# NATURAL VERSUS ARTIFICIAL REGENERATION:

# A BIOLOGIC AND ECONOMIC ANALYSIS

A Thesis

Presented in Partial Fulfillment of the Requirements for the

DEGREE OF MASTER OF SCIENCE

With a

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## ABSTRACT

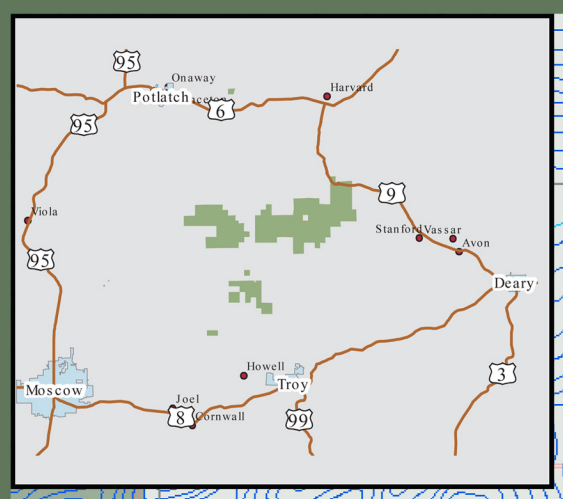
The potential of natural regeneration using the shelterwood and seedtree harvest-regeneration methods was evaluated for several site and stand conditions in northern Idaho. One seedtree and seven shelterwood cuts were examined and compared with potential plantations on the same sites. Growth and development of natural and artificially regenerated stands were projected using the Prognosis Model for Stand Development. Biological yields were evaluated economically with the Net Present Value (NPV) criterion.

The success of natural regeneration was highly dependent upon the habitat type, overwood and regeneration characteristics, and the economic assumptions used in the analysis. For the natural stands on the Thuja/Pachistima habitat type, results showed preferred reforestation method was clearcut and plant to western white pine to maximize NPV. On the Abies/Pachistma habitat type natural regeneration was financially more attractive. Of the five natural stands on this habitat type, four had approximately equal NPV's to comparable ponderosa pine plantations. Within this habitat type, several tree/stand attributes were desirable for successful natural regeneration. Overwood density, growth, and species composition had a major impact on the overall NPV of the natural stands. Empirical models were developed to quantify desirable overwood characteristics. Variables with proved significant in the models were tree diameter, crown ratio, and competitive status. Similarly, the composition, the amount, and growth of the regeneration had the most significant impact on the overall NPV of the natural stands for a given set of economic conditions.

The financial results reported in this study were greatly influenced by the economic assumptions used in the analysis. Financial success of natural regeneration was highly sensitive to the discount rate. Varying stumpage prices influenced the magnitude of NPV but did not change the preferred regime.

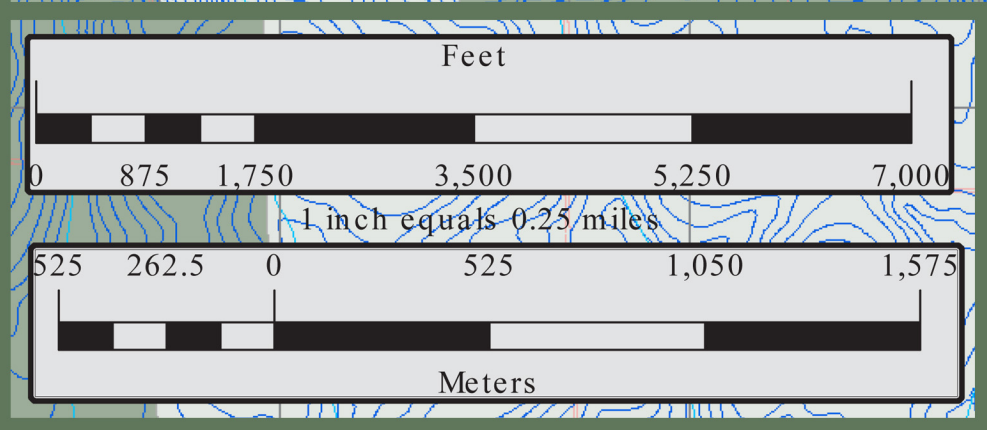
## SITE (abbreviated to pertinent UI Experimental Forest information)

…To obtain a broader range of site and stand conditions, two additional experimental areas were included in this study. One area was located on a ridge-top classified as the Abies/Pachistima habitat type in the Flat Creek Unit of the University of Idaho Experimental Forest. Three treatments were performed for demonstration purposes. In 1974 a shelterwood and seedtree cut were performed, and in 1978 an additional shelterwood cut was made….










## UI Experimental Forest Administrative Map 2004

- 6-Meter Contours
- Running Surface Water
- Fencelines
- 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
- University of Idaho Experimental Forest
- Bennett Lumber Products
- Potlatch Corporation
- City of Troy Forest

# Flat Creek Unit

# Location of Complete Research:

Author & Title: Fitzgerald, Stephen A.
Natural Versus Artificial Regeneration: A Biologic and Economic Analysis

University of Idaho Library:

Call Number- SD409.F58

College of Natural Resources:

Department- Forest Resources

Other Sources: