

# Prairie Chicken Populations of the Sheyenne Delta in North Dakota, 1961-1987<sup>1</sup>

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Abstract.--Prairie chickens (*Tympanuchus cupido pinnatus*) were first censused on the Sheyenne Grasslands in 1961. The population was extremely low in the 1960's, gradually increased in the 1970's, and reached a peak of 410 in 1980. Sufficient evidence exists to link the increase in numbers of prairie chickens on the grasslands from 1961 through 1987 to changes in land management, primarily the introduction of rotational grazing practices and prescribed burning of meadows.

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## INTRODUCTION

The Sheyenne National Grasslands, under administration of the United States Forest Service (USFS), is located in southeastern North Dakota about 30 miles from both Minnesota and South Dakota. There are 70,180 acres under Federal administration but 64,609 acres of private land are also included within the grassland boundary. These public lands were obtained by purchase in the 1930% tier the Bankhead-Jones Forma Tenant Act.

The senior author first became aware of grouse on the Sheyenne Grasslands in september, 1963, at the Prairie Grouse Technical Council meeing in Nevada, Missouri when John Mathison presented a paper entitle "Prairie Grouse Habitat and Plans for Management on the Sheyenne National Grasslands". In 1963, when Mathison gave his report, 9 male prairie chickens had been counted on the Sheyenne Grasslands. The particulars of the paper are

hard to recall, but in John's abstract he states: "Direct wildlife improvements and coordination with other resource management is being considered for wildlife". It sounds like up to this point in time that wildlife considerations were nil. He also stated that "all of the publicly owned land is in prairie which is grazed by livestock under special USFS permit. The native tall grass prairie has been largely replaced by intermediate and introduced species". The improvements that Mathison mentioned that would aid prairie grouse were: fencing to protect woody cover; planting of shrubs; and good grazing practices. Perhaps by the conclusion of this session today we will learn, after 24 years, if these were good recommendations and if they were actually carried out.

## PRAIRIE CHICKEN CENSUS DATA

The first prairie chicken census actually occurred in 1961: 6 booming grounds were located; 2 were censused; and 5 males were counted. Lloyd Oldenburg, biologist for the North Dakota Game and Fish department, filed a report on 13 April 1961 which stated: "on 12 April, 46 miles of transect were covered on which stops were located to effectively census 88 square miles". Oldenburg calculated a prairie chicken density of 0.5 birds per square mile, a low population but with potential for rapid increase, should habitat conditions become suitable. In his memo, Oldenburg noted that all grouse were observed within 1/4 mile of areas excluded from grazing andfaming. He recommended fencing 40 acres per section to benefit all wildlife. It is interesting to note that Richard Flory, Wildlife Staff Assistant, USFS, who aided in the survey that year, recommeded fencing only 10 acres per section for wildlife.

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**Table 1. Prairie chicken census, Sheyenne Grasslands, North Dakota, 1961-70.**

Ground Number	Year of Census							
	1961	1962	1963	1965	1966	1968	1969	1970
1	*	0	*			*	7	
2	*	*	*					
3	*	0						
4	1	1						
5	4	6	9	4	3	0	0	2
6	*	0	*		0	0		1
7		2						
8		*	*					
<b>Total Males</b>	<b>5</b>	<b>9</b>	<b>9</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>7</b>	<b>3</b>

\* Booming ground was heard and plotted but not censused.

No counts were made in 1964 or 1967.

Census attempts were made in 1962, 63, 65, 66, 68, and 1969. During this period the highest counts were in 1962 and 1963 when 9 males were seen each year; none were seen in 1968 (Table 1). In 1970, 5 personnel helped

conduct surveys on all or parts of 3 different mornings. Despite ideal conditions on 2 of the mornings, only 2 male prairie chickens were recorded; however, 1970 must have been a good production year because 1971 was the turning

**Table 2. Prairie chicken census, Sheyenne Grasslands, North Dakota, 1971-80.**

	Year of Census									
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
<b>Grounds Visited</b>	6	15	20	17	25	29	33	31	48	49
<b>Active Grounds Counted</b>	5	12	14	14	23	20	24	22	36	39
<b>Total Males</b>	20	68	89	78	139	139	188	195	338	410
<b>Males/Active Ground</b>	4.0	5.7	6.4	5.6	6.0	7.0	7.8	8.9	9.4	10.8

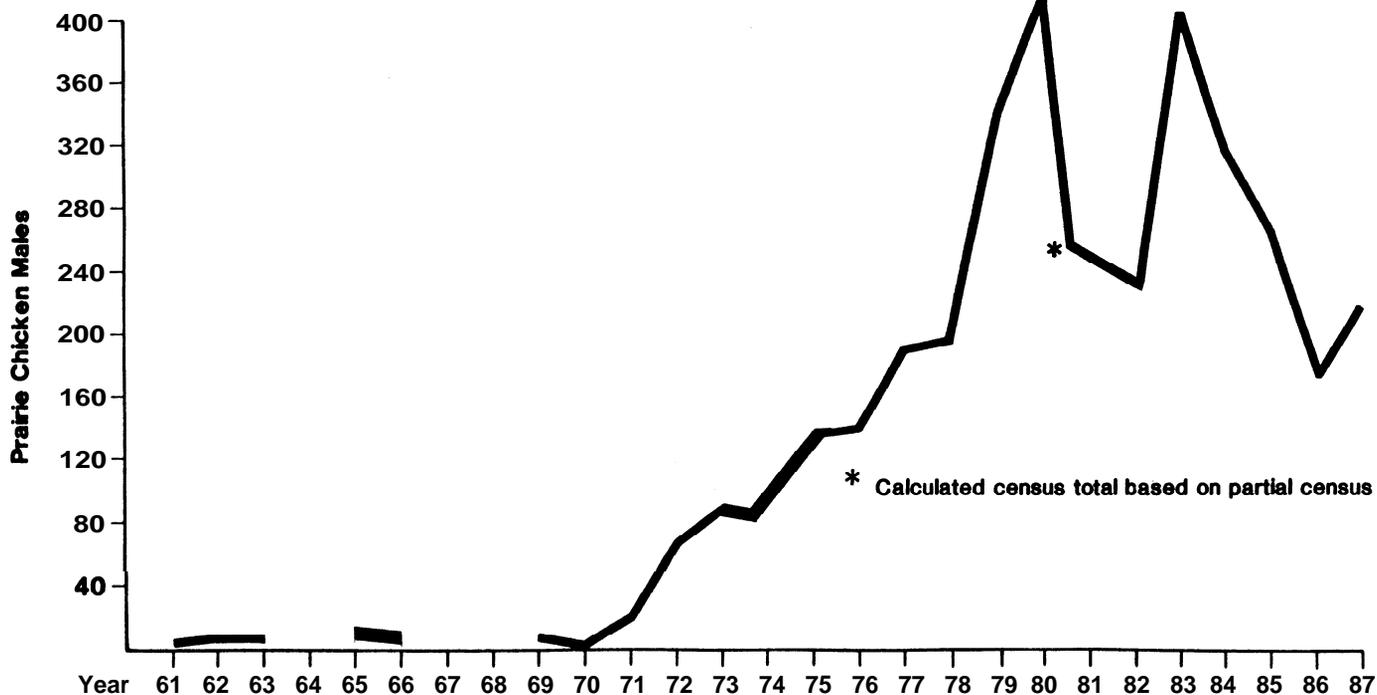
**Table 3. Prairie chicken census, Sheyenne Grasslands, North Dakota, 1981-87.**

	Year of Census						
	1981	1982	1983	1984	1985	1986	1987
<b>Grounds Visited</b>	29	37	40	28	43	22	39
<b>Active Grounds Counted</b>	17	28	34	26	27	22	24
<b>Total Males</b>	137	223	396	313	262	173	220
<b>Males/Active Ground</b>	8.1	8.0	11.6	12.0	9.7	7.9	9.2

point in the spring male counts (Table 2). Three personnel worked the area in 1971, located 5 active grounds and 20 males. In 1972, 6 biologists counted 68 males on 12 grounds. The prairie chicken population continued to increase, reaching a peak in 1980 when 410 males were counted on 39 booming grounds.

The census effort has remained fairly constant since 1979 except for 1981. The prairie chicken population (males) has fluctuated between 410 and 173 (excluding 1981) (Table 3).

It is difficult to assess the true population numbers over the long term due to



**Figure 1. Male prairie chickens counted, Sheyenne Grasslands, North Dakota, 1961-1987.**

incomplete census work, particularly during the early years. However, there is no doubt the population increased from 1961 through 1987 (Fig. 1). A significant positive relationship exists between males counted per year and year of census (Fig. 2).

At this point in time, it would do little good to dwell on the accuracy of population figures for the early years, it is sufficient to know that the population was very low. But, with better census effort and data from 1979 through 1987 (Fig. 3), the population trend has been downward, but not significantly so (Fig. 4). We do not think the downward population trend is cause for immediate alarm, but it is of concern. The population, compared to earlier census years, is still in good shape.

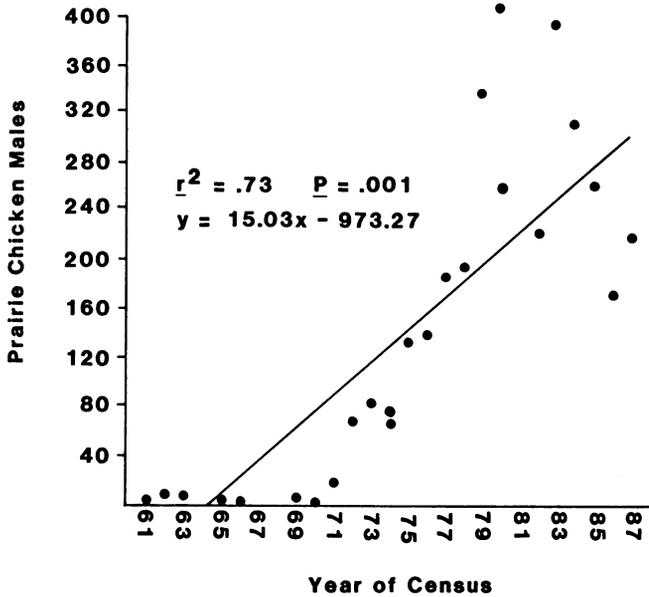


Figure 2. Linear relationship between total prairie chicken males counted and year of census, Sheyenne Grasslands in North Dakota, 1961-1987.

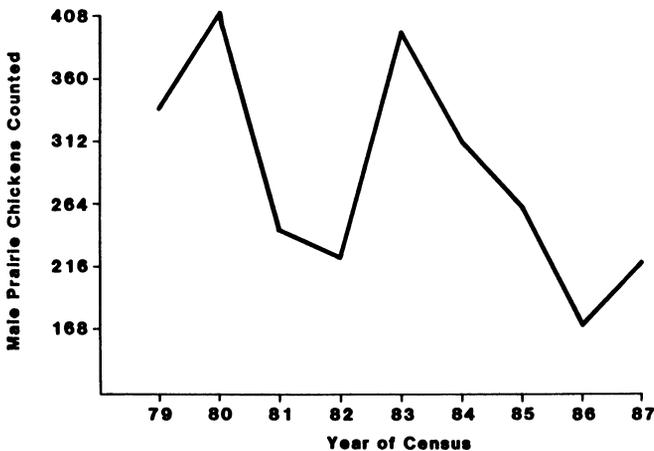


Figure 3. Male prairie chickens counted on the Sheyenne Grasslands, North Dakota, 1979-1987.

With this prairie chicken population, and with the interest shown in the area, as demonstrated by this symposium today, this trend can be reversed. The prairie chicken population in the Sheyenne grasslands is the only viable one left in North Dakota and the species is listed as threatened on the state list.

Manske and Barker (1981) estimated that approximately 100 square miles of potential prairie chicken habitat occurs in the Sheyenne National Grasslands. Densities of prairie chicken males in this area have ranged from 0.2 per square mile in 1961 to 6.2 per square mile in 1980 for potential habitat. We and many other biologists believe that the peak number of males (410) that was counted in 1980, was not the potential peak population that could be attained on the Sheyenne grasslands area. Westemier (1983) has stated that 100 prairie chicken males per square mile of nesting cover are realistic goals in Illinois. In North Dakota, sharp-tailed grouse (Kobriger and Oldenburg 1965) densities have reached about 18 males per square mile of total habitat. Thus, we believe a realistic goal for the Sheyenne Delta grasslands area would be 16 male prairie chickens per square mile of potential cover or double the estimated 8.2 males per square mile of occupied habitat in 1980.

