

UNITED STATES
DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE
Grand Canyon National Park
Grand Canyon, Arizona

December 27, 1954

Memorandum

To: Superintendent, Grand Canyon National Park,
through the Chief Ranger

From: Biologist Robert Benét

Subject: Wildlife Study Progress Report, North Rim.

INTRODUCTION:

The purpose of this paper is to report on the progress at the termination of approximately one year's study of the North Rim deer herd and their effects on the vegetation of the area.

Most of the deer range has been covered in an attempt to determine the amount of browse utilization and the general condition and trend of the range. Many areas show evidence of serious overutilization of browse plants.. It is not uncommon to find cliffrose, sagebrush, and other browse plants which are dead throughout an entire area.

Evidence of the severe utilization, past and present, is recorded in the extreme highline on the aspen and cliffrose plants throughout the North Rim areas of the park.

RANGE EVALUATION OF THE NORTH RIM:

It is also disturbing to observe the increasing utilization and appearance of highlining of the Locust (*Robinia neomexicana*). Without exception, all areas appear to be down considerably in plant vigor. Recent dry springs and early summers have not improved this situation and relief for the forage plants is necessary in order to safeguard what little remains of the important browse plants. The forage production at the present time appears to be insufficient to meet the potential demand of the present deer herd residing on the North Rim. The increased replacement of sagebrush and cliffrose by grasses is already obvious in many areas.

FINDINGS:

The browse utilization on the North Rim areas was quite variable. The Cape Royal points are visibly in the worst shape, with an approximate annual growth of only 1.3 inches on the cliffrose plants. To add to the problem, 80.4 percent of last year's remaining growth, plus all of this year's, was completely utilized during the spring and summer months. Point Sublime sustained a cliffrose utilization of 69.2 percent, with an estimated growth this year of 1.7 inches, all of which was consumed.

Cape Final sustained a cliffrose utilization of 42.3 percent. However, the plants did not produce the annual growth found on other transects. A total of .8 inches of annual growth was produced.

Myo Point was above average in cliffrose production with 2.5 inches of annual growth, and sustained a utilization of 52.5 percent.

All annual growth data is not as accurate as desired. On the majority of the transects, annual growth was obtained from the upper story of the cliffrose plant, or that region of the plant which was not available to browsing deer. The variance of production of this area of the plant compared with other sections is not known. It would have been desirable to set up wire deer exclosures of a pyramid type for individual plants. A wire exclosure would give us a more complete annual growth figure and allow us to make an attempt to determine what may be killing these browse plants.

Figure 2 illustrates in graphic form the percentage of utilization on cliffrose plants of the previous year's growth, plus this year's additional growth, providing this year's growth was possible prior to utilization.

Deer occupy the cliffrose ranges prior to and during the growing season. Therefore, the tender shoots are consumed as quickly as the growing season begins. In years when there is a good cliffrose growth, very little actual benefit can be derived for the browse plant in this increased forage because of this early utilization and the rapid growth, pushing increased portions of the browse plant beyond the reach of the deer; and producing the over-storied effect which we have on our cliffrose forage.

FIGURE I. AGE CLASSES OF BROWSE SPECIES FROM TRANSECTS ON THE NORTH RIM

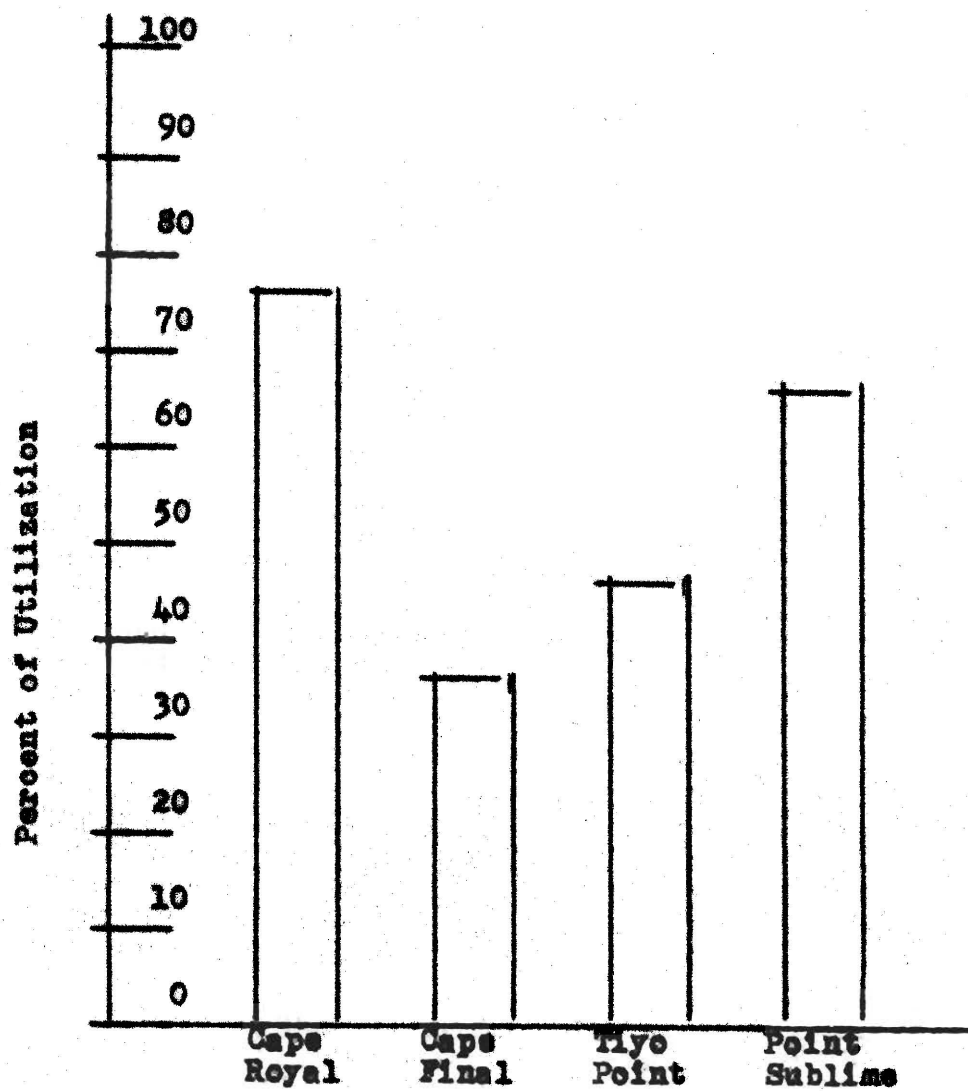
No. of Plants of Each Age Class							No. Plants
Species	Young	Mature	Decadent	Young Dec.	Mat. Dec.		
Cliffrose	13	8	32	5	12		
Sagebrush	12	20	6		8		
Total number of plants							116

FIGURE FORM CLASS OF CLIFFROSE ON NORTH RIM TRANSECTS - FALL, 1954

No. of Plants in Each Form Class										
Location	1	2	3	4	5	6	7	8	9	10
Cape Royal	3		8					6	2	3
Cape Final			6		1			4		1
Aerial Pt.			3					1		3
Tiye Pt.		4					3			1
Pt. Sublime	1		3		2			5	3	1

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- | | |
|-------------------------------------|--|
| 1. All available, not hedged | 6. Partly available, lightly hedged |
| 2. All available, lightly hedged | 7. Partly available, moderately hedged |
| 3. All available, moderately hedged | 8. Partly available, heavily hedged |
| 4. All available, heavily hedged | 9. Unavailable, all over 5' high |
| 5. Partly available, not hedged | 10. Dead |

**FIGURE 2 -- Average Utilization of Cliffrose Plants
on North Rim Range Transects, 1954.**



It is disturbing when we consider the nutrient value variations in the various size twigs which was found on all transects. A noticeably heavier usage of the slender and smaller twigs occurred on all transects. Thus, it appears a definite selection was made of those twigs presumably having greater concentration of desired nutrients. Deim also found this to be true of the west winter range on the North Kaibab. The above seems logical, since the worthless pith and epidermis occupy a greater mass in the larger twigs than in the fine slender twigs. Indications therefore are, that the cortex and phloem possess those facilities for storage or passage of the desired nutritive substances.

The percentages of utilization can be deceiving if the above factors are not considered.

On all transects, cliffrose plants were chosen as the representative index to the utilization of forage on the deer range. Two cliffrose plants at each transect were tagged when possible. Each plant was tagged on three different branches with a yellow colored deer seal. When possible, the three branches were located at different elevations and on opposing sides of the plant. All tagged branches were within reach of browsing deer.

From this method, cliffrose utilization data were gathered from sixteen tagged plants involving forty-eight marked twigs.

Age and form class data were obtained from all cliffrose and sagebrush plants within the lines of the range transects, and at additional transects established to obtain form and age class data.

From the age and form class data already obtained, it will be important to watch carefully for future increases or decreases of dead sagebrush and cliffrose plants.

From our form class data we can readily see the percentage of cliffrose plants which we have that are completely unavailable to browsing deer, accompanied by the almost complete lack of young plants and reproduction. On Tiye Point only, is there any indication of cliffrose reproduction occurring.

As in the Spring, the largest percentage of plants are in class four, "All available, heavily hedged". Variations in form class may be rapid when proceeding from light to heavy, but progress slow on recovering or going from indications of heavy use to signs of light use.

The sample size has been increased for age and form classification data and warrants the repetition of Figure 2 as an evaluation technique of the range. The four classes that normally constitute the stages in the life of a perennial plant are: seedlings, young, mature, and decadent. In addition, two arbitrary classifications have also been added, those of young-decadent, and mature-decadent. These two categories are used to denote plants that are young or mature, but exhibit a downward trend, as indicated by the varying amounts of deadwood and dead or dying leaves. These categories tend to indicate that adverse environmental factors, as well as degree of use, have affected the plant.

Since no seedlings have been found actually on the transects, this category was omitted from the table.

The important story as indicated by the age classes is that of the future of existing plants and the possibilities for new plants to take over in the future. The great percentage of plants in the decadent classes and the absence of seedlings indicate that a severely overbrowsed range exists in many areas of the park at the present time.

Importance should be placed on the large percentage of cliffrose plants in the decadent class, as these plants probably will not survive very long, besides furnishing progressively less forage as time goes on. The great percentage of plants in the decadent classes and the absence of seedlings is disturbing.

(SIGNED)

Robert Bendt
Biologist

Copy to: Regional Director, Region Three, in triplicate

APPROVED FOR DISTRIBUTION:

(SIGNED)

P. P. Patraw, Superintendent

Table I -- PLANT SPECIES FOUND ON NORTH RIM TRANSECTS

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>
Juregrass	<i>Koeleria cristata</i>
Blue grama	<i>Bouteloua gracilis</i>
Spike Muhly	<i>Muhlenbergia whrightii</i>
Cacti	<i>Opuntia</i> spp.
Yucca	<i>Yucca baccata</i>
Snakeweed	<i>Gutierrezia sarothrae</i>
Spurge	<i>Euphorbia</i> spp.
Buckwheat	<i>Eriogonum arcuatum</i>
Mormon-tea	<i>Ephedra</i> spp.
Centuryplant	<i>Agave utahensis</i>
Fernbush	<i>Chamaebatiaria millefolium</i>
Larkspur	<i>Delphinium</i> spp.
Locust	<i>Robinia neomexicana</i>
Buckbrush	<i>Ceanothus greggi</i>
Cliffrose	<i>Cowania mexicana</i>
Sagebrush	<i>Artemesia tridentata</i>
Pinyon pine	<i>Pinus edulis</i>
Ponderosa pine	<i>Pinus ponderosa</i>
Juniper	<i>Juniperus</i> spp.
Gambel oak	<i>Quercus gambelii</i>

TABLE II - COMPOSITION OF NORTH RIM GROUND COVER - 1954

CLASS OF COVER	PERCENT OF GROUND COVER		
	Cape Final	Cape Royal	Tiyo Point
Bareground (incl. rx)	36.7	41.7	31.6
Litter	9.3	4.0	10.6
Cliffrose	18.6	3.4	22.0
Sagebrush	15.3	10.8	11.3
Yucca	0.6	0.2	0.6
Cacti	4.7	5.0	0.3
Ponderosa Pine	-	0.7	3.0
Juniper	0.4	-	-
Pinyon pine	-	-	5.0
Gambel Oak	0.2	-	1.0
Annual grasses	-	-	-
Perennial grasses	2.5	10.3	3.2
Misc. Forks and Shrubs	8.0	3.2	8.3
Dead Sagebrush	1.2	9.0	0.9
Dead Cliffrose	2.5	11.7	1.2

(Obtained from established North Rim Transects)