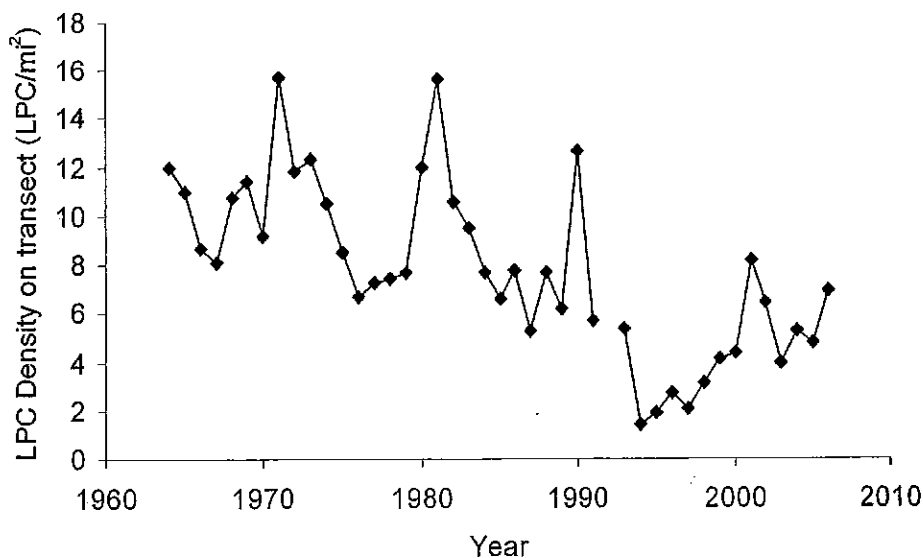
Current Forest Service direction regarding management indicator species (MIS) requires that the Forest Service monitor species such as LPC at the Grassland scale, and determine both population size and trend over time. This report summarizes population and habitat surveys conducted on the Cimarron and Comanche NGs in 2006, as well as other monitoring efforts conducted on the Grasslands in previous years. Monitoring for lesser prairie-chickens (LPC) on the Cimarron and Comanche National Grasslands was conducted collaboratively by FS staff and technicians working for Kansas Department of Wildlife and Parks and the Colorado Division of Wildlife in 2006.

Cimarron NG

1) Long-term LPC trends from KDWP transect count:

Several surveys methods have been used to monitor LPC populations on the Cimarron NG. A single 10-mile transect has been surveyed annually by Kansas Dept. of Wildlife and Parks (KDWP) staff since 1964. Their method involves driving along a designated 10-mile route and stopping at every 1-mile interval to listen for birds on leks. Birds on any leks heard along the route are then flushed and counted. The transect is surveyed twice each spring, and the high-count of birds is used in a state-wide survey to estimate LPC population trend for Kansas.

Figure 1. Long-term trends in LPC counted along KDWP's 10-mile transect on the Cimarron NG.



The number of LPC counted along this transect can fluctuate considerably from year to year, likely in response to inter-annual rainfall variation, but the long-term trend has been a declining number of LPC during the period from 1964 – 1994, following by an increasing number of birds counted during 1994 – 2006. Numbers counted in recent years (2000 – 2006, average of 5.7 birds/square mile) are still lower than numbers counted in the 1960's (1964 – 1970, average of 10.2 birds/square mile) and the 1970's (1971 – 1980, average of 10.0 birds/square mile). However, counts from a single 10-mile transect can not be used to estimate population size for the Cimarron NG because that transect may not be representative of the entire Grassland. In addition, there are large annual fluctuations in the transect count. Whether those annual fluctuations are occurring across the entire Grassland or just within the vicinity of that transect is unclear.

2) *1995 – 2006 LPC population trends from lek surveys:*

During 1995 – 1999, more intensive surveys of the LPC population on the Cimarron NG were conducted by Lawrence and Ruth Smith from Elkhart, KS, under contract with the Cimarron NG. They conducted a complete census of leks each spring from 1995 – 1999 by intensively searching along and listening from all roads on the Grassland south of the Cimarron River (lek census method). This survey was repeated in 2005 and 2006 by FS and KDWP staff.

