EFFECTS OF SEASON OF USE ON QUALITY AND BOTANICAL COMPOSITION OF SHEEP DIETS WITHIN A NORTHERN IDAHO CONIFER PLANTATION

A Thesis

Presented in Partial Fulfillment of the requirements for the

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By

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Abstract

The effect of season use on quality and botanical composition of sheep (Ovis aries) diets within a northern Idaho conifer plantation was examined during the summers of 1993, 1994 and 1995. The grazing seasons were in early and late summer. The botanical composition of sheep diets averaged 58% graminoids, 27% forbs, 11% shrubs and 4% conifers during the entire study period. The average graminoid content of sheep diets tended to be higher in the early summer grazing season compared to the late summer grazing season. The interaction between the three years and the two grazing seasons was significant for both forb and shrub content in the sheep diets ($p<0.10$). The conifer composition of the sheep diets was lowest when the graminoid content was highest in the early grazing season of 1993 and 1994. The same was true with respect to the shrub use by the sheep. Relative preference index values indicated that sheep selected first for graminoids, followed by the forbs and then shrubs. Diet quality results tended to be high in fecal nitrogen (FN) in the early grazing season. The fecal diaminopimelic acid (FDAPA) levels appeared to be high in the early grazing season in each of the two grazing seasons over the three years of the study. Data in this study demonstrated that sheep can obtain diverse forage within a conifer plantation with a minimum consumption of conifers, especially in the early summer grazing season. The forage consumed at this time was also generally higher in both FN and FDAPA levels.

Study Site

The site for this study was within the Flat Creek Unit of the University of Idaho Experimental Forest located about 60 km northeast of Moscow, Idaho (fig.1), and Potlatch, Idaho is located 20 km southwest and 13 km northwest from the site. Climate of the area is temperate with cool, moist winters and warm, relatively dry summers. The site has a predominant east to northeast aspect at an elevation of 1006 to 1036 m. Its habitat type is Western redcedar (Thuja plicata Donn. Exl.) Don)/queencup beadily (Clintonia uniflora (Shult.) Kunth.).

Site History

The site was clearcut and burned in 1986 before being replanted with Ponderosa pine, Douglas-fir, western larch, in the spring of 1987.

similar conclusion when they examined DAPA levels in black-tailed deer in California.

Nelson et al. (1983) found DAPA to be correlated with dietary protein and digestible energy, both of which are important measures of the nutritional well-being of the grazing animal. About 80% of the ruminant's energy is derived from volatile fatty acids produced by rumen bacteria (Weller 1969). Because FDAPA is found mainly in bacterial cell walls, it should provide a more specialized indication of microbial dynamics than FN (Hodgman et al. 1996). The ratio of DAPA to total bacterial nitrogen has also been found to be rather consistent (Nelson and Davitt 1984). Research by these authors has shown, however, that DAPA may vary with the season, between years (plant phenology, climatic conditions), among and within animal species.

Because microhistological analysis is a direct technique for evaluating current nutritional well-being of herbivore animals, relatively inexpensive, not requiring live capture or animal sacrifice, DAPA has been found to be a practical method for determining the grazing animal's diet quality. For example, concentration of DAPA in mule deer (*Odocoileus hemionus*) feces was among the most precise fecal indices for estimating diet quality and intake (Hodgman et al. 1996).

MATERIALS AND METHODS

Study Site

The site for this study was within the Flat Creek Unit of the University of Idaho Experimental Forest located about 60 km northeast of Moscow, Idaho (Fig. 1). Climate of the area is temperate with cool, moist winters and warm, relatively dry summers. The site has a predominant east to northeast aspect at an elevation of 1006 to 1036 m. Slopes average

20 to 40%, and the soil is an ashy, mixed, frigid Vitric Hapludand which was formed in a volcanic ash over residuum which is primarily granite (Barker 1981). The average annual precipitation is approximately 645 mm, with about 30% received as rainfall from May to September (NOAA 1993).

Weather data for the period of this study (Table 1) were obtained from two National Oceanic and Atmospheric Administration weather stations, in Moscow, Idaho and in Potlatch, Idaho located about 20 km southwest and 13 km northwest of the study site, respectively (NOAA 1993, 1994, 1995). The average temperature in the summers of 1993, 1994 and 1995 was 15°C, 18 °C and 16 °C, respectively. The base average summer temperature in each of the three years was 14 °C in June. The 29-year average temperature in the study site region generally is warmest throughout July and August, with cooler weather predominating the remainder of the year. The first fall frost normally occurs in September and the last killing frost ordinarily occurs in May.

The annual precipitation for this study was 591 mm in both 1993 and 1994, which was lower than the 29-year average of 645 mm (Table 1). The wettest year was 1995 with an annual precipitation of 833 mm. Although the 29-year average summer precipitation is 131 mm, the recorded precipitation during the summer months was: 153 mm in 1993, 88 mm in 1994 and 201 mm in 1995. The above-average precipitation in 1993 and 1995 resulted in greater growth of succulent forage, and the below average precipitation in 1994 was likely responsible for the reduced amount of forage in that year.

The study site was located in a western redcedar (*Thuja plicata* Donn. Ex D. Don)/queencup beadily (*Clintonia uniflora* (Schult.) Kunth.) habitat type (Cooper et al.

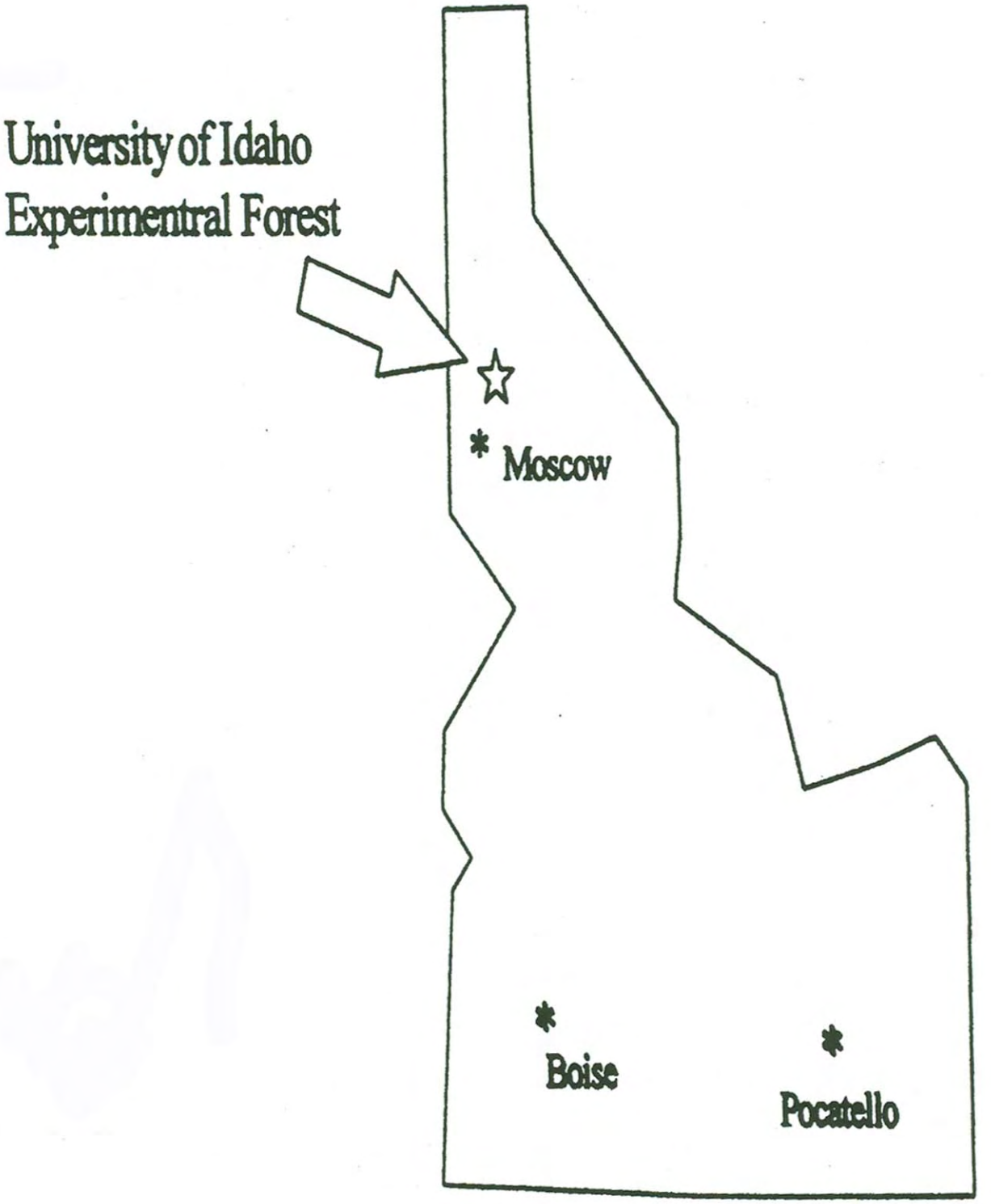


Figure 1. Study site location.

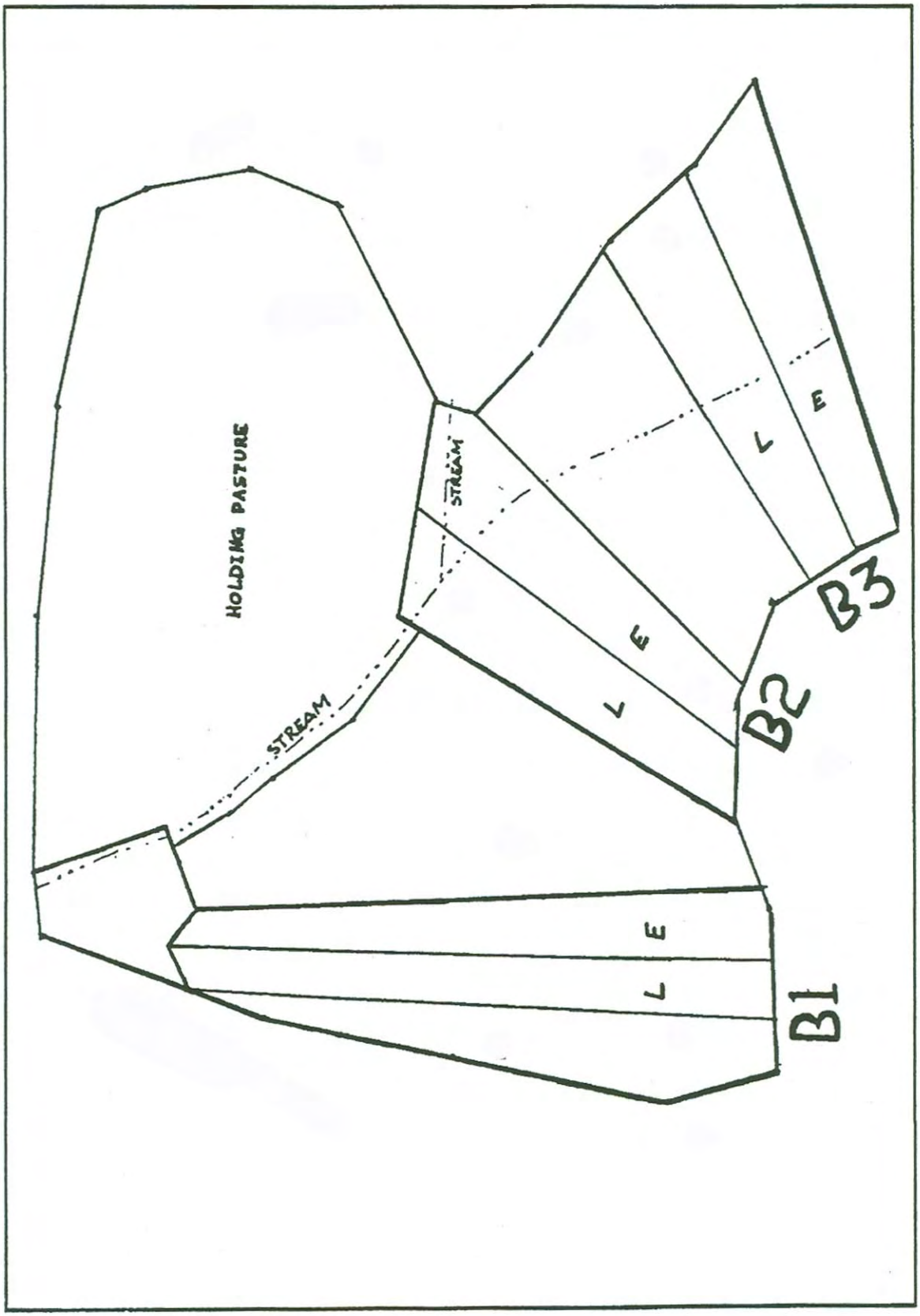
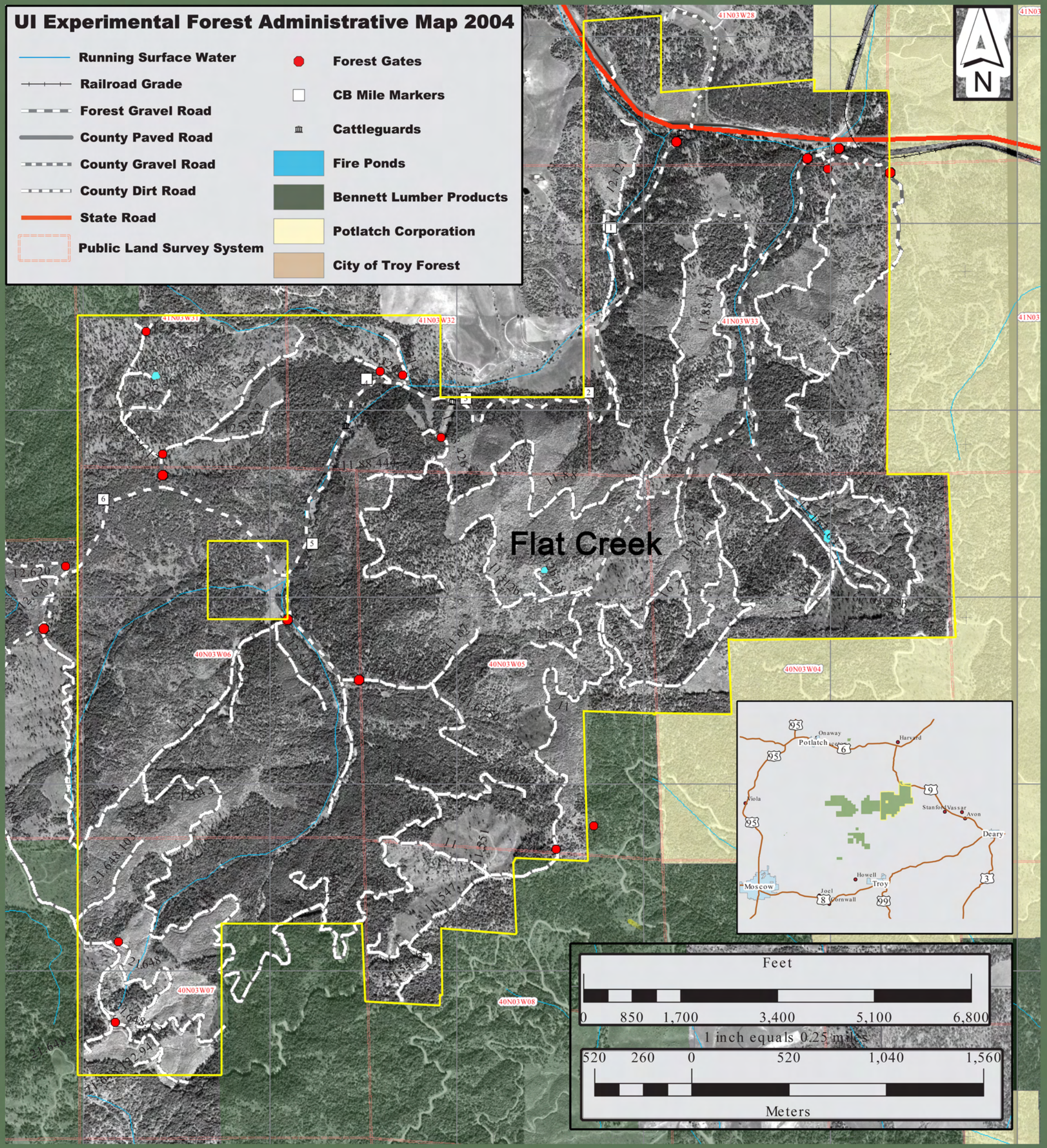


Figure 2. Study site layout


UI Experimental Forest Administrative Map 2004
Running Surface Water
Railroad Grade
Forest Gravel Road
County Paved Road
County Gravel Road
County Dirt Road
State Road
Public Land Survey System
Forest Gates
CB Mile Markers
Cattleguards
Fire Ponds
Bennett Lumber Products
Potlatch Corporation
City of Troy Forest
N
41N03W28
41N03W31
41N03W32
41N03W33
40N03W06
40N03W05
40N03W04
40N03W07
40N03W08
Flat Creek
Onaway
Potlatch
Harvard
Viola
Stanford
Vassar
Avon
Deary
Howell
Troy
Moscow
Joel
Cornwall
Feet
0 850 1,700 3,400 5,100 6,800
1 inch equals 0.25 miles
520 260 0 520 1,040 1,560
Meters

Flat Creek

Location of Complete Research:

Author & Title: Mbabaliye, Theogene
Effect of Season of Use on Quality and Botanical Composition of Sheep Diets Within a Northern Idaho Conifer Plantation

University of Idaho Library:

Call Number- SF376.M33 1996

College of Natural Resources:

Department- Range Sciences

Other Sources: