

RANGE USE BY DEER AT HASTINGS RESERVATION AS DETERMINED BY PELLET COUNT

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A series of deer pellet plots were established on an area embracing four different vegetation types on Hastings Reservation to determine the extent of differential range use by deer. The Hastings Natural History Reservation is located in the Santa Lucia Mountains of central, coastal California in northern Monterey county. The Reservation is a former 1,600 acre working ranch, protected from grazing, burning and cultivation since 1937 and administered by the Museum of Vertebrate Zoology, University of California.

An east-west ridge with elevations from 1,600 to 2,100 feet was selected as the study area. Somewhat open chamise (Adenostoma fasciculatum), unburned for at least 25 years, grew on the steep, south-facing slopes of this ridge. Foothill woodland, composed of nearly pure blue oak (Quercus Douglasii), covered the gentle slopes of the ridge top. The steep north slopes were grown to a mixed evergreen forest of live oak (Q. agrifolia), California laurel (Umbellularia californica), madrone (Arbutus Menziesii) and big-leaf maple (Acer macrophyllum). A transition zone of black oak - madrone vegetation covered the more gentle north slopes between the foothill woodland above and the mixed evergreen forest below, and was characterized by the presence of black oak (Q. Kelloggii) which grew along with madrone, live oak, blue oak and valley oak (Q. lobata).

METHODS

A total of 189 circular, 100 ft.² plots were permanently staked on the study area in February, 1963. Inconspicuous steel stakes, 3/16 in. diameter and protruding 10 inches above ground level, were used to mark the plots. Plot numbers were recorded by location rather than by the use of tags. The plots were located on north-south compass lines, with the lines 208 ft. apart and parallel. Two plots were randomly located within each 208-foot distance along the lines. Thus two plots were located on each acre, and the study area consisted of 95 acres. The plots were counted and cleared of all deer pellets in February, June and October of

1963, 1964 and 1965. Of the 189 plots, 168 were paired (i.e., 84 pairs) in order to evaluate the adequacy of sampling; members of a pair were neighbors and occurred in the same vegetation type. The number of pellets per group was counted for 292 of the 856 groups noted on the nine counts to detect variation in number with season or vegetation type. All pellet groups were classified according to condition, i.e., entire groups, groups at the periphery of plots but half or more within the plot, strewn groups, or groups occurring as clods.

ADEQUACY OF SAMPLING

Comparison of paired plots according to the number of pellet groups found per plot gave a good fit by Chi-square test for each of the nine counts. Comparison of paired plots according to pellet group condition also gave a good fit by Chi-square test for each of the nine counts. The similarity of results from the paired plots (or subsamples) indicated that the sampling technique gave reproducible results.

RESULTS AND DISCUSSION

The number of pellets counted per entire group varied from 28 to 254, and the mean number per group was 99.8. There was no significant difference in number of pellets per group by season, as might be expected when comparing a dry summer and probable low forage intake with a wet spring and probable high forage intake. It was not possible to determine whether or not the number of pellet groups per deer day varied with the season since no census of deer was available for the study area.

The mean number of pellets per group differed significantly by t-test in all comparisons of vegetation types except that between chamise and mixed evergreen forest. The mean number of pellets per group in the oak - madrone type was especially low - 90.0; the means for the other types were 101.8 in foothill woodland, 110.4 in chamise, and 112.3 in mixed evergreen forest. While I cannot account for the differences in mean number of pellets per group in the various vegetation types, it is doubtful that the differences are due to variable decomposition because only four months are involved between counts.

Conversion of the pellet group counts to deer population densities, using an assumed defecation rate of 13 groups per deer day, showed a decrease in density from 1963 to 1965. Calculated densities ranged from 107 to 121 deer per square mile in 1963, from 81 to 88 in 1964, and from 54 to 61 in 1965. The decrease occurred each year in the February pellet count, which represented the months of October, November, December and January.

No seasonal preference for any one of the four vegetation types was apparent from the pellet group counts. For all nine counts, however, 18% to 120% more than the expected number of pellet groups were counted

on the plots in foothill woodland. The expected numbers were calculated for each of the nine counts by multiplying the percentage of plots located in each vegetation type times the total number of groups counted. In eight of the nine counts, from 3% to 54% less than the expected number of pellet groups were counted in the mixed evergreen and oak - madrone vegetation types. Pellet group counts in chamise varied inconsistently from the expected number; there were more than expected on three counts, less than expected on four counts, and exactly as expected on two counts.

Assuming that deer defecate where they forage rather than at certain loafing or watering areas, it is difficult to account for the greater than expected use of foothill woodland especially since the use was consistent throughout the year. Important forage plants for deer are about equally distributed over the four vegetation types, i.e., there is no concentration of preferred forage species in the foothill woodland. Intensity of range use may be related to several factors other than forage such as temperature, proximity to water, or openness of the vegetation. On the other hand, the preference could have been due simply to the location of the woodland on the ridgetop. At any rate, it would require more intensive observation and study than pellet group counting to account for the apparent preference by deer for foothill woodland on the study area. The results of this study do suggest that forage species in the foothill woodland are subjected to greater use than species in the other three vegetation types.