Session 1 – Background and Model Description

Slide 1

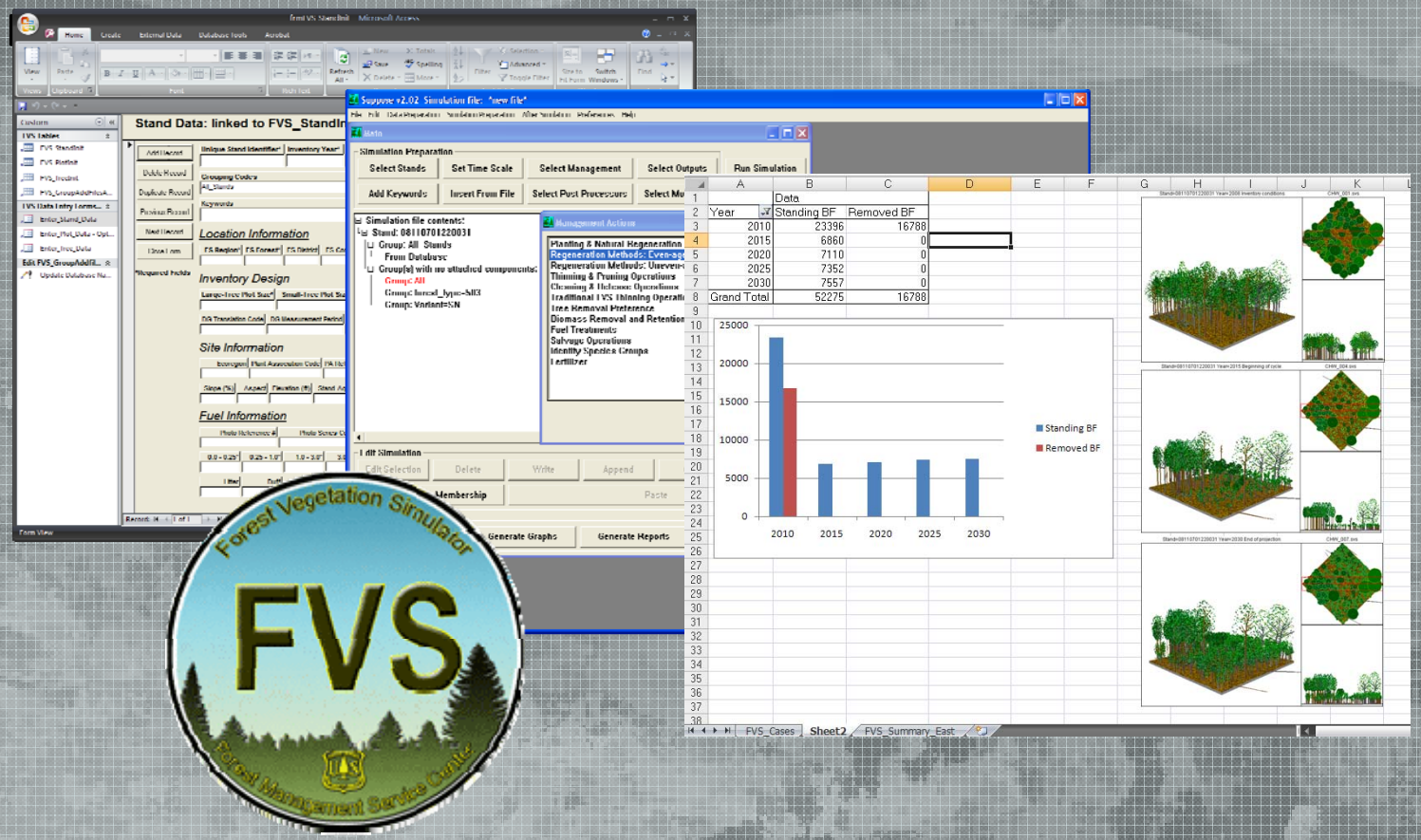
Overviews

FPS

FVS

ORGANON

Summary

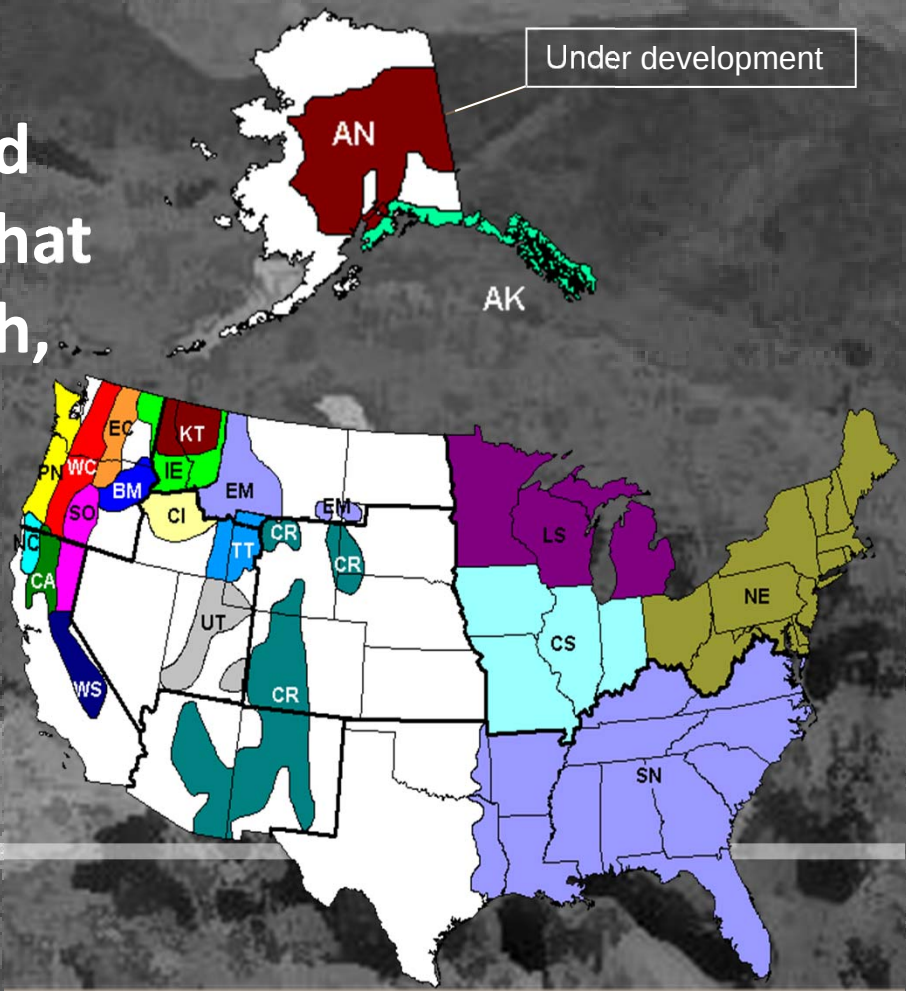


FVS Overview- outline

- FVS Background
- FVS Model Structure and Behavior
  - Data Needs and Requirements
  - Model Components
  - Example: Large Tree Diameter Growth
- FVS Suite Software

FVS: Background

- Represent species commonly found in a geographic region
- Local Data are used to create models that predict tree growth, mortality, and regeneration



FVS: Code and Documentation

The FVS Code repository:

Outside the FS firewall – Google Code

- **http://code.google.com/p/open-fvs/**

FVS Documentation:

Forest Service web site

- **http://www.fs.fed.us/fmsc/fvs/**

