RANGE MANAGEMENT PLAN

FOR

DISTRICT 6 - HOPI RESERVATION - ARIZONA

By

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Approved November 8 1945

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Approved Dec 1. 1945

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Approved MAR 25 1946 19

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OFFICE OF INDIAN
JAN 24 1948

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INTRODUCTION

The Forestry and Grazing Division of the Indian Service has a major responsibility for management and conservation of Indian forests and range lands. Prior to 1930, the primary function of this branch was management of the forests, but subsequently thereafter, it was enlarged to include grazing and was officially designated as the Division of Forestry and Grazing. From that time forward, this Division with its staff of field technicians has made range surveys and developed management plans for the orderly use of Indian ranges.

In the year 1930, the total area of range land in Indian reservations of the Southwest was 22,399,267 acres. The Moqui (Hopi) Reserve or so-called "Executive Order Reservation" comprised 2,472,320 acres or approximately 11 per cent of the area. Concurrent with range surveys on other reservations the carrying capacity of the Hopi Reservation was established and recognized as the controlling factor in management until a resurvey was made of both the Hopi and Navajo Reservations in 1935-36, by the Soil Conservation Service. Data assembled and plans developed as a result of the Soil Conservation Service survey resulted in the setting up of Land Management Districts. These units usually covered particular watersheds or use areas.

Range management plans developed for the entire Navajo-Hopi area were followed for a number of years, but their application became complicated because of tribal differences. To accomplish range conservation on Hopi, an agreement was finally made to set aside an area to be used mainly by Hopis and Tewas. However, any Navajo who could prove indisputable range rights within the established area was to be accepted. This area was called District 6 of the Hopi Reservation.

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The Range Management Plan which follows is for District 6 of the Hopi Reservation. It embodies much data and practices previously recommended but which, for one reason or another, were not carried out. This Plan is written in plain language and is believed to be practical. Wherever possible, procedures to be followed are emphatically stated so there can be no mistake as to what is meant.

This Plan represents the consensus of opinions of the Superintendent and all the land-use personnel of the Hopi Agency.

Incorporation of land-use data and procedures is not the customary way followed by the Forestry and Grazing Division, but it is felt by the Superintendent and the land-use personnel that all these functions are so inter-related that it is advisable to incorporate many of these functions under one cover. When this Plan is followed, it will assist the Indians to achieve range conservation and good land-use vital to the welfare of the tribe.

* * *

ACKNOWLEDGMENTS

Apreciation is especially expressed to Mr. Burton A. Ladd, Superintendent of Hopi Agency and to Hugh Harvey, Range Examiner, of the Regional Forestry and Grazing Office, whose many ideas and constructive criticisms were extremely valuable in the formulation of this Plan. Appreciation is also expressed to the Land Use personnel at Hopi Agency and to the staff of the Regional Forestry and Grazing Office for their ideas, some of which were incorporated in this Plan.

E. Vance Day

July 4, 1945

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TABLE OF CONTENTS

	PAGE
Description of Area	1
Topography and Drainage	1
Climate	3
Soils	5
Vegetation	7
General Condition of the Range	7
Water	8
Other Physical Range Improvements	9
Poison Plants	10
Rodents	10
Predators	11
Wildlife	11
The Range Livestock Industry and Land Use	11
RANGE MANAGEMENT PAST AND PRESENT	13
Brief History of Grazing	13
Methods of Handling Stock, Present and Past	14
Users of the Range	14
Class of Stock Grazed	15
Period of Use	15
Herding	16
Salting	17
Breeding Methods	17
Driveways	17
Trespass	18
Livestock Diseases	18
Marketing	19
PLAN OF MANAGEMENT	20
Administrative Control	21
Objectives	23
Sub-Units	23
Carrying Capacity	24
Distribution of Stock	26
Water Development	26
Methods of Handling Livestock	26
Fencing	26
Stock Movements	27
Herding (Sheep)	27
Size of Flocks	29
Corrective Measures	30
Salting	31
Summary	31
Driveways	32
Stock Trespass in the Form of Unauthorized Use of Range	32
Control of Numbers	33
Class of Stock Suited to Range	34
Supplementary Feed	34
Sires and the Breeding Season	35

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CV-6417-201 NN012382

Table of Contents -- 2

	PAGE
Lambing	36
Branding	36
Dipping	37
Sub-Units and Range Areas	37
Permits	38
Permit Agreement	40
Marketing	41
Farm Land and Fencing	41
Range Improvements	42
Poisonous Plant Eradication	43
Rodent and Predator Control	43
Wildlife Management	44
Erosion Control and Revegetation	44
Range Inspections	45
Execution of Plan	45
Revision of Plan	45
APPENDIX	46
List of natural vegetative species growing on District 6	47
Copy of Executive Order	51
Hopi District 6 Boundary Description	52
Statement on Hopi Livestock Reduction Program	54
Articles of Association of Polacca Stockgrowers Association	55
Articles of Association of Second Mesa Livestock Association	67
Articles of Association of Hopi Stockmen's Union	79
Post-War Construction Projects	95
General Grazing Regulations	119
List of First Mesa Permittees	132
List of Second Mesa Permittees	137
List of Third Mesa Permittees	141
Copy of Permit Form	145

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RANGE MANAGEMENT PLAN FOR DISTRICT 6, HOPI RESERVATION, ARIZONA

Description of Area.

Under Executive Order dated December 10, 1882, an area of 2,472,320 acres was set aside as "The Moqui Reserve." This area was "withdrawn from settlement and sale and set apart for the use and occupancy of the Moqui (Hopi) and such other Indians as the Secretary of the Interior may see fit to settle thereon." The Executive Order Reservation is located in Northern Arizona and lies entirely within the Navajo Reservation.

In 1936, the Indian Service set aside an area within the Executive Order Reservation known as Land Management Unit No. 6 or the "Hopi Unit." The boundary of this area was unsatisfactory to all concerned and on April 24, 1943, the Commissioner of Indian Affairs approved a new boundary which was recommended by the Superintendents of both the Navajo and Hopi Reservations. District 6, as now approved, consists of 631,194 acres. 545,537 acres is in Navajo County and 85,657 is in Coconino County.

Topography and Drainage.

The elevation of the District varies from 6800 feet to 5030 feet. At Hotevilla the elevation is 6,363 feet, at Oraibi 5,672 feet, at Polacca 5,7[illegible] feet, and at Keams Canyon 6,184 feet. The highest point is in the vicinity of Bigham's Dam and is approximately 6,800 feet. The lowest point is where the Dinnebito Wash leaves the District and is approximately 5,030 feet.

The topography of the northern part of the District is characterized by long fingerlike extensions of Black Mesa on the north. The breaks between these mesas are formed by deep alluvial valleys. The southern portion is less broken than the northern portion, exhibiting a rolling topography. Four large drainages enter

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from the north and leave the District along the southern boundary. They are the Jeddito, the Polacca with its large tributaries, the Nepo, the Oraibi, and the Dinnebito. These drainages have all cut deep channels through the alluvial valleys and flow in a southwesterly direction. They eventually drain into the Little Colorado River which empties into the Colorado River.

However, on the Jeddito wash there are a series of three spreader dams which effectively spread excess water and have silted up the deep channel for some distance. This area appears to have good possibilities for flood irrigation. The following picture shows a farm on the area flooded by the last spreader dike.

Picture taken September, 1944, by E. Vance Day

On the Polacca Wash we have built a series of spreader dams which may eventually result in the silting up of part of the Polacca Wash. The spreading of this water over the rangeland should result in more production of forage.

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Climate.

The average annual precipitation for the District is between 11 and 12 inches and the average annual temperature about 55° Fahrenheit. The average maximum temperature is 98° F., and the average minimum temperature is -15° F. The growing season averages between 140-150 days. At Jeddito, elevation 6,150 feet, on the eastern edge of the District, the average date of the latest killing frost in the spring is May 16. The average date of the earliest killing frost in the fall is October 4. Tables I and II give climatological data for the District.

There are no records on the relative humidity, evaporation, or wind movement for this District. The relative humidity is low. Evaporation from soils and reservoirs is high. The highest evaporation occurs during the driest and hottest months, or May and June. The evaporation of water from tanks is estimated at 65 to 70 inches per year. The prevailing winds are from the southwest with highest velocities occurring during March and April. At times these winds carry a great amount of dust and sand which results in some damage to vegetation and structures.

Weather observations are made at Jeddito, Keams Canyon, and Oraibi. Rainfall is recorded at these points, but many local showers pass over other areas on the District and are never recorded. During these local storms one reservoir may fill while another two or three miles away may remain dry.

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CV-6417-201

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* TABLE I

Place	Length of record	Average temp. in July	Average temp. in January	Max. temp.	Min. temp.	Av. killing frost date in spring	Av. killing frost date in fall	No. days in growing season	Elevation
Jeddito	21 yrs.	71.8°	29.8°	104°	-30°	May 16	Oct. 4	141	6,150
Kayenta	22 yrs.	75.7°	27.5°	104°	-17°	April 28	Oct. 13	168	5,640
Tuba City	36 yrs.	77.4°	31.9°	108°	-15°	April 23	Oct. 19	179	4,593

* Information from United States Department of Agriculture Yearbook - 1941, pp. 761-763.

* TABLE II

Showing Average Monthly Precipitation

Place	Length of record	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average yearly precip.
Jeddito	21 yrs.	1.17	.98	.98	.68	.45	.31	2.27	1.96	.92	1.05	.61	1.32	12.70
Keams Canyon	16 yrs.	1.31	.95	.90	.66	.38	.27	2.41	1.81	.70	1.25	.70	1.08	12.42
Oraibi	5 yrs.	.78	.94	.94	1.44	.23	.22	.72	1.17	1.31	2.06	.37	1.35	11.82

* Information from United States Department of Agriculture Yearbook - 1941, page 763, and also from the records of the United States Indian Service.

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Soils.

The following information is taken mostly from "Soils and Erosion Report of District 6" by H. F. Johnson.

According to their ability to produce native vegetation under normal climatic conditions, the range soils of District 6 have been grouped into five classes: A, B, C, D, and E.

Class "A" is rated as excellent and is found in the northern and southeastern portions of sub-unit 1 or the area known as 1st Mesa. These soils are deep and permeable, moderately eroded, have a moderate water-holding capacity, and are, at present, little affected by erosion.

Class "B" is rated as good and is similar to Class "A". These soils are either less permeable, moderately eroded, have a moderate water-holding capacity, or possess all three characteristics. The largest areas of Class "B" land are in the southern portion of sub-unit 2 or 2nd Mesa, with some areas scattered over sub-unit 1 and small areas over sub-unit 3. The soils in both the above classes should respond readily to a land management program.

Class "C" soils have a fair or relatively low productive capacity, high alkali content, shallow soil cover, or accelerated erosion caused by overgrazing and farming. The largest areas of Class "C" soils are found in sub-unit 3 or 3rd Mesa and the least in sub-unit 1. They are generally located along valley bottoms and on mesa tops, usually representing the critical erosion areas. This class of soil will be slow to respond to a range improvement program.

Class "D" generally consists of rough, broken, and stony lands having an intermittent soil cover. Usually little improvement is possible. However, these soils represent an important part of the watershed and their present vegetative cover should be protected as much as possible.

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Class "E" soils represent steep, inaccessible, rough, stony, and broken escarpments. Essentially no improvement can be expected on these soils.

Since Mr. Johnson's report, the District has been increased by 131,946 acres or approximately 26%. However, the percentages of the different soil classes listed below are based on the old District:

Class "A"	12%
Class "B"	22%
Class "C"	37%
Class "D"	13%
Class "E"	15%
Cultivated	1%

Erosion on the District is varied in kind and severity. Primary erosion factors are the strong southwesterly winds, torrential seasonal rains, overgrazing, farming practices, and, around the villages, human activity and trampling.

Wind erosion is unusually active in farming areas. The practice of farming an area for a few years and abandoning it when the light surface soil has blown away has greatly increased the wind erosion problem. Grazing close to farming areas has aided in increasing wind erosion on grazing land. Areas of severe erosion correspond very closely to areas which have been heavily overgrazed, such as near the villages, along the main valleys, and near old developed water supplies. On those areas which are farther from permanent water supplies, erosion is slight.

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Vegetation.

The District contains 631,194 acres of land classified as follows:

Grassland	208,134	acres
Sagebrush	5,639	"
Browse	309,062	"
Pinon & juniper	78,411	"
Waste	22,[illegible]	"
Cultivated	7,130	"

For all general purposes, the vegetation of this District can be grouped into three major types; namely, Grassland, Browse, and Woodland. All lands typed as inaccessible, barren, and barren with weeds have been termed Waste.

There are three main grasses; namely, blue grama (Bouteloua gracilis), galleta (Hilaria jamesii), and alkali sacaton (Sporobolus airoides).

The three main species of browse are: chamiza (Atriplex canescens), greasewood (Sarcobatus vermiculatus), and Mormon tea (Ephedra spp.).

General Condition of the Range.

Along the main valleys, adjacent to many of the permanent waters, and around the villages, the vegetation is less abundant, less palatable, and less vigorous than on the mesas in the northern portion or on the rolling country to the south. Indicators of overgrazing as, for example, snake weed, yellow brush, rabbit brush, and annual weeds are present on all parts of the District, but they are the most abundant vegetative species near the villages. These indicator plants are undoubtedly the result of prolonged overgrazing, human trampling, and present agricultural practices. The most vigorous vegetation is found where utilization is least; that is, as a general rule, farthest from permanent water. Methods of handling livestock are probably responsible for this condition.

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The Hopi people live in villages, and their bands of sheep are often small. These small bands each require a herder the same as a large one, but a herder cannot spend all his time with the sheep since it is not an economic unit. As a result, children or old men not wishing to get too far from camp or home often herd. If a grown man herds, he will often travel back and forth from corral to village. As a consequence, he arrives at the corral late in the morning and pens the sheep early in the afternoon. Thus the sheep graze only a small area. Very often the owner of a small band tries to watch his sheep and farm the field at the same time causing concentration around the field. This method of handling results in the overgrazing of vegetation quite badly in the vicinity of corrals and fields.

Water.

There are 26 drilled wells, 2 artesian wells, 13 shallow dug wells, 31 developed springs, and 25 undeveloped springs that can be considered as permanent water on District 6. There are 77 surface tanks which can be counted on as temporary water only.

During the past two years (1943-44), the Indian Service personnel, through the three livestock associations, have been conducting a program concentrating on earthan reservoirs. There have been previous reports stating that District 6 was well watered. It is the opinion of the writer that much more water should be developed in this area. The more water provided, the better the distribution of livestock and less trampling there will be. It is planned that after the war 20 additional wells will be drilled in areas needing water.

Mr. Tom Meeks, a geologist who made a study of the District, has the following to say about ground water: "Ground water in the District may be divided into two classes--alluvial and formational. The main valleys of the District, the

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Oraibi and the Polacca, have been filled with alluvium to a depth of 100 feet and more, and the sands and gravels in them offer a convenient source of water at relatively shallow depths. Minor valleys also offer available water in shallow wells.

"The three formational aquifers of the region are the Mesa Verde, Dakota, and Morrison formations. The Dakota is a possible aquifer in the central and northern portion of the area, but it cannot be depended on for sufficient water to justify drilling to the limited depth of about 900 to 1,000 feet in certain locations.

"The Morrison formation will produce water at almost any locality in the District with depths varying from 200 feet in the southern portion to 1,200 feet in the northern part of the District. Care would have to be exercised in making well locations in order to provide a sufficient intake area. Sufficient water for wells with windmills, to be used as stockwaters, in the Morrison formation water is usually assured at proper locations. It is universally salty but is in most places suitable for stock and even human consumption.

"The Mesa Verde forms a source for most of the springs in the District but is not suitable for deep wells. The springs are forced out of the base of the sandstones by the underlying impervious shales, and the water from them is practically always good. Blow sand in the District also forms a source for many of the springs where it rests on a fairly impervious formation."

Other Physical Range Improvements.

Besides the other range improvements already mentioned there are two sire pastures with a combined carrying capacity of 500 sheep units yearlong. One is located near Keams Canyon, and the other is at Badger Butte. There are approximately forty miles of drift fence, two dipping vats, and two corrals. There are five fenced desilting plots and two small range experimental plots.

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