

**Operational fertilization effects on under-story vegetation**

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## ABSTRACT

This research was designed to investigate fertilization's effects on understory vegetation in conifer stands in the inland Northwest. Results of this study are presented in three sections with these main objectives: 1) determine if fertilization increased annual production and nutrient concentration and contents in understory vegetation; 2) determine if multi-nutrient fertilization changed understory vegetation diversity in understory vegetation; 3) create a model to estimate understory annual production in relation to overstory tree density as measured by basal area and multi-nutrient fertilization.

Experimental designs and statistical analyses differed between the three sections. Transects were established at sites located throughout the inland Northwest. The transect was the sampling unit for this study. Overstory density as measured by basal area and crown competition factor were assumed to be similar between treatments. Annual production was estimated by use of the comparative yield method based on Haydock and Shaw (1975). This part of the study consisted of four treatments; multi-nutrient, Nitrogen only, and Nitrogen + Potassium treatments, and control. These estimates were used to determine if fertilization increased understory annual production and to predict understory annual production following multi-nutrient fertilization. Analysis of variance and t-tests were used to determine if fertilization increased understory vegetation annual production. However, overstory density on some sites differed between treatments and Analysis of Covariance was used. Non-linear regression was used to create a statistical model to predict understory vegetation annual production following multi-nutrient fertilization. Nutrient analysis was conducted on vegetation clipped in the comparative yield method plots as well as additional vegetation collected along the transects. Only vegetation in the multi-nutrient fertilized units was

analyzed by use of t-tests. Percent cover data on understory vegetation was used to determine if fertilization changed diversity. T-tests and Analysis of Covariance (if overstory density differed between treatments) were used to determine if diversity changed.

Results of this study show that fertilization can change understory vegetation dynamics. The statistical model created to predict understory vegetation annual production explained variation while still being field practical. Fertilization produced variable results to increase understory vegetation annual production, diversity, and to change nutrient concentrations. This study showed that several factors may influence understory vegetation response to fertilization such as overstory tree density, overstory tree species, and present understory species composition.

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