In 2005 and 2006, lesser prairie-chickens on the Cimarron National Grassland were surveyed by Andy Chappell (Forest Service) and Kraig Schultz (Kansas Department of Wildlife & Parks). In 2006, surveys started on March 27th, concluded on April 21st, and the survey area encompassed all NFS lands south side of the Cimarron River in the sand sage habitat area. All of the known active sites from the previous year were visited three times within the survey dates, following the Kansas Department of Wildlife and Parks Instructions for Prairie-chicken Lek Counts guidelines that included timing and wind restrictions. If the lek site was not active, surveyors listened for >3 minutes to determine if there was another lek in the area. Surveyors also made frequent stops between the known lek sites and listened for new leks along the way.

The lek census method records the number of birds flushed from each lek. Because most birds present on a lek are males, these counts need to be corrected to obtain a total population estimate. Previous studies in SE Colorado estimated that 5% of birds observed during lek counts were females (Giesen 2000), so the number of males on leks was estimated as 95% of the total bird count. Because sex ratios reported for LPC in the literature vary widely, we followed Giesen (2000) in assuming a 1:1 sex ratio in order to estimate the total number of LPC from the lek counts. The lek-census method showed a stable LPC population during 1995 – 2005. This method gives total population estimates for the Cimarron NG varying annually from 173 – 283 lesser prairie-chickens (1.8 – 2.9 birds/mi²) during 1995-2006, with an overall stable population trend. Results for 2006 show a slight increase from 2005.

Table 1. Population estimates of LPC on the Cimarron NG during 1995-1999 based on the lek-census method.

	Birds Flushed	Estimated # of males	Estimated total # LPC	Total Acres Surveyed	Sq mi Surveyed	Total Pop Estimate: Birds per mi ²
1995	142	135	270	61638	96.3	2.80
1996	129	123	245	61638	96.3	2.54
1997	91	86	173	61638	96.3	1.80
1998	138	131	262	61638	96.3	2.72
1999	149	142	283	61638	96.3	2.94
2005	131	124	249	61638	96.3	2.58
2006	139	132	264	61638	96.3	2.74

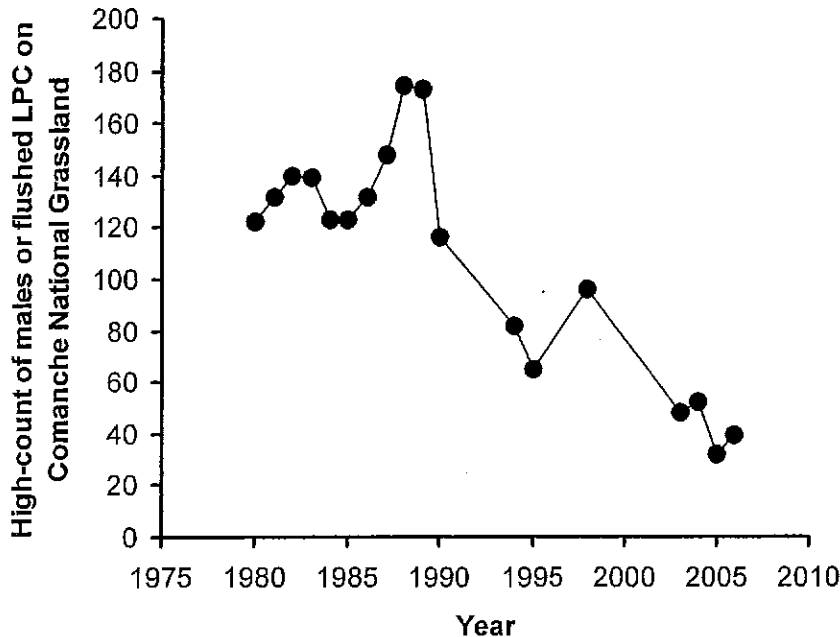
Comanche NG

The lek-census method has been the primary means of monitoring LPC on the Comanche NG since the 1980's (Giesen 2000). From 1980-1990, Colorado Division of Wildlife staff conducted studies on the biology and monitoring methods for LPC on the Comanche. During this time period, the lek counts inventoried all available habitat on the Comanche, with efforts made to obtain a minimum of three replicate counts of each known lek in April/May. Survey efforts were reduced and variable after 1990, but surveys that included most or all of the Comanche NG were conducted in 1994, 1995, 1998, 2003, 2004, and 2005. The surveys conducted in 1998, 2003, 2004, 2005 and 2006 were especially thorough, with all known active and historic leks on the Comanche NG checked a minimum of 3 times in each of those years. The 2004 - 2006 surveys were a collaborative effort involving both USFS and CDOW staff; all known lek sites were checked a minimum of 3 times during the last week of March and the first 3 weeks of April (following the same protocol described above for Cimarron NG). In 2005 and 2006, FS staff also established listening points in areas of potential LPC habitat where known leks were not present. Sufficient listening points were established to ensure that all potential habitat on the Comanche NG was within 1 mile of a listening point or within 1 mile of a surveyed lek location.

In 2006, a total of 49 historic lek locations were surveyed. In addition, surveyors listened for new leks at 28 listening points in areas of potential habitat with low density of historic leks. No new leks were detected from listening points. Lesser prairie-chickens were observed at 11 of the 49 historic leks. However, at 7 of the 11 active leks, only 1 or 2 LPC were observed, while 6-8 males were documented at the remaining 4 active leks. At several of the leks, it was not possible to distinguish between males and females (flush count only), so in these cases the flush count was adjusted by assuming 95% of the birds were males. The total high count estimate of male LPC for the Comanche NG in 2006 was 38. This was a small increase over the 32 males counted in 2005, but was still far lower than the counts of 122 – 174 males during the 1980s. Results of the lek-census method for all 18 years in which survey effort was comparable on the Comanche NG are shown in Figure 2.

Results from lek surveys show a steady downward trend in the LPC population during 1989 - 2006. Assuming a 1:1 sex ratio, the total LPC population estimate was highest in 1988 with 348 birds and the lowest in 2005 with 64 birds.

Figure 2. Total number of male LPCs counted via lek censuses on the Comanche NG during 1980 – 2006.



Habitat Monitoring:

Availability of suitable nesting habitat for lesser prairie-chickens can be monitored using visual obstruction measurements (VOM; Mote et al. 1999), which are typically conducted using a “Robel pole” (Robel et al. 1970). These measurements are useful because nesting habitat availability can vary annually in response to rainfall, grazing management, and fires. The Robel pole method has been used on both Grasslands since the mid-1990s. Two measures of LPC habitat calculated from the Robel pole surveys are (1) mean VOM, and (2) percent of observations that are 12 inches or greater. The latter measurement is especially important because LPC select patches of tall vegetation (with VOM greater than 12 inches) for nesting in sandsage prairie habitats (Elson 2000; Giesen 1994). It should be noted that the Robel pole measurements do not provide a complete representation of LPC habitat needs; other factors such as species composition of the plant community and the spatial distribution of nesting vs. brood-rearing cover are also important to LPC.

The timing of Robel Pole surveys is important for interpreting the results. LPCs initiate nesting in early April, so surveys conducted at this time provide the best representation of nesting habitat conditions. However, for input to management decisions such as livestock grazing, measurement of nesting habitat conditions may be needed prior to the

spring. For example, VOM conducted in late fall or winter after the grazing season are useful in identifying areas where management adjustments during the following spring and summer could improve nesting habitat.

Cimarron NG

Six "complexes" of LPC habitat have been identified on the Cimarron NG. Complexes 1, 2, 3, 4 and 6 run sequentially from west to east in a band of sand sage prairie between highway 56 and the Cimarron River. Complex 5 occurs south of highway 56 and east of Wilburton.

Table 2. Names of allotments that occur in each of the 6 LPC habitat complexes on the Cimarron NG.

Complex	Allotments
1	Stateline, Steer
2	Steer, College, Headquarters
3	East Artesian, West Artesian
4	South Lowe
5	Rolla, Santa Fe, Wilburton
6	Bridge, South Lowe

Robel pole surveys of complexes 2, 4 and 5 have been conducted annually from 1998 until 2006, except in 2002. In addition, all six complexes were surveyed in 1999. Surveys have been conducted in the spring at variable dates ranging from March to June, and in 2006, surveys were conducted during fall (of 2005) through winter and spring of 2006. Surveys conducted in May-June have resulted in higher VOM than surveys in April (see 2004 LPC Population and Habitat Report).

The VOM data show an increase in nesting habitat from 1998 until 2001, followed by a decline in nesting habitat from 2001 to 2003, and then a large increase in nesting habitat between 2003 and 2006 (Table 3). The decline between 2001 and 2003 reflects drought conditions during 2001-2002. In both 2001 and 2006, overall habitat conditions on the Cimarron NG met or exceeded the recommendation of the LPC Interstate Working Group that mean VOM be greater than 4 inches and more than 10% of VOM observations be greater than 12 inches (Table 3). Surveys in 2000, 2004 and 2005 occurred during May - June, primarily after spring greenup, and hence were analyzed separately from the April surveys (see 2004 LPC Habitat and Population Report). VOM surveys for the Cimarron NG indicate good current LPC nesting habitat condition.

Comanche NG

Four “complexes” of LPC habitat occur on the Comanche NG. Complexes 1 and 2 are located east of Campo, CO and are in close proximity to one another, so LPC using these complexes may be considered 1 local population. Habitat complex 3 is located west of Campo, CO and is separated from Complex 2 by a strip of non-habitat approximately 3 miles wide (Campo town, shortgrass prairie, and crop fields). Habitat complex 4 is located along Sand Arroyo, approximately 9 miles north of complexes 1-3, and is a relatively small, isolated area of LPC habitat.

Table 4. Allotments that occur in the 4 habitat complexes on the Comanche NG.

Complex	Allotments
1	Prairie Chicken, Sunrise, Bethel, Mt Carmel, Sunflower, Rattlesnake
2	Las Vacas Blancas, Sandsage, Aubrey Trail, Lowder Knoll
3	Deweese, Ute Canyon, State Line, Gardener, Sandy Plains, Hawks Nest, Lyons Camp, Salisbury
4	Vilas Grade, Arroyo, Sand Hills

Surveys in the spring of 1998 and 1999 were conducted in habitat complexes 1 and 4. These were local, intensive surveys (higher within-allotment sample size compared to later years) but they covered only a few allotments. In 2003, surveys were conducted in at lower intensity in complexes 1 and 4. Because the 2003 survey was conducted in May when greenup had already begun, those results are not shown in the comparison tables below (see 2004 LPC Population and Habitat Report). In 2004, surveys were conducted at 45 transects distributed in all 4 habitat complexes at a density of approximately 1 transect per 640 acres, but these surveys still did not include all allotments with potential habitat (see sample sizes in Table 6). In 2005 and 2006, sample size was increased to 73 transects which were distributed in a stratified-random manner at a density of approximately 1 transect per 640 acres (following recommendations of Mote et al. 1999). In order to complete all transect sampling during the dormant season in 2005 and 2006, sampling began in the fall after cattle left the allotments (after November 15th) and was completed prior to mid-April of the following spring. Thus, “2005” surveys were actually conducted between November of 2004 and April of 2005, and the “2006” surveys were conducted between November of 2005 and April of 2006. Previous surveys had shown that only minor changes in vegetation structure occurred over the course of the winter due to factors such as snowpack, so we did not adjust transects sampled in the fall (see 2004 LPC Population and Habitat Report). While preparing the 2006 report, some additional data from 1999 surveys was identified in the district files, so this data was incorporated into Table 5.

Surveys in 1998, 1999, and 2004-2006 all indicate low availability of nesting habitat on the Comanche NG (Table 5). The one exception was Complex 4 habitat in 2004; the increase in nesting habitat in Complex 4 between 1998 and 2004 reflects the fact that no cattle grazed in the Arroyo allotment in 2002 or 2003. Comparison of 2006 survey results between the two Grasslands shows that vegetation structure is dramatically lower on the Comanche NG (mean VOM of 3.7 and 5.4% of Observations >12 inches) compared to the Cimarron NG (mean VOM of 9.0 inches and 27.3% of Observations >12 inches).

Table 3. Robel pole surveys conducted on the Cimarron NG in 1998, 1999, 2001, 2003 and 2006. Surveys in these years primarily occurred prior to spring greenup (see "period of data collection").

Table 1. Surveys 1998-2003		1998	1999	2001	2003	2006
Period of data collection		5/5/98 - 5/7/98	3/25/99 - 5/6/99	3/29/01 - 4/25/01	4/9/03 - 4/11/03	1/5/06 - 2/5/06
Average VOM – combined (in)		3.6	5.3	4.9	3.4	9.0
Avg. VOM complex 2 (in)		4.2	5.1	5.9	3.9	7.7
Avg. VOM complex 4 (in)		2.7	5.8	2.3	3.4	7.9
Avg. VOM complex 5 (in)		3.6	5.2	6	2.9	11.1
Readings 12" or greater (combined)		3.4%	6.5%	13.5%	6.8%	27.3%
complex 2 (readings 12" or greater)		5.8%	6.5%	16.9%	9.1%	18.4%
complex 4 (readings 12" or greater)		0.8%	8.6%	3.6%	3.6%	19.0%
complex 5 (readings 12" or greater)		3.0%	5.1%	18.0%	6.4%	42.7%

Table 5. Trends in vegetation structure in lesser prairie-chicken habitat on the Comanche National Grassland. Numbers in parentheses represent 1 standard error for each mean value shown.

	1998	1999	2004	2005	2006
Period of Data Collection	4/20/98 - 5/5/98	4/8/99 - 4/21/99	3/31/04 - 4/21/04	11/16/04 - 4/12/05	11/14/05 - 4/12/06
Mean VOM - All Complexes	--	--	3.6 (0.2)	3.2 (1.2)	3.7 (0.2)
Mean VOM - Complex 1	3.4 (0.1)	3.4 (0.2)	3.6 (0.3)	3.6 (0.2)	4.4 (0.3)
Mean VOM - Complex 2	--	--	2.7 (0.2)	3.0 (0.4)	4.1 (0.3)
Mean VOM - Complex 3	--	--	4.0 (0.5)	2.5 (0.2)	2.8 (0.2)
Mean VOM - Complex 4	4.1 (0.2)	4.2 (0.4)	4.4 (0.3)	4.5 (1.2)	3.8 (1.2)
% Readings ≥ 12 in - All	--	--	6.6 (0.9)	4.4 (0.5)	5.4 (0.6)
% Readings ≥ 12 in - Complex 1	2.0 (0.5)	3.3 (0.7)	5.8 (1.2)	5.0 (0.9)	6.4 (1.2)
% Readings ≥ 12 in - Complex 2	--	--	3.6 (0.8)	3.7 (0.8)	6.0 (1.1)
% Readings ≥ 12 in - Complex 3	--	--	7.8 (2.5)	3.3 (2.9)	3.9 (0.8)
% Readings ≥ 12 in - Complex 4	3.7 (0.9)	5.4 (1.9)	12.3 (2.0)	7.7 (2.3)	6.0 (1.7)
% Readings 5-11 in - All	--	--	21.1 (1.3)	19.7 (1.2)	23.8 (1.7)
% Readings 5-11 in - Complex 1	17.5 (1.4)	20.6 (1.6)	22.0 (2.2)	21.3 (1.6)	31.3 (3.3)
% Readings 5-11 in - Complex 2	--	--	14.7 (1.4)	17.8 (4.1)	26.3 (3.7)
% Readings 5-11 in - Complex 3	--	--	25.8 (2.8)	16.2 (1.6)	15.5 (1.6)
% Readings 5-11 in - Complex 4	27.3 (2.7)	27.4 (3.7)	22.0 (2.6)	30.7 (1.8)	23.7 (5.4)
# of Transects - All	54	56	45	73	73
Complex 1	40	42	18	27	27
Complex 2	--	--	11	13	13
Complex 3	--	--	10	27	27
Complex 4	14	14	6	6	6

The survey conducted in 2004 showed that nesting habitat was most limited in Complex 2 (Las Vacas Blancas, Sandsage and Aubrey Allotments), with a mean VOM of only 2.7 inches and only 3.6% of all VOM exceeding 12 inches. In 2004, the grazing system was changed from a deferred rotation to a rest rotation in the Las Vacas Blancas and Sandsage Allotment (i.e. 1 pasture in each of those allotments was ungrazed in a given year). Also, the amount of time cattle spent in the sandsage unit of the Aubrey Allotment (Unit 2) was reduced in 2005. These changes in grazing management are correlated with a significant increase in vegetative structure in Complex 2 during 2004 – 2006 (Table 5 and Figure 3). The increase was observed in mean VOM, percentage of observations >12 inches, and percentage of observations 5-11 inches. The latter measurement increased most dramatically, and is most directly related to grazing pressure and grass cover in the allotment. In contrast, the percentage of observations >12 inches is more strongly affected by the density and recent growth of sand sagebrush, which is less affected by short-term grazing management.

In FY06, there were 13 permanent transects surveyed in Habitat Complex 2; of these, 11 occurred in grazed units and 2 occurred in rested units. To quantify the degree to which grazing affected vegetation structure within Complex 2, we also surveyed 13 additional transects within the Las Vacas Blancas and Sandsage Allotments, of which 11 were randomly-located in rested units and 2 were randomly-located in grazed units. This gave a total of 13 grazed and 13 rested transects sampled in Complex 2 in FY06. Note that the extra transects surveyed for the purposes of the FY06 grazed vs. rested structural comparison (Table 6) were *not* used in the measurements of overall vegetative structure in Complex 2; rather the overall structure measurements shown in Table 4 and Figure 3 were based on the permanent transects sampled every year.

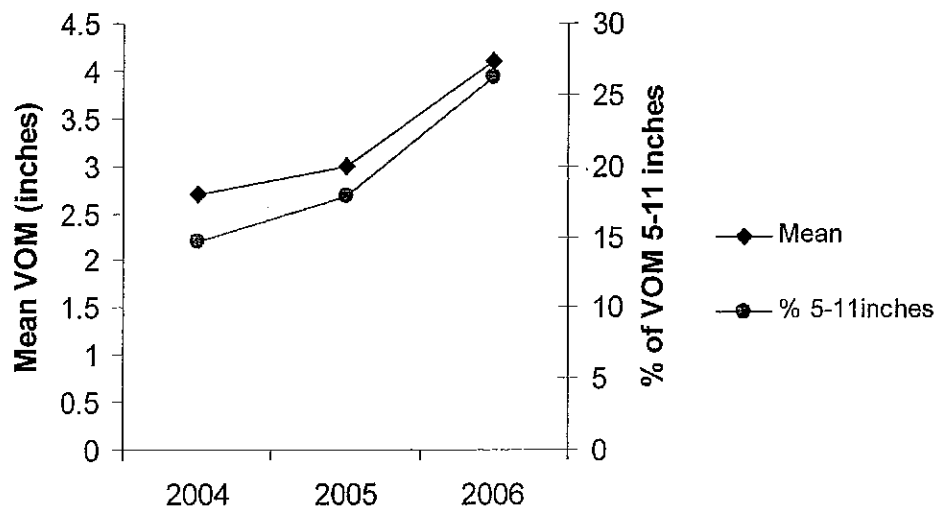
The grazed vs. rested units comparison showed that grazing during the 2005 grazing season reduced mean VOM by 33%, and also significantly affected the percentage of VOM in the 5-11 inch and ≥ 12 inch height classes (Table 6). While these measurements demonstrate that grazing does strongly influence vegetation structure, it should be emphasized again that during the past 2 years, overall vegetation structure has improved in Complex 2 allotments following implementation of the rest-rotation grazing systems.

Table 6. Comparison of vegetation structure in grazed vs. rested pastures in Habitat Complex 2 in 2006. Vegetation structure was statistically significantly greater ($P < 0.05$) in units rested for 1 year in terms of all 3 structural measurements.

	Grazed Units	Rested Units	<i>P</i> for t-test
Mean VOM	3.8	5.6	0.0001
% Observations 5-11 inches	24.2	38.2	0.0076
% Observations ≥ 12 inches	4.8	9.5	0.0040
# Transects	13	13	

Most notably, the improvement in vegetative structure in Complex 2 is also correlated with an increase in LPC numbers in this complex, from only 4 birds counted on leks in 2005 to 14 birds counted on leks in 2006. This increase included 8 LPC counted on a lek in the Sandsage allotment (BA-14) in 2006 that was adjacent to a unit in the Las Vacas Blancas allotment which had been rested from grazing in 2004. Complex 2 was the only area where LPC increased on the Comanche NG between 2005 and 2006. In Complex 3, where vegetation structure has declined steadily for the past 3 years (Table 4), LPC numbers declined to only 2 males in 2006.

Figure 3. Trends in overall vegetation structure in Habitat Complex 2 (Las Vacas Blancas, Sandsage, Aubrey Trail and Lowder Knoll Allotments) during 2004-2006. Both mean vegetation height (left axis) and the proportion of vegetation with VOM readings of 5-11 inches (right axis) have increased significantly over the past 2 years, following adjustments in the grazing systems in these allotments (see text). In contrast, vegetation trend has been stable in Complexes 1 and 4, and has declined significantly in Complex 3 (see Table 4).



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