

EFFECTS OF SHEEP GRAZING ON TREE SEEDLINGS IN
A NORTHERN IDAHO CONIFER PLANTATION



A Thesis

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By

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Abstract

Two studies were conducted near Moscow, Idaho over 4 years to evaluate the effects of sheep grazing intensity on Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) and sheep season of use on Douglas-fir and Ponderosa pine (*Pinus ponderosa* Dougl. ex laws.). The grazing intensity study was conducted on a 4-year-old conifer plantation during 1991-1992. Four pastures were grazed plus an ungrazed control. Grazing intensity averaged over the 2 years ranged from 65 to 78.5% utilization of the available forage. Tree seedling height growth in the heaviest grazed treatment did not differ from the ungrazed control ($p > 0.10$), and was at least 35% greater ($p \leq 0.10$) than the other grazed treatments. Diameter growth of tree seedlings in the heaviest grazed treatment exceeded the other 4 treatments by 32-49% ($p \leq 0.10$). Lateral browsing and terminal clipping did not differ ($p \geq 0.10$) in the heaviest grazed treatment compared to the ungrazed control in both years of the study. Treatments did not differ ($p > 0.10$) in rodent damage, trampling, or tree seedling mortality. In 1991, about 3-4 weeks after grazing ceased, lower tree seedling xylem water potential ($p \leq 0.10$) and greater soil moisture levels ($p \leq 0.10$) were recorded in the heaviest grazed treatment compared to ungrazed control. The season of grazing study was conducted during 1993-1994 on a portion of the same site as the aforementioned study. The treatments used during the study were early and late summer grazing and an ungrazed control. Greater lateral browsing ($p \leq 0.10$) and terminal clipping ($p \leq 0.10$) of Douglas-fir occurred in the late treatment of 1993 compared to early and control treatments. In 1994, lateral browsing did not differ ($p > 0.10$) among treatments and greater terminal clipping ($p \leq 0.10$) occurred in the early grazed treatment compared to the late and control treatments. Douglas-fir seedling damage was reflected in reduced ($p \leq 0.10$) height and diameter growth for both early and late grazed treatments compared to the ungrazed control. However, Douglas-fir seedlings in the early treatment of 1994 that did not have their terminal buds clipped by sheep did not differ in height growth compared to the control ($p > 0.10$). Browsing damage of ponderosa pine in the early and late grazed treatments did not differ from the ungrazed control ($p > 0.10$). Height growth had a significant ($p \leq 0.10$) treatment \times year interaction. In 1993 there was no difference in height growth among treatments ($p > 0.10$). However, in 1994, both the early and late

treatments had greater height growth compared to the ungrazed control ($p \leq 0.10$). Diameter growth was greater ($p \leq 0.10$) in the early and late grazed treatments over control. Ponderosa pine seedling growth benefited equally from either grazing treatment.

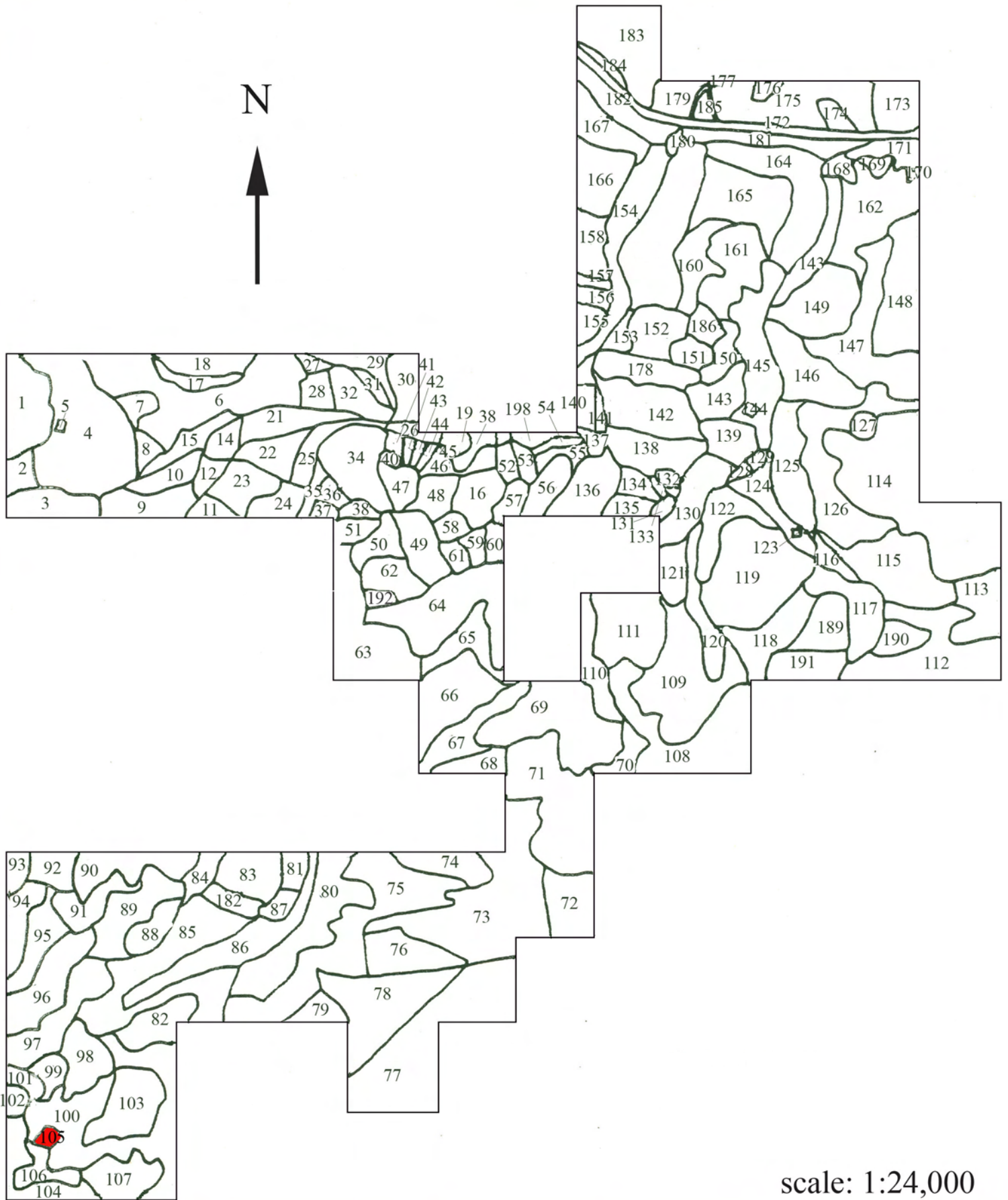
Study Site

The study was conducted on the Flat Creek Unit of the University of Idaho Experimental Forest, located about 60 km northeast of Moscow, Idaho. The site was a 4.5 ha clearcut that was harvested in the fall of 1985 and early winter of 1986. The logging method used was a skyline with locking carriage on an Idaho jammer with a haulback. Most of the logs were suspended with one end dragging on the ground. All of the tree limbs and tops were left on the site. The site was broadcast burned in October 1986. Large woody debris and other duff layer were retained. The site was planted to ponderosa pine, Douglas-fir, western white pine (*Pinus monticola* Dougl. Ex D. Don), and western larch (*Larix occidentalis* Nutt.) in April 1987. All of the planting stock was from local seed sources. The tree seedlings were all 1-year-old, 65.5-cm³ container stock grown by the Forest Research Nursery of the University of Idaho.

The study site is a western redcedar (*Thuja plicata* Donn ex D. Don)/queencup beadlily (*Clintonia uniflora* [Shult.] Kunth.) habitat type (Cooper et al. 1991). At the time of the study the plant community was a shrub-dominated overstory with a grass/forb understory. Natural tree regeneration included grand fir (*Abies grandis* [Dougl. ex D. Don] Lindl.), and western redcedar. The predominant shrubs were redstem ceanothus (*Ceanothus sanguineus* Pursh), serviceberry (*Amelanchier alniflora* Nutt.), snowberry (*Symphoricarpos albus* L. Blake), ninebark (*Physocarpus malvaceus* [Green] Kuntz), blue elderberry (*Sambucus cerulea* Raf), Scouler willow (*Salix scouleriana* Barratt ex Hook.), sticky currant (*Ribes viscosissimum* Pursh), and thimbleberry (*Rubus parviflorus* Pursh). Dominant understory plants included mullein (*Verbascum thapsis* L.), thistle (*Cirsium* spp. Mill.), fireweed (*Epilobium angustifolium* L.), bracken fern (*Pteridium aquilinum* [L.] Kuhn.), everlasting (*Antennaria neglecta* Greene), sheep fescue (*Festuca ovina* L.), bluegrass (*Poa* spp. L.), and elk sedge (*Carex geyeri* Boott). The site's average

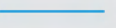

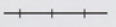



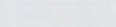

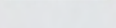

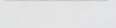

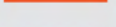

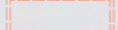
annual precipitation is 643 mm, with about 30% received as May to September rainfall (NOAA 1992). Slopes average about 20-40%. The site has a predominant north, northeast aspect at an elevation of 1006-1036 m. The soils are volcanic ash over loess and granitic parent material with a bulk density between 0.7 and 0.9 gm cm⁻³. They were classified ashy, mixed, frigid Vitric Hapludands within the Vasser soil series of Latah County (SCS 1981). A first-order stream flows through the bottom of the plantation.

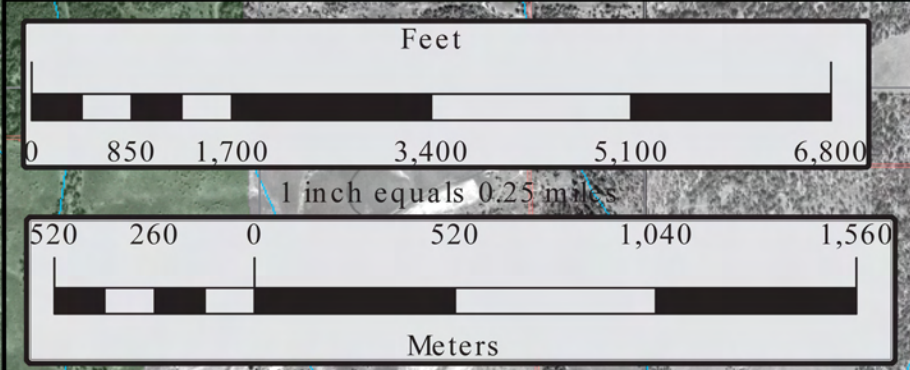
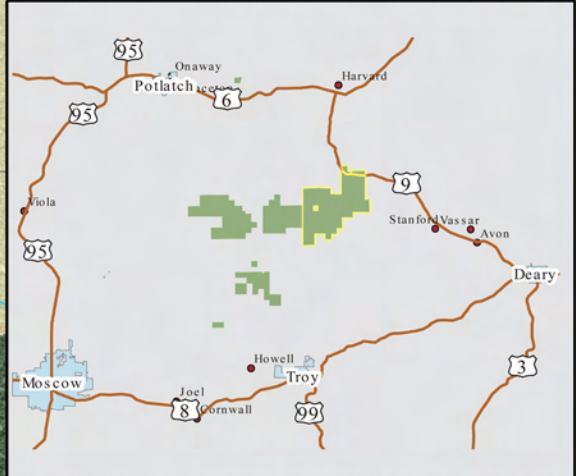
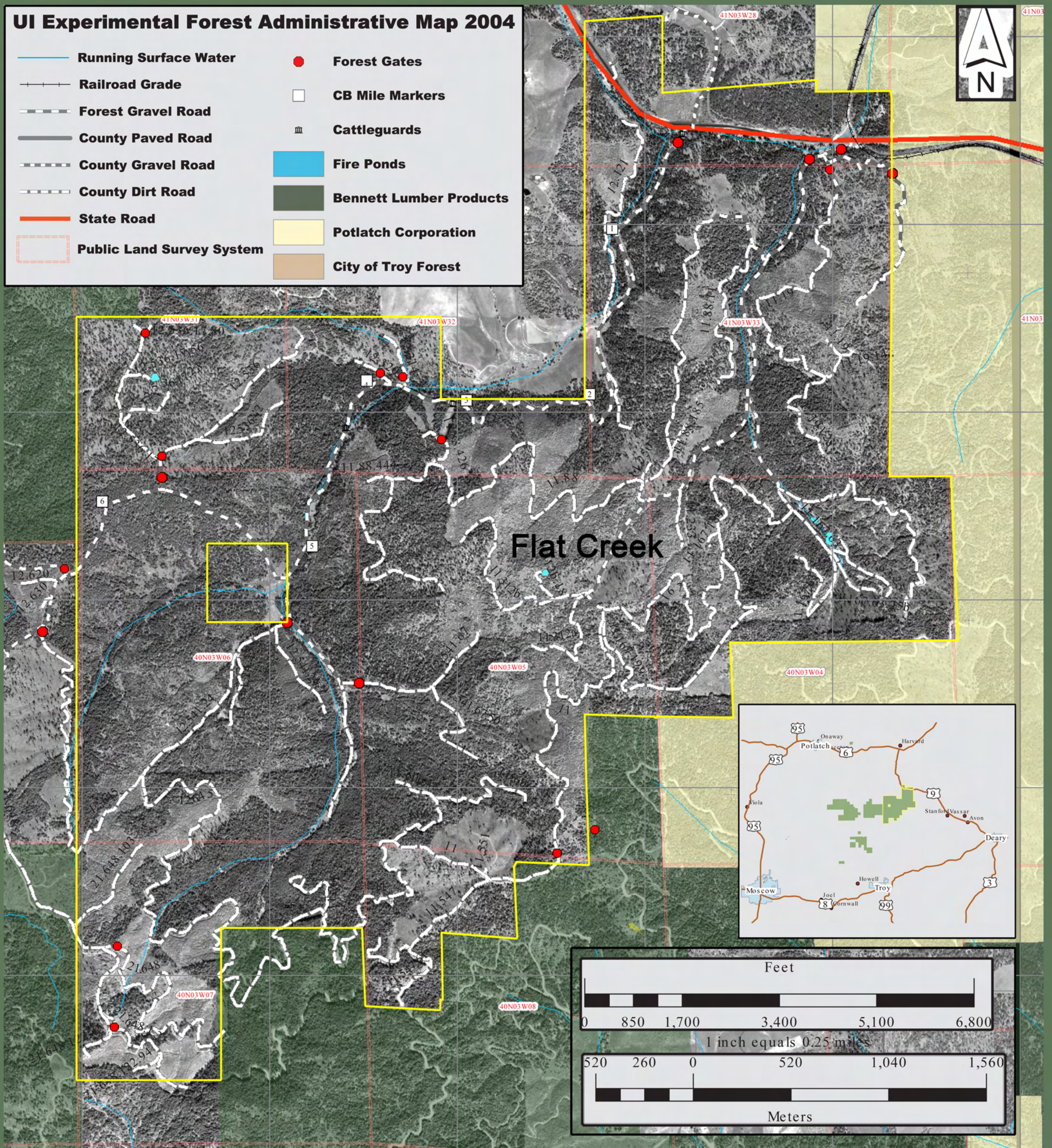
Flat Creek Stand Map 1986



Stand 01-10-06
harvested in 1986 by a cable system, and
broadcast burned

UI Experimental Forest Administrative Map 2004

- | | | | |
|---|----------------------------------|---|--------------------------------|
|  | Running Surface Water |  | Forest Gates |
|  | Railroad Grade |  | CB Mile Markers |
|  | Forest Gravel Road |  | Cattleguards |
|  | County Paved Road |  | Fire Ponds |
|  | County Gravel Road |  | Bennett Lumber Products |
|  | County Dirt Road |  | Potlatch Corporation |
|  | State Road |  | City of Troy Forest |
|  | Public Land Survey System | | |



Flat Creek



Location of Complete Research:

Author & Title: MacRae, Steven J.
Effects of Sheep Grazing on Tree Seedlings in a Northern Idaho
Conifer Plantation

University of Idaho Library:

Call Number- SF375.4..I2M27 1996

College of Natural Resources:

Department- Range Sciences

Other Sources: