THE SOBOBA PROJECT: PRELIMINARY EVALUATION OF HABITAT IMPROVEMENT TECHNIQUES

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ABSTRACT.

Preliminary data points toward prescribed burning as the most effective method of improving chaparral. Placement of a burn near water can noticeably increase the benefits of that burn. During the first year after discing and brush raking, deer use declined, along with a significant drop in small mammal productivity on the disced site. Deer response to hand cutting of brush and water impoundment were both positive. This suggests that burning adjacent to natural or artificial water sources, with handcut control lines where possible, represents the best first step in a chaparral management program.

INTRODUCTION

Chaparral manipulation methods utilize both mechanical equipment and prescribed fire to reduce hazardous fuels accumulation and improve wildlife habitat. Both of these approaches have been used for several decades in southern California. It is known that mature (decadent) brushfields are low in wildlife productivity and diversity. Still, the contention that any technique reversing succession in chaparral benefits animals is unsubstantiated. Claims that brush-to-grass type conversion improve wildlife habitat is conjectural at best (USFS 1972). In Texas, deer preferred brush range to root plowed and seeded ranges (Davis and Winkler 1968). Lillywhite (1977) noted a decline in diversity and abundance of lizards and small mammals after brushland to grassland conversion in San Diego County. Although some studies indicate prescribed fire can be used successfully for habitat enhancement (Biswell et al., 1952; Taber 1953; Taber and Dasmann 1957; Cowles 1958; Biswell 1961; Biswell and Gilman 1961; Gibbens and Schultz 1963; Lawrence 1966; Longhurst 1978; Wirtz 1979), other studies demonstrate inconclusive results (Dasmann et al., 1967; Longhurst and Connolly 1970).

The Soboba Project is a chaparral management project jointly planned by the U.S. Forest Service and the California Department of Fish and Game. The project area occupies a 12,000 acre watershed in the San Jacinto Mountains. This project is studying a wide range of improvement techniques, including prescribed burning, water development, oak silviculture and several types of mechanical treatment. In order to obtain an indication of which techniques, or which combination of techniques, achieve the best results, response data has been documented on at least one site representing each type of treatment. This report describes the preliminary findings for deer and small mammals.

Deer and small mammal populations (Figure 1) showed a rapid increase for 5 years following the 1974 fire. This pattern reflects the relatively short-lived increases in nutritive quality of the forage (Biswell 1961; Bell 1974). Using these data as a baseline, the Soboba Project offers a unique opportunity to develop a brushland treatment "mix" that, can be tailored to local conditions in order to give the best results for each dollar invested.

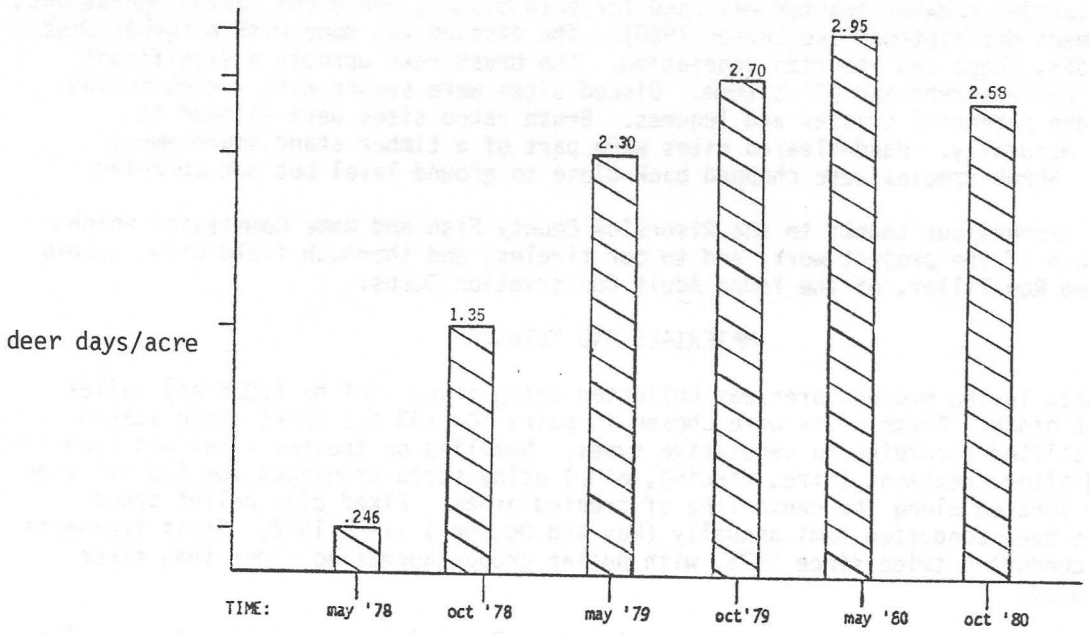

Figure 1. Deer Days/Acre of the Soboba deer herd since 1978.

Manipulations were carried out between December 1979 and June 1980 on sites that had not burned in the 1974 fire. Prescribed burn sites were similar in slope, exposure, and dominant species (Table 1). Both prescribed burns were conducted in the spring using the helitorch ignition method, and resulted in the removal of 40%-50% of the vegetation on each site. The chief difference between the two sites was the presence of a small spring at one end of the Oak Flats site. The Indian Mountain site was intentionally laid out so that no point was nearer than 160m (480 ft.) to a water source through heavy brush.

Table 1. Vegetation structure on prescribed burn sites in the Soboba study area 1979 - 1980.

	Importance values (a)	
	Adenostoma fasiculatur	Arctostaphylos (spp.)
Oak Flats	118	141
Indian Mountain	104	98

a. Importance value is the sum of the values for relative density, relative frequency and relative cover obtained on random transects run through the burned area.

A Caterpillar D-7 crawler tractor was used for both discing and brush raking operations, (for equipment descriptions see Larson 1980). The discing was done with a Towner Disc which uproots, chops and reburies vegetation. The brush rake uproots a significant portion of whole shrubs and piles them. Disced sites were seeded with a combination of annual and perennial grasses and legumes. Brush raked sites were allowed to revegetate naturally. Hand-cleared sites were part of a timber stand improvement operation. Shrub species were chopped back close to ground level but not uprooted.

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MATERIALS AND METHODS

Deer use data in the project area was collected using fixed .001 ha (.025 ac) pellet group count plots. These plots were chosen in pairs 10m (33 ft) apart along staked lines, stratified according to vegetative types. Sampling on treated sites was conducted before and after treatment (fire, discing, etc.) using strip transects 10m (33 ft) wide which were located along the centerline of treated areas. Fixed plot pellet group counts have been conducted semi-annually (May and October) since 1978. Strip transects have been conducted twice since 1978, with pellet groups appearing older than three years excluded.

Small mammals were trapped in 7.6 x 7.6 x 23cm (3 x 3 x 9 in) Sherman live traps. The traps were spaced 15m (49 ft) apart along lines located in similar habitats in both the treated and control areas. Trapping was conducted during November the year before treatment and the year after. Each line transect was trapped for an average of 60 trap nights. The control areas were selected by line intercept sampling to determine vegetative structure and species similarity to the treated areas, (Smith 1974).

The sites which were brush-raked and hand-cleared were not planned for formal study and occurred as a result of other activities in the Soboba Project area. Therefore, only fixed plot deer use data are available for these areas. All deer use data are expressed in terms of deer-days/acre, adjusted to eliminate the influences of population increases over the project area as a whole.

RESULTS

DEER

Prescribed burning was the most effective treatment for increasing deer usage during the first year following treatment. The Oak Flats burn demonstrated the greatest improvement, transforming an area with very low deer activity into one with almost twice the average deer activity on the watershed (from 0 to 4.67 dd/ac). The Indian Mountain burn was designed to limit access to water. This burn resulted in a noticeable increase in deer usage, although not as large as the Oak Flats burn (Table 2).

Hand cutting brush produced a six-fold increase in deer use. A permanent summer water supply produced a 70% increase over the previous year. Areas in which discing and brush raking were utilized decreased deer use by 66% and 35% respectively in the first year following treatment. This "type conversion" approach produces bare soil, and relies on either natural or planted regeneration, both of which take time to restore forage.

SMALL MAMMALS

There was a significant difference in trapping success between the control line and the proposed burn site. The control line trapping success was lower than that of the proposed burn site. Following the burn, the trapping success decreased from .45 animals/trap night to .32 in the burned area (Table 3) making it not significantly different from the control. This decline in small mammals would be expected due to the removal of cover and food sources. However, this decline is still within the range of known small mammal use of unburned chaparral. Mortality due to the fire itself was low. Several woodrats (Neotona sp.) were seen escaping the fire shortly after ignition, and two Peromyscus californicus marked in 1979 were recaptured a year later.

Table 2. Response of deer to different chaparral manipulation techniques on the Soboba study area 1979 - 1980

Treatment	Site	Before Treatment (deer days/acre)	After Treatment (a) (deer days/acre)
Prescribed Burn (water available)	Oak Flats	0	4.67
Prescribed Burn (water unavailable)	Indian Mountain	0	1.84
Water Impoundment	Buck Springs	2.3	3.9
Type Conversion (using Towner Disc)	Buck Springs	.83	.28
Hand Cutting of Brush	Bay Tree Springs	.05	.30
Brush Raking	Mellor Ranch	3.1	.46

a. Adjusted for overall herd population changes during sampling period.

Table 3. Response of small mammals to two caparral manipulation techniques on the Soboba Study Area 1979 - 1980

Treatment	Site	Before treatment (captures/trap night)	After treatment (captures/trap night)
Oak Flats Prescribed Burn	Treated	.45 (a)	.32
	Control	.18	.43
Buck Springs Type Conversion (Towner Disc.)	Treated	.6 (a)	.09 (a)
	Control	.35	.60

a. Difference between Treated and Control significant ($p < .05$).

The area proposed for discing was found to have a significantly higher number of small mammals than the control area to the discing. Following discing the small mammal population dropped significantly in the treated area, from .6 animals/trap night to .09, well below that of the control site. Five species were trapped prior to treatment and only 2 species in the year following treatment.

DISCUSSION

Prescribed burning has long been advocated (Taber and Dasmann 1957; Anonymous 1961) as the mainstay of chaparral management for wildlife, and the preliminary results from the Soboba area clearly support this view. Deer use increased immediately and markedly after fire, while mechanical work produced the opposite effect. Small mammal abundance decreased after both types of manipulation, but the post-fire decrease was far less.

In dollar terms, even the most costly burns are no more expensive than mechanical work. Furthermore, costs of prescribed burning can be expected to decrease as experience grows and because larger acreages can be burned with less manpower.

There are, however, additional considerations. Some burns are more effective than others. The relative dryness of the Indian Mountain site appears to have limited deer use and the overall "usefulness" of the burn. This, together with the positive response to our water impoundment, identified the importance for careful placement of burns with respect to other potentially limiting factors (Roberts 1980).

The benefits of burning are short-lived, as indicated by the population trend since the 1974 wildfire. At the same time, most of the Soboba area is not yet ready for a reburn. In a post-fire rehabilitation effort such as this one, rotational burning is difficult to begin because the age class is uniformly too young. Once vegetation is established at a type conversion site, it can produce stable, high protein forage sources similar to those produced by prescribed burning. Type conversion is thus a valid method for maintaining high quality forage cover until a burning program can be started.

Disced or brush raked areas can provide needed firebreaks for the prescribed burning program, especially when placed on ridgetops, and in this case slow regeneration is desirable. Although animal use may be limited in this area, it will eventually provide an important control line for prescribed fires.

Lastly, the benefits from hand clearing give us another approach to both direct habitat improvement and the preparation of future firebreaks. The deer response is clearly favorable, and fuel is reduced in a safe (though costly) manner. Areas cleared in this manner can be expected to revegetate as quickly as a burned site.

At this stage in the project, our results indicate the following management combination is the most effective: 1) brush cutting to create firebreaks on ridgetops in areas where burning can be used immediately and 2) brush raking/discing in areas which require several years in order to carry fire. In selecting areas to be burned, all other limiting factors should be considered.

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