

RANGE CONSERVATION - TECHNICAL NOTES

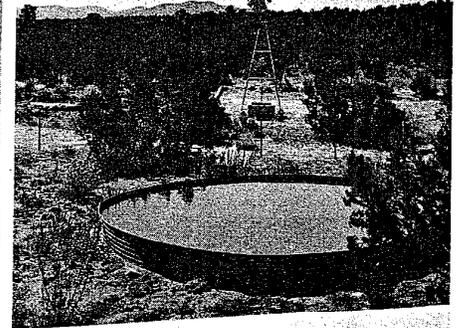
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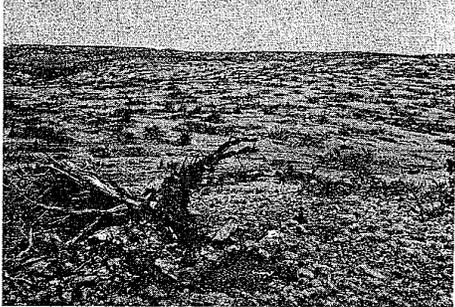
PROPER RANGE USE PAYS



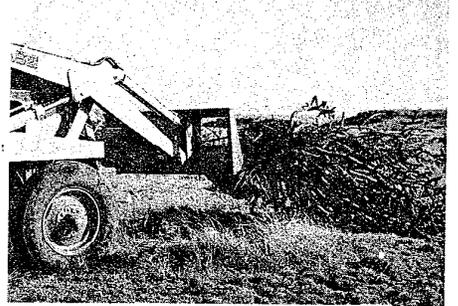
GOOD LIVESTOCK WATERING



CHAINING PINON JUNIPER



CHOLLA CONTROL



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NEW MEXICO

TECHNICAL NOTE NO. 7

October 6, 1966

SUBJECT: RANGE INFORMATION - Changing Vegetation Patterns in
Southern New Mexico
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The information included in this paper is based on ecological work
in Southern New Mexico. It should provide a stimulus to the thinking
of interested technicians.

Attachment

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CHANGING VEGETATION PATTERNS IN SOUTHERN NEW MEXICO

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INTRODUCTION

The vegetation of southern New Mexico has been described many times. It has been classified as "desert grassland," "desert shrub-grassland ecotone," "semi-desert," "Chihuahuan desert," "creosote-tarbrush type," and others. Some of these classifications are merely synonyms but others indicate differences of opinion regarding either "what was" or "what is" the ecology of the vegetation. This article will examine and evaluate some of these views on the vegetational ecology of southern New Mexico. In the light of some recent investigations, the author will submit additional opinions about this problem.

PAST AND PRESENT VEGETATION PATTERNS

Early accounts of the vegetation of southern New Mexico constantly referred to the vast and continuous expanse of grama (*Bouteloua*) grass dominated grasslands which were said to virtually blanket the mesas. These accounts are found in the records of army expeditions and boundary surveys which took place within the last two hundred years.

Today the uncultivated mesas of southern New Mexico are dominated by creosote bush (*Larrea divaricata*) and mesquite (*Prosopis juliflora*). Grama grassland dominates a few relatively small areas, but even in these its dominance appears to be diminishing.

CONTROVERSIAL EXPLANATIONS

Many explanations have been forwarded to account for this extreme discrepancy over so short a period of time. (1) Some doubt if there has been much change. They question the reliability of the early accounts because of the apparent present stability of thousands of acres of creosote bush and mesquite. It is pointed out by them that although logs were kept, the various operations were not designed to measure or evaluate vegetation, but instead had other considerations as their primary objectives. Therefore, the accounts of "vast" and "lush" grasslands were undoubtedly highly subjective and at best relative. (2) Some who accept the early accounts as being generally valid, attempt to explain the changes in the vegetation as being the result of an altered climate. They suggest that the

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present climate favors desert shrubs while that of one hundred years ago favored grassland vegetation. (3) Others attribute the apparent changes in the dominant vegetation patterns of southern New Mexico to the introduction of livestock. They feel that if the beginning of intensive grazing is not considered the primary cause, one is forced to accept an unlikely reporting or an abrupt climatic change occurring at the precise time in history that the livestock industry was introduced into southern New Mexico.

EVALUATION OF THE EVIDENCE

Possibly some truth is contained in each of these explanations and it is of considerable importance for future planning that we discover exactly what the pre-settlement vegetation patterns were, and, if these patterns have changed, to determine why.

Territorial survey records have been found to be a source of relatively unbiased quantitative information concerning presettlement vegetation patterns. In eastern and midwestern United States these records have made possible the reconstruction of forest vegetation patterns. Territorial surveys were made in New Mexico between the 1840's and 1850's. The primary purpose of these surveys was to determine the amount of land available for cultivation and the mountainous lands were therefore excluded. The surveys were conducted in a westerly direction from prime meridians and based upon units 6 x 6 miles square which were called townships. The surveyor proceeded from corner to corner around each section until he had completed all 36 sections. All vegetational and topographic features encountered along the lines were recorded. A summary description was given for each section, followed by a general description of the township.

Following are some items which are disclosed when the survey records for southern New Mexico are examined and analyzed in the light of today's conditions:

1. The surveyors specifically mentioned the occurrence of trees and shrubs even when the trees were few; i.e., "there are six juniper trees in the southwest corner of this section." Therefore, it is safe to assume that when the surveyor states that "there is nothing but good grama grass on this section," it is undoubtedly a relatively accurate and unbiased piece of information.

2. Level and gently rolling land was virtually covered with grama grass.

3. There were randomly scattered pockets of mesquite over most of southern New Mexico 100 years ago.

4. The majority of these mesquite pockets have subsequently been found to be early man sites (usually Indian villages).

5. Junipers (*Juniperus monosperma*) were restricted to foothills or very steep slopes in areas where they are out on the flats today.

6. Cholla cactus (*Opuntia* spp.) was rare in areas which are overrun with it today.

7. Creosote bush was encountered only in the foothills or occasionally out on well drained gravelly knolls.

8. *Yucca* (*Yucca elata*) occupied sites which were generally on the margins between tobosa grass (*Hilaria mutica*) swales and grama grass mesas.

9. In a number of instances the grassland-shrub ecotone is found today to be exactly where it was 100 years ago.

10. Some sites which were covered with mesquite 100 years ago are now almost devoid of the plant and are now covered by creosote bush.

TENTATIVE CONCLUSIONS

More investigation is needed but some tentative generalizations may be made.

1. Grass was the dominant vegetation occupying the mesas of southern New Mexico 100 years ago. Therefore, there has been a drastic change in the vegetation patterns since then.

2. A marked climatic change 100 years ago is unlikely because at a number of localities the grass has held its own against the shrubs.

3. The primary cause of vegetational pattern change from grassland to desert shrub has been livestock grazing.

4. The rapid increase in the amount of mesquite can be accounted for because the mesquite was already well established 100 years ago on scattered Indian village sites.

5. *Yucca* stands today are undoubtedly good indicators of previous grassland areas.

6. Mesquite-occupied sites may further deteriorate and eventually be occupied by creosote bush.

7. It may be valid to assume that grass occupied mesa sites on which creosote bush now dominates. However, it would not likely be correct to assume that the present microhabitat is identical or even similar to

that which existed under grass. Therefore, a creosote bush site today may be so modified that it will not support grass successfully.

8. The "invasion" of "grassland" by creosote bush, mesquite, juniper, or cholla is most likely a symptom of an already deteriorated site. It may be more explicit to say that these shrubs have become established upon sites which had been suitable for grass at some earlier time.

FUTURE EFFORTS

The vegetational history of southern New Mexico is difficult to ascertain. The present vegetational dynamics are also confusing. These difficulties are due to the rapid and extensive changes which have taken place over most of the area. Paradoxically, prediction of future vegetational conditions is hazardous because of the slow rate of pattern change by some of the key species such as mesquite and creosote bush. More detailed information about the ecological amplitudes and optimum, maximum, and minimum requirements will have to be obtained for these plants before realistic reconstructions or predictions can be made.

REFERENCES

- Abert, J. W., 1848, Report and map of the examination of New Mexico: Report of the Secretary of War, Senate Exec. Doc. 23, 30th Congress, 1st Session.
- Beale, E. F., 1858, Wagon road from Ft. Defiance to the Colorado River: House Exec. Doc. 124, 35th Congress, 1st session.
- Blewett, Marilyn B. and Potzger, J. E., 1951, The forest primeval in Marion and Johnson Counties, Indiana in 1819: *Rutler Univ. Bot. Studies* 10:40-52.
- Buffington, L. C. and Herbel, C. H., 1965, Vegetational changes on a semidesert grassland range from 1853 to 1963: *Ecol. Mono.* 35:139-164.
- Campbell, R. S., 1929, Vegetative succession in the *Prosopis* dunes of southern New Mexico: *Ecology* 10:392-398.
- Cooke, Philip St. George., 1848, Report of Lt. Col. P. St. George Cooke of his march from Santa Fe, New Mexico, to San Diego, upper California: House Exec. Doc. 41, 30th Congress, 1st Session.
- Emory, W. H., 1848, Notes of a military reconnaissance from Ft. Leavenworth, to San Diego, in California, including parts of the Arkansas, Del Norte, and Gila rivers: Senate Exec. Doc. 7; 30th Congress, 1st Session.
- , 1857, Report of the United States and Mexican Boundary Survey: Senate Exec. Doc. 108; 34th Congress, 1st Session.
- Gardner, J. L., 1951, Vegetation of the Creosote bush area of the Rio Grande valley in New Mexico: *Ecol. Mono.* 21:379-403.
- Kenoyer, L. A., 1939, Forest distribution in Barry, Calhoun and Branch Counties, Michigan, as illustrated by the original land survey: *Papers Mich. Acad. Sci.* 26:75-77.
- Marcy, R. B., 1850, Report of exploration and survey of route from Ft. Smith, Arkansas to Santa Fe, New Mexico, made in 1849: House Exec. Doc. 45, 31st Congress, 1st Session.