

TABLE OF CONTENTS

- .01 Purpose
- .02 Objective
- .03 Authority
- .04 Responsibility
- .05 Definitions
- .06 Policy
- .1 Ecological Factors
 - .11 Soil Moisture
 - A. Soil Moisture and Herbaceous Vegetation
 - B. Soil Moisture and Woody Vegetation
 - .12 Temperature
 - A. Temperature and Herbaceous Vegetation
 - B. Temperature and Woody Vegetation
 - .13 Light
 - .14 Nutrients
 - .15 Plant – Animal Interactions
 - .16 Fire
- 5711 Site Preparation
- 5712 Tree Seed
- 5713 Seedlings
- 5714 Seeding
- 5715 Planting
- 5716 Protective Measures

5710 – REFORESTATION

.01 Purpose. This section provides guidelines, instructions, and practices to obtain maximum timber yields through natural regeneration, tree planting, and seeding.

.02 Objectives.

- A. To reestablish timber stands of desirable species and stocking on commercial forest land that is nonstocked or poorly stocked or occupied by undesirable species.
- B. To improve the quality of new timber stands by controlling the genetic quality of seeds and trees used on reforestation projects.
- C. To contribute to reforestation progress by developing and using improved reforestation methods and techniques.

.03 Authority. (See 5700.03)

.04 Responsibility. (See 5700.04)

.05 Definitions. (Reserved)

.06 Policy. (See 5700.06)

5710 – REFORESTATION

.1 Ecological Factors. Success in establishing, maintaining, and improving forest stands is largely dependent upon a knowledge of the ecology of competing vegetation. Without such knowledge and a conscientious effort to apply it, forest development treatments will seldom produce the desire results and are likely to be detrimental. Ecological factors in an ecosystem are interrelated and complex. A plant species competing with a conifer may also have beneficial interactions with the conifer and other species on the site.

.11 Soil Moisture. Most studies seeking correlations between forest site quality and physical-chemical characteristics of the soil have found the physical characteristics that influence soil moisture to be the most important.

- A. Soil Moisture and Herbaceous Vegetation. Since most feeder roots of first year Douglas-Fir seedlings are at depths of two to seven inches, with root penetration varying from three to twelve inches, it follows that these and other seedlings suffer most for moisture in competition with shallow, fibrous root systems of grasses, herbs, and shrubs. Herbaceous vegetation is nearly always present on sites suitable for planting. In droughty zones, such vegetation is capable of intensifying the drought conditions to the exclusion of conifers. Conditions that cause heavy mortality also contribute to slow growth of seedlings that survive, whereas seedlings that grow quickly from the start are exposed to less animal depredation and tend to evade the encroachment of weeds better than those in heavy cover. When moving from dry sites to wet, it becomes less likely that herbaceous vegetation will restrict the development of conifers.
- B. Soil Moisture and Woody Vegetation. Compared to herbaceous vegetation, older trees suffer greatest competition for soil moisture from shrubs with deep root systems. When conifers and brush species germinate at the same time (in the absence of herbaceous vegetation), it is conceivable that many of the seedlings occupy soil volume where roots of competing vegetation are not present. As trees and shrubs grow, however, their root systems overlap and root competition increases. While there is ample evidence that complete eradication of brush is necessary to assure success of some reforestation projects, there is also evidence that moisture conditions in the root zone of seedlings may be more favorable for initial establishment underbrush than in herbaceous vegetation or in the open.

.12 Temperature. High temperature at the soil surface kill seedlings by collapsing cells of their tissues. Thermal death point is reached when surface soil temperatures are in the range of 125°F, to more than 150°F, depending upon heat resistance of the seedling. Largest losses of coniferous seedlings occur on south slopes where greater radiation loads produce the hottest environments. Older trees, however, are more resistant to high temperatures caused by solar radiation. Warm temperatures are a physiological necessity since many biochemical processes of conifers are temperature dependent.

- A. Temperature and Herbaceous Vegetation. Herbaceous vegetation intensifies heat close to the ground thereby increasing transpirational stress on conifers exposed to any given moisture stress.
- B. Temperature and Woody Vegetation. Observations in south-western Oregon indicate that species such as varnishleaf ceanothus, (*C. velutinus* var. *laevigatus*) and Pacific Madrone (*Arbutus menziesii*) may act as nurse crops, by providing shade and reducing surface soil temperatures during the critical period in the early life of the seedlings. Snow-brush ceanothus, (*C. veluntinus*) in the northern Rocky Mountains, has provided situations more favorable to seedling survival than in the open partly by reducing soil temperatures. Brush also serves to protect seedlings from late spring and early fall frosts. High temperatures unless associated with drought, do not have very serious effects on well-established, hardened plants.

.13 Light. Most commercial confiders, once established, use direct sunlight, with its high intensity and enriched spectral quality, instantaneously, for photosynthesis. Cumulative effects, such as growth, storage of carbohydrates and water usage, depend upon the amount of light reaching a plant over a period of time. Trees shaded by brush for too long are characteristically slender-stemmed and fragile in appearance, with narrow, open crowns and small amounts of foliage.

.14 Nutrients. The presence of numerous nodulated non-leguminous plants in the forest ecosystem is of great importance. Many of them fix nitrogen as efficiently as legumes. Also, in the forest ecosystem, where most of the nutrients are concentrated in the organic layers, the accumulation of litter underbrush significantly effects the fertility in the seedling root zones.

5710 – REFORESTATION

.15 Plant-Animal Interactions. Herbaceous or woody vegetation may provide a favorable habitat for destructive animals such as mice, gophers, wood rats, rabbits, and mountain beaver. Brush, however, may provide protection from grazing livestock and larger wildlife. Currently, there is disagreement among researchers regarding the effect, on animals, of eliminating their food supply. Gratkowski, for example, states that, "Where rabbits, game, and other animals are apt to be a problem, we must be careful not to eliminate preferred browse species from the community for the animals may turn to conifers as a substitute." However, Newton's findings are in disagreement with this concept, "... the total absence of desirable forage species in plantations treated with atrazine appears to prevent the occurrence of animals within the general plantation area." Research in progress will hopefully clarify this questions.

.16 Fire. Fire is an extremely important environmental factor in the ecology of woody and herbaceous plant species. Many brush species resprout from burls and roots after fire while most important conifers do not. Also, seeds of chaparral species may lie dormant but viable in the soil for many years until fire induces germination.