#### LAND MANAGEMENT-PRAIRIE CHICKEN RELATIONSHIPS

A very apparent relationship existed between the number of male prairie chickens and the predominant type of land management being practiced on the Sheyenne Delta grassland area. The increase in the prairie chicken population between 1961 and 1987 is almost entirely attributable to changes in land management, primarily grazing practices (Fig. 5), because during the same period it was illegal to hunt prairie chickens and systematic predator control measures were not in practice. Thus, very little, if any, of the expansion in prairie chicken numbers was due to curtailment

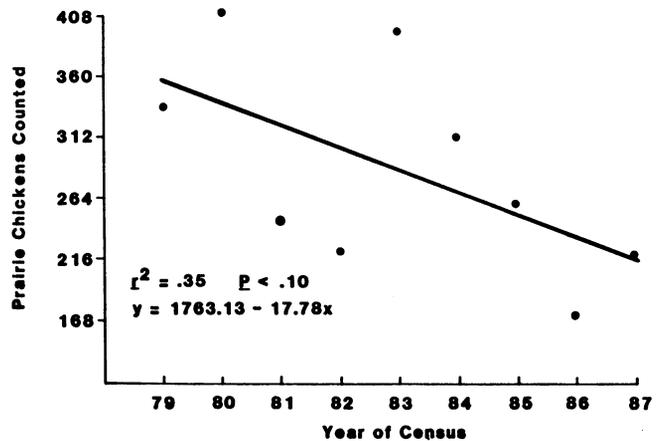


Figure 4. Linear relationship between total male prairie chickens counted and year of census, Sheyenne Grasslands, North Dakota, 1979-1987.

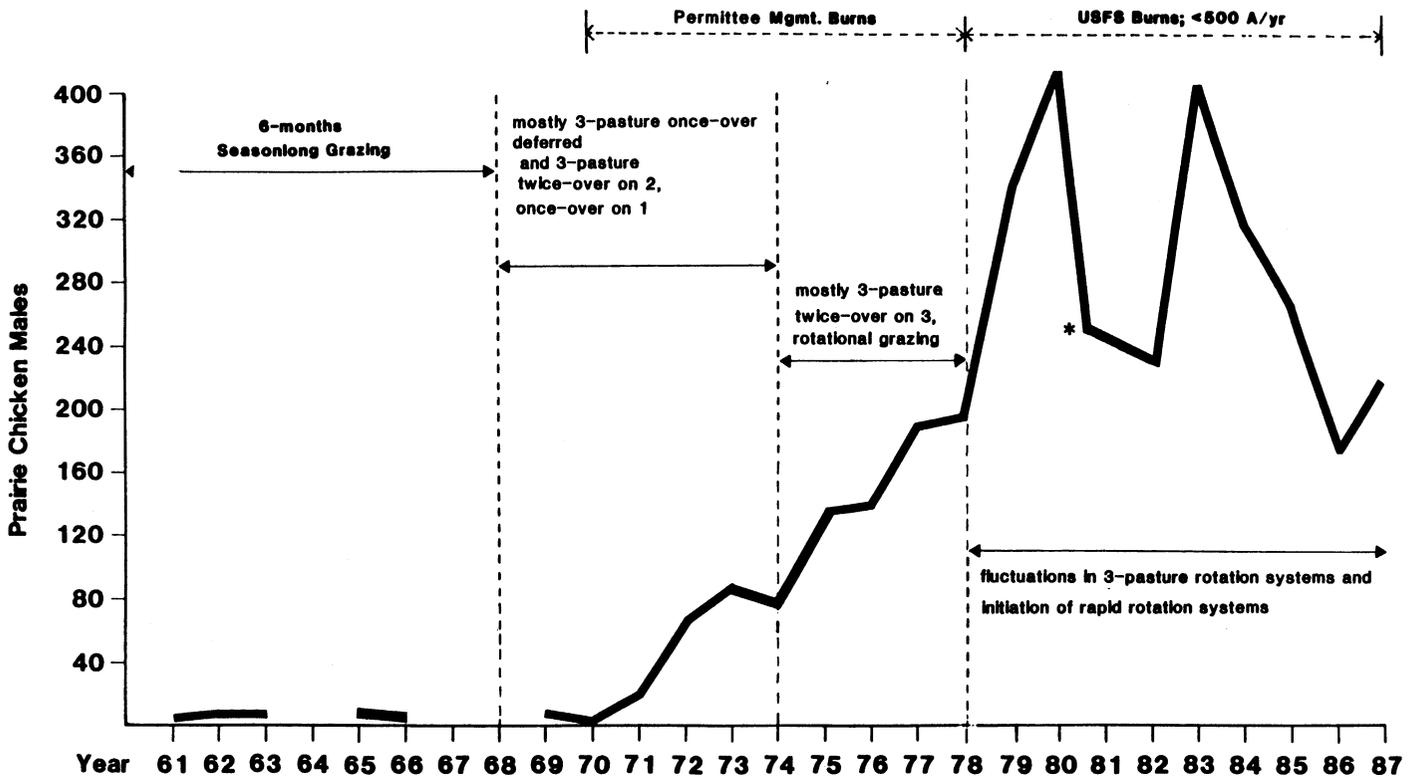


Figure 5. Land management relationships to prairie chicken males counted in spring during 1961-1987, Sheyenne grasslands, ND.

\* 1981 count was estimated on the basis of partial survey  
No burns in 1975 or 1980

of harvest or the elimination or control of predators by professional predator control agents. During 1961-1987, the amount of winter food supply in terms of corn and sunflower seeds increased but we have no direct evidence to indicate whether or not food was a limiting factor. However, the N.D. Crop and Livestock Reporting Service records for Ransom and Richland Counties indicate significant increases in sunflower and corn acreages from 1969 through 1986 and these acreages appeared to correlate with grouse numbers.

#### Seasonlong Grazing

The 56 allotments on the Sheyenne grasslands were managed with a "seasonlong grazing treatment" for 8 months duration during 1940-1954 and 6 months duration from 1955-1967. In 1967, cross-fencing was established on some allotments. When the Sheyenne grasslands were managed with seasonlong grazing, the prairie chicken population was apparently kept at the threshold of extinction ( $\leq 10$  males in total per year) (Fig.5).

#### 3-Pasture Once-Over Deferred Rotation

Starting in 1968, some type of rotational herd management was initiated on several

allotments and by 1974 approximately 63% of the allotments or 84% of the total land area was being managed with rotational grazing, primarily a "3-pasture once-over deferred rotation system". With this system, one herd was rotated once among the 3 pastures after approximately 45-60 days of grazing per pasture. Essentially, 2 of the 3 pastures were overgrazed with this system of herd rotation but 1 pasture retained some residual cover for the next spring.

The first noticeable increase of prairie chickens in early spring occurred in 1971 or during the 1968-1974 period (Fig. 5). The delay in prairie chicken response following the substantial reduction in seasonlong grazing in 1967 may have been due to the residual effect of seasonlong grazing on the habitat causing a delay in plant community response during 1968 and possibly even into 1969. Furthermore, the winter of 1968-1969 was one of extremely heavy snow cover and it may have affected food availability and subsequently the post-winter reproductive condition of female grouse. Thus, we believe there is good justifiable cause to imply that grouse production may have been delayed until the 1970 nesting season and these birds were subsequently censused in spring 1971.

However, the increase of prairie chickens during 1968-1974 cannot be singly attributable to the change in grazing practices, because in 1970 prescribed burning was also introduced as a grassland management practice on the same area (Fig. 5). The objective of the prescribed burning was mainly to reduce willows (Salix spp.) in the meadows and to induce better grazing utilization of the meadows (Barker 1983).

### 3-Pasture Twice-Over Rotation Systems

There are two types of 3-pasture twice over systems: 3-pasture twice over on 2-pastures, once on 1-pasture; and 3-pasture twice over on 3 pastures.

Between approximately 1971-1974, and again during 1979-1985, the primary grazing system was a "3-pasture twice-over on 2-pastures, once-over on 1-pasture deferred rotation system". This system increased the herd rotation on two of the pastures from a previous history of once-over to twice-over. Between 1971-1974 this system was used on about 28% of the area and between 1978 and 1979 it went from 5% to 36% and averaged about 41% of the area between 1979-1984.

Starting in approximately 1974, some of the grazing allotments were managed with a "3-pasture twice-over on 3 pastures". This system increased the herd rotation to every 28 days instead of the 45-60 days in the 3-pasture once-over rotation system. In this system, the herds are rotated twice over on 3-pastures. This system was increased in use on the grasslands from 1974 until 1978 when 54% of the area was managed with it.

Simultaneously in the same period, permittee burning and mowing of meadows had increased in practice, and as many as 5,000 acres were spring burned annually between 1 April and 20 May, except in 1975. There was no burning in 1975 because of a record high rain fall. With the implementation of the 3-pasture twice-over rotation systems in combination with meadow burning, the prairie chicken population continued to increase (Fig. 5).

### Land Management Changes 1979-1987

Some significant changes in grazing systems practices and prescribed burning occurred between 1979 and 1987. In 1979 prescribed burning by permittees was curtailed and 3-pasture twice-over on 3-pastures rotational grazing was reduced from 40% to 10% of the area and this was replaced primarily by an increase in 3-pasture twice-over on 2-pastures, once-over on one-pasture, deferred rotational systems and smaller total acreages ( $\leq$  500 acres) being managed with prescribed burns by USFS.

About 1982, a type of "short-duration

rotational system" was implemented on one all- and by 1986 this system of grazing practice was being used on 4 allotments. With this system, cattle are moved every 12 days among 3 pastures. The grazing period varies from as few as 7 days to a maximum of 15 days. In some other allotments, a few seasonlong pastures were converted to either a 2-pasture twice-over rotation or to a 3-pasture twice-over deferred rotational system.

In addition to individual pasture capacities, two aspects of plant physiology are utilized in selection of a grazing duration. One is that the plant should not be stressed a second time after being grazed while it is trying to regrow. The second aspect is that the plant should be afforded ample time to regrow. On the Shyenenne National Grassland, the optimal time frames for these two aspects are thought to be 7-14 days of grazing followed with at least 25-30 days rest between grazing periods.

Along with erratic changes in land management practices from 1979-1987, there were also erratic fluctuations in the number of prairie chickens (Fig. 5). The prairie chicken population on the grasslands continued to increase until a peak of 410 displaying males in 1980 even though large management burns and the area being managed with 3-pasture twice-over rotational grazing systems were greatly reduced in 1979. Very probably, the continuance in prairie chicken population increases during 1979 and 1980 were still in response to the residual positive vegetation response from the former management practices. A large population decline in 1981 (39%) corresponds with the large change in grazing from the 3-pasture twice-over on 3-pasture rotation system (40% to 10%) to the 3-pasture twice-over on 2-pastures, once-over on 1-pasture deferred rotation system (5% to 36%) and little change in the seasonlong grazing. After 1980, the erratic fluctuations in the prairie chicken population are unexplainable. The population fluctuations may have been natural, they may have been due to periodic changes in grazing management systems or to winter food availability, e.g. greater acreages on sunflowers and corn, or a combination of these. We would also like to point out that these changes occurred with minimal burning of meadows after 1978.

### SUMMARY AND MANAGEMENT IMPLEMENTATION

The prairie chicken population on the Shyenenne grasslands was near extinction in the early 1960's at the same time seasonlong grazing was practiced on the whole area. The population dramatically increased in size following changes in grazing practices and the addition of prescribed burning of meadows. Since the burning of large acreages of meadows by permittees was curtailed and several changes

in grazing system, including the addition of short duration rapid-rotation in some allotments during 1982-1987, the relationship between land management practices and the numbers of male prairie chickens during spring counts is confounded and largely unexplainable when the grasslands are evaluated in total. By the very fact that all males on several "booming grounds" disappeared during 1981-1987 instead of a reduction of a few grouse from all or most of the booming grounds suggests that the contributing effect may be on an allotment basis rather than an overall natural cause affecting the entire population or grasslands area.

This prairie chicken population is the only remaining viable population in North Dakota. Because of the importance of this population, we offer the following recommendations:

- 1) Censuses should be made of displaying prairie chicken and sharp-tailed grouse (*Tympanuchus phasianellus*) males and all booming and dancing grounds should be mapped accurately within allotments on an annual basis.
- 2) Annual records should be accurately maintained on the amount, season, type, and intensity of land management practices and the kind and age structure of animals within grazing herds.
- 3) Prescribed burnign practices of meadows should be brought back, at least to the amounts that were being done in the mid-1970's including permittee burning efforts (approx. 5,000 acres per year).
- 4) We propose that strong consideration be given to an evaluation of the effects and differences between 3-pasture, twice-over on 2-pastures and once-over on 1-pasture rotational systems and 3-pasture, twice-

over on all 3-pastures deferred systems on greater prairie chicken populations and habitats.

- 5) We recommend further evaluation of the prairie chicken population in relation to land management practices, including past **records as well as in the future**, particularly on an allotment and pasture basis. Annual records should also be kept on acreages of corn, sunflowers and other potential winter food crops in and adjacent to the Sheyenne grasslands.
- 6) Andlastly, we recommend a deferment of implementation of "short duration" grazing systems on additional areas or allotments until proper evluation has been made of their effects on native prairie vegetation and wildlife.

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