Surveying Forest Lands

FOR

STOCKING

By

Dale N. Bever

May 1961 Research Note 44

Forest Lands Research

OREGON FOREST RESEARCH CENTER

Corvallis

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Two State programs of research are combined in the Oregon Forest Research Center to improve and expand values from timberlands of the State.

A team of forest scientists is investigating problems in forestry research of growing and protecting the crop, while wood scientists engaged in forest products research endeavor to make the most of the timber produced.

The current report stems from studies of forest lands.

Purpose . . .

Develop the full potential of Oregon's timber resource by:

- increasing productiveness of forest lands with improved forest practices.
- improving timber quality through intensified management and superior tree selection.
- reducing losses from fire, insects, and diseases--thus saving timber for products and jobs.

Keep development of the forest resource in harmony with development of other Oregon resources.

Current Program . . .

Seed production, collection, extraction, cleaning, storage, and germination.

Seedling production, establishment, and survival for new forests.

Growth and development of trees, quality of growth, and methods of thinning and harvesting to grow improved trees.

Study of forest fire behavior and fire weather to prevent fires.

Insect pests and their control, to save trees.

Disease control and prevention in Oregon forests.

Mammal damage and the controls to help regrowth.

Soils and their relationship to growth.

Development of improved forests through selection and breeding.

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FOREWORD

This publication contains data first presented in two notes and one bulletin prepared by the Research Section, Oregon State Board of Forestry, forerunner of the present Forest Lands Research, Oregon Forest Research Center.

These publications, now out of print, are A Study of A Stocking Survey System and the Relationship of Stocking Percent as Determined By This System to Number of Trees Per Acre, Research Bulletin No. 1, and The Relationship of Stocking Percent to Number of Trees Per Acre on Artificially Seeded Areas, Research Note No. 9, both by Dale N. Bever, and Revised Number of Trees Per Acre Curves, Research Note No. 25, by Dale N. Bever and Denis P. Lavender.

SURVEYING FOREST LANDS FOR STOCKING

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Director
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INTRODUCTION

To determine and describe the condition of forest lands as new forests become established following logging, foresters need an accepted standard of adequacy of stocking. Once a standard has been selected there is established automatically a need for a reliable system of surveying lands for stocking to determine if this standard has been met.

With enactment of the Oregon Forest Conservation Act in 1941, the State Forester needed to select a standard of adequate stocking and a survey system by which to gather data. The standard chosen and defined in the amended Conservation Act of 1947 was 300 established live seedlings to an acre sufficiently spaced for individual normal growth and development, 100 of which are well distributed over the acre. The survey system devised for collecting data involved the simultaneous tabulation of stocking by both milacre quadrants and single plots of four milacres. This survey system is described on the following pages.

Because the survey system gives results in percentage of milacre plots and percentage of four milacre plots that are stocked, conversion of these percentages to number of trees on an acre is desired to enable comparison with the established standard. This conversion also is helpful because stocking in terms of number of trees on an acre is preferred by many foresters and because it is understood readily by the public.

GATHERING DATA

Data are taken from equidistant points along two compass lines running north and south, and along two compass lines running east and west through each forty-acre area. Parallel survey lines are located ten chains apart, five chains inside the boundaries of those 40-acre subdivisions regular in shape. If the subdivisions are irregular in shape, lines are adjusted to provide the same proportionate division of each forty acres.

The first sample plot on each line is established one chain from the starting point; remaining plots are located at two-chain intervals (Figure 1). Forty plots are established on each 40-acre subdivision. All distances usually are measured by pacing. Sample plots are circles four

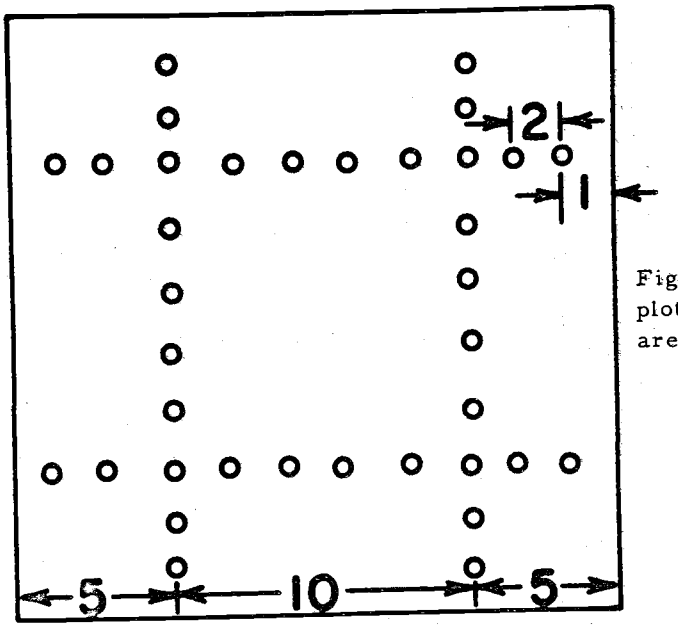

Figure 1. Location of plots within a 40-acre area, showing distances in chains.

milacres in horizontal area, about 7.45 feet in radius. Each plot is divided by cardinal lines into four quadrants, one milacre in size (Figure 2).

In recording stocking, three classes of reproduction are recognized:

- First-year reproduction--seedlings in their first season of growth and not yet definitely established.
- Established reproduction--seedlings in healthy condition after one or more seasons of growth.
- Advanced reproduction--seedlings in healthy condition after five or more seasons of growth.

Results of stocking surveys are expressed as percentages in terms of advanced reproduction and established reproduction. Three first-year seedlings are considered equal to one established seedling.

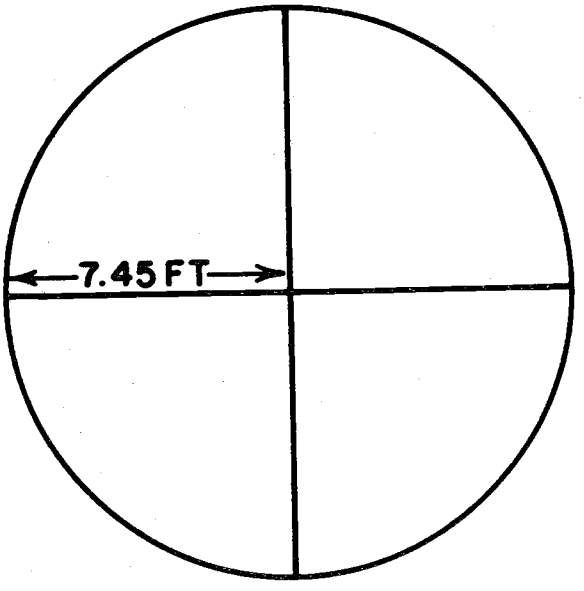

Figure 2. Division of a four-milacre plot into four plots of one milacre each.

DETERMINING NUMBER OF TREES

Naturally Seeded Areas

In the Douglas fir region of Western Oregon, some 100 sample plots each 40 acres in size were surveyed for stocking following natural seeding. By applying standard statistical methods, a curve was constructed to show ratio of per cent of stocking on milacre plots to number of trees on an acre (Figure 3). Ratio also was determined of per cent of stocking on four-milacre plots to number of trees on an acre (Figure 4). Because a low standard estimate of error is found in the milacre curve, this curve offers a more accurate conversion of per cent of stocking to number of trees on an acre than does the four-milacre curve.

Number of trees on an acre as shown on any part of either curve may be slightly low, because counts of seedlings 2-4 years old made during field surveys may be low. These small seedlings often are difficult to find.

Artificially Seeded Areas

About 13,000 acres that received direct seeding of Douglas fir in Western Oregon were surveyed in 43 samples for construction of the curve in Figure 5. Intensity of sampling ranged from 120 plots of one milacre to 480 plots of one milacre to a forty-acre subdivision. The curve in Figure 5 indicates conversion of per cent of stocking on milacre plots to number of trees to an acre for stocking up to 35-40 per cent.

Areas surveyed in this study were seeded at the rate of from 1/4 pound to an acre to 1-1/2 pounds to an acre. Because there was no significant difference in ratio of per cent of stocking to number of trees to an acre in these samples, the assumption was made that, for practical purposes, amount of seed broadcast on each acre did not affect the ratio.

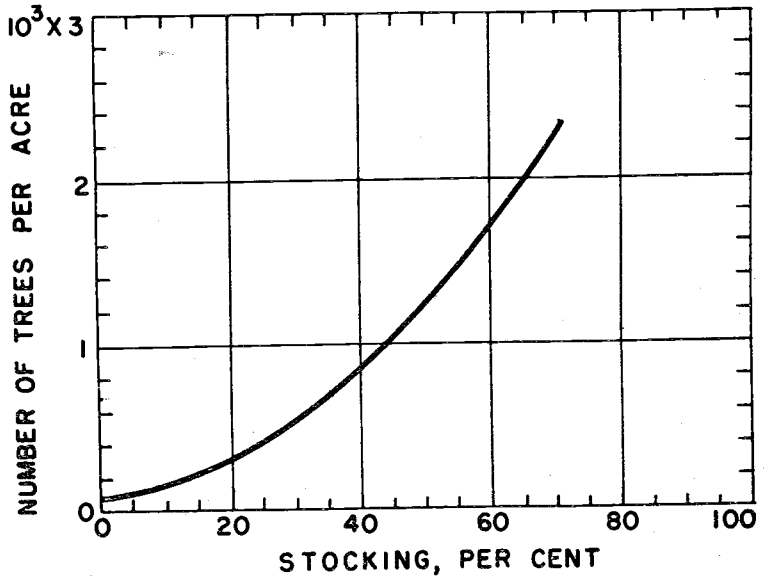

Figure 3. Ratio of percentage of stocking on milacre plots to number of trees per acre.

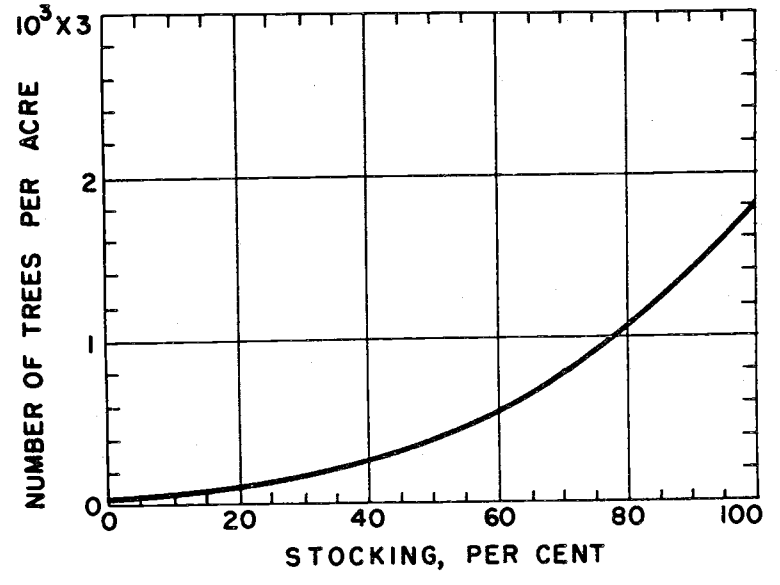

Figure 4. Ratio of percentage of stocking on four-milacre plots to number of trees per acre.

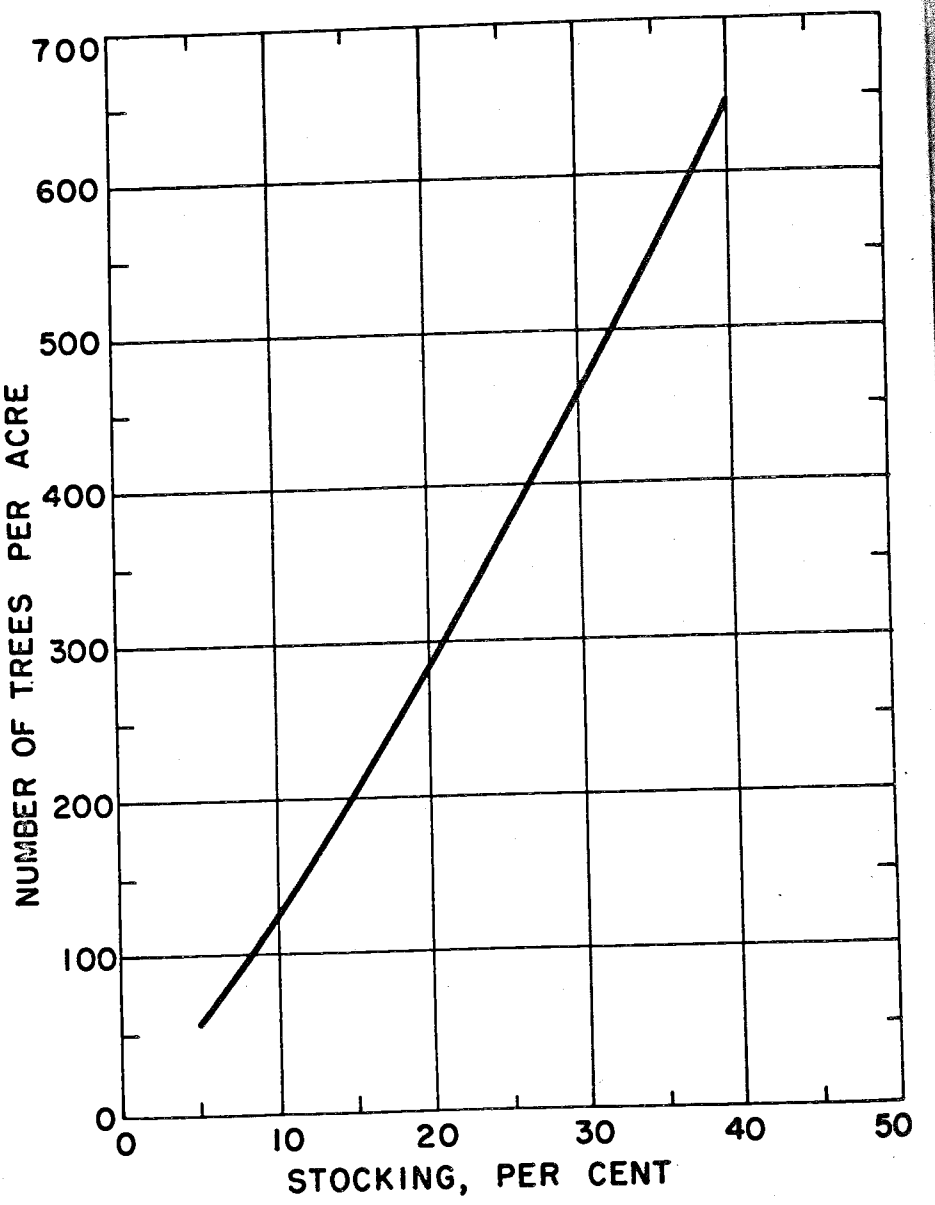

Figure 5. Ratio of percentage of stocking on milacre plots to number of trees per acre on artificially seeded areas.

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