

User's Guide to the Western Root Disease Model, Version 3.0

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Preface

Purpose and Scope

This document contains background information and detailed instructions on how to use the Western Root Disease Model, Version 3.0 (WRDM3). The WRDM3 is an extension for the Forest Vegetation Simulator (FVS), an individual-tree, distant-independent, growth and yield model produced by the USDA Forest Service. This user's guide assumes that the reader is generally familiar with FVS, and the guide should be used in conjunction with the FVS (Prognosis) User's Guide (Wycoff and others 1982).¹

The WRDM3 was developed to account for the influences of pathogens and insects on stand dynamics predicted by FVS. The model simulates the effects of *Armillaria* root disease (caused by *Armillaria* spp. (Fr.:Fr.)), laminated root disease caused by *Phellinus weirii* (Murr. [Gilbn.]), or Annosus root disease (caused by *Heterobasidion annosum* (Fr.) Bref.) and their interaction with bark beetles. The model evolved from two earlier root disease models: The Western Root Disease Model, Version 1.0 (Stage and others 1990)¹ and the Annosus Root Disease/Bark Beetle Model (Beukema and others 1995).¹ All these models were developed using a workshop process through which pathologists, entomologists, and silviculturists contributed their knowledge of these biological systems.

This manual provides instructions on how to use the model and what to use it for, and a complete description of model design. It is not meant to be read cover-to-cover. Instead, the reader is encouraged to use the Table of Contents and Index to pull out information as needed.

Once you become familiar with the WRDM3 it becomes fairly easy to use; however, at first, trying to use it can be overwhelming. If you are new to the model, we encourage you to get assistance from pathologists and entomologists and FVS model specialists. To get the most recent version of the model or for answers to technical questions contact: Judy Adams, Forest Health Technology Enterprise Team, USDA Forest Service, 3825 E. Mulberry Street, Fort Collins, CO 80524.

This manual is composed of six chapters, as follows.

Chapter 1 provides background information on the impacts and biology of root diseases. It describes the biological phenomenon that the model is designed to capture.

Chapter 2 contains instructions on how to use the model. If you are anxious to get started with the model, you may want to read this section first.

Chapter 3 outlines some pointers on how to use the model. It selects some important information that will optimize the running of the model. Contents include a brief explanation of how to collect the root disease information needed to run the model, how to adjust model functions to represent local conditions, and examples of ways to enter root disease information into the model.

Chapter 4 is a detailed description of how the model was developed, and the functions and assumptions it is based upon. It does not need to be read before using the model, rather it is presented for those curious about how the model actually works.

Chapter 5 summarizes a test of the model that compared model performance to permanent plot data. Short-term (13-year) model predictions were compared to real data from fir stands with Annosus root disease in California. Results demonstrate that the model is, on average, making accurate projections.

Chapter 6 contains information relevant to model users in British Columbia (B.C.), Canada. A brief overview of root disease models available in B.C. and their advantages and disadvantages is presented.

Technical Specifications

The Western Root Disease Model along with FVS is written using the Fortran 77 Standard. It currently runs on the following computer platforms: AOS/VS (Data General), DOS (IBM compatible PCs) and AIX (IBM Unix). It ports to other platforms easily.

System requirements for an IBM compatible PC are:

- IBM compatible PC, 386DX or better

1. Anon. 1995. *VDYP interactive application user guide, version 6.3*. Victoria, BC:BC Ministry of Forests Resources Inventory Branch; 44 p.

- DOS 3.3 or above
- 4 Mbytes of memory
- Minimum of 20.0 Mbytes of disk space. The model, depending on the variant of FVS being used, requires 1.2 Mbytes to 3.5 Mbytes.
- To use the model along with a user interface (Submittal System or Suppose...) and post-processors, 100 Mbytes of disk space are suggested.

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Chapter I



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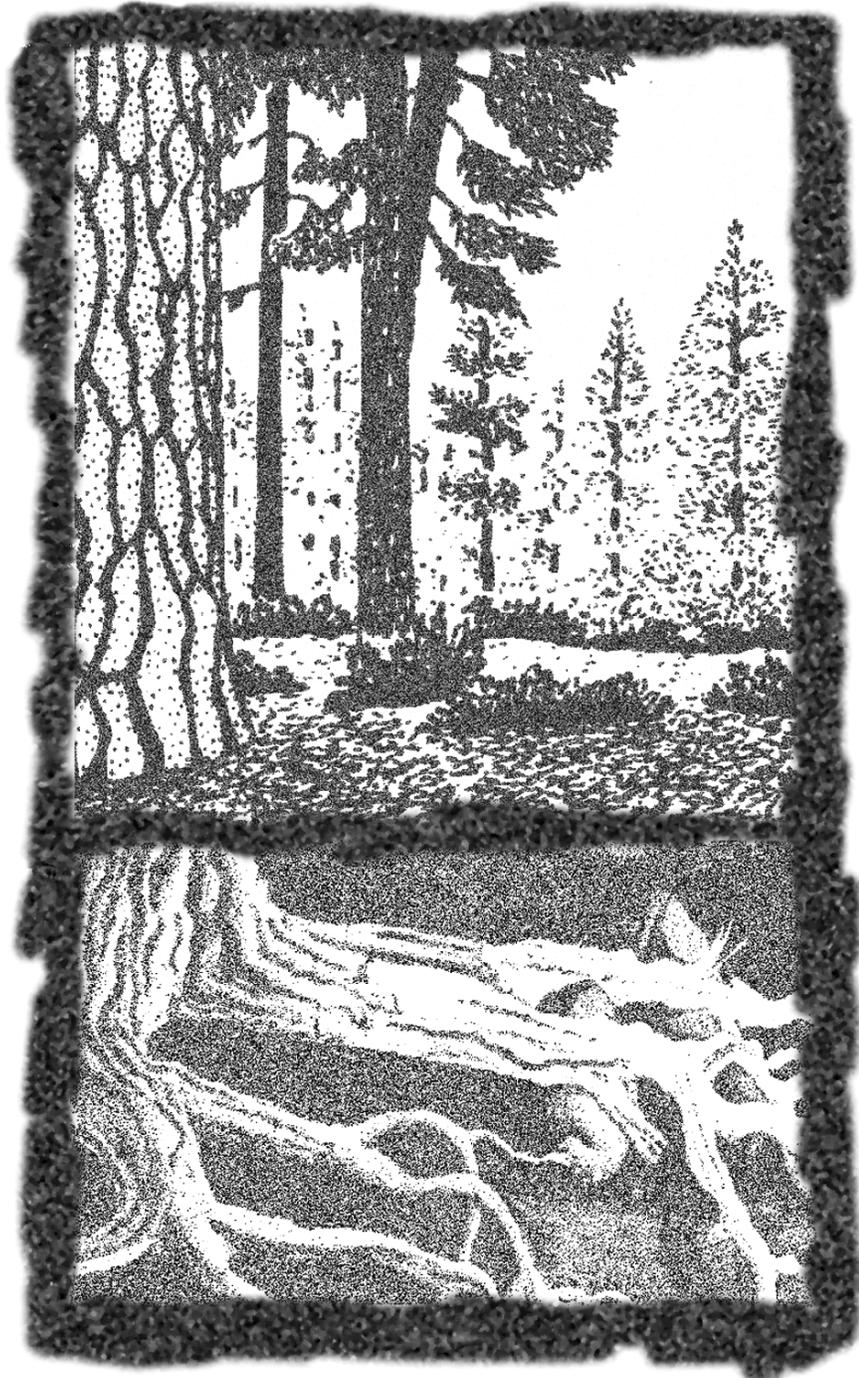
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Abstract

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Effects of *Armillaria* spp., *Phellinus weirii*, *Heterobasidion annosum*, or bark beetles on stand dynamics are represented by the Western Root Disease Model, Version 3.0. This model, which operates in conjunction with the Forest Vegetation Simulator, can be used to evaluate the effects of many silvicultural practices. This guide contains instructions for use, detailed description of model functions, an overview of characteristics of root diseases, a comparison of model predictions to real data, and special instructions for users in British Columbia.

Retrieval terms: *Armillaria*, bark beetles, forest modeling, Forest Vegetation Simulator, *Heterobasidion annosum*, *Phellinus weirii*

Technical Coordinator

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