

OPTIMUM CARRYING CAPACITY FOR BISON  
IN THEODORE ROOSEVELT NATIONAL PARK

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Objectives

This project was designed to determine the optimum population size for bison in the Theodore Roosevelt National Park (TRNP) by fulfilling the following objectives:

1. Delineate primary and secondary bison ranges;
2. Determine forage productivity for major range sites within primary and secondary use areas;
3. Determine the general seasonal food habits of bison in TRNP;
4. Determine range condition under present population density of bison and the maximum carrying capacity of primary use areas; and
5. Integrate range condition and carrying capacity estimates with management priorities for bison on the TRNP.

Methods

The first objective is being accomplished through direct observation of bison herds. During observation periods, habitat usage, herd location, and activity are recorded. To augment the observation data fecal density transects will be conducted to quantify the level of usage habitats receive.

The second objective will be met through: 1) producing a habitat map of the park from infra-red photography; and 2) forage production figures for those habitats (Kjar 1982, SCS n.d.a., Whitman 1978) will be derived from the proportional contribution of each habitat type to the total area of the park. Originally, forage utilization was to be part of this objective. However, high range condition and herd mobility made measurement of forage use both

impractical and of dubious accuracy. Therefore, this portion of objective #2 was deleted from the project.

Fecal matter is collected for determination of seasonal bison diets twice each month. Intake of forage by bison in the spring and summer is being taken from the literature (Peden, et al. 1974) while winter intake will be determined through a lignin dilution technique conducted by the investigators. Seasonal dietary composition and intake combined with forage production estimates for primary ranges will be used in the final calculation of bison carrying capacity.

Permanent range condition/trend sites will be established on primary ranges during 1983. If management decisions call for an increase in bison numbers, regular monitoring of these sites will provide information on the herd/forage base balance.

### Results

Due to a three month delay in funding, grazing behavior and fecal collections have been the major accomplishment to date. From the observation of bison herds, 34,000 individual bison hours have been logged. At this time, certain trends in movement, activities, and habitat preferences have been detected, but more information and analysis is needed for accurate assessment.

While observing bison, it was noticed that their grazing pattern would produce feeding craters in an ungrazed sward. A test of paired plots (cratered vs. uncratered) indicated that the feeding craters had lower plant species diversity and graminoid basal cover ( $n = 78$ ,  $P < .001$ ) than did uncratered sites. Fecal collection and preparation of plant reference material is proceeding at this time. As data collection is completed, more results will be forthcoming.

### Conclusion

The picture emerging from the present data base indicates feeding behavior patterns previously unreported. In addition, continued field work will provide TRNP personnel with a definitive map of important bison ranges within the park. However, neither can be finalized with accuracy without another 12-14 months of field work and data analysis.

### Literature Cited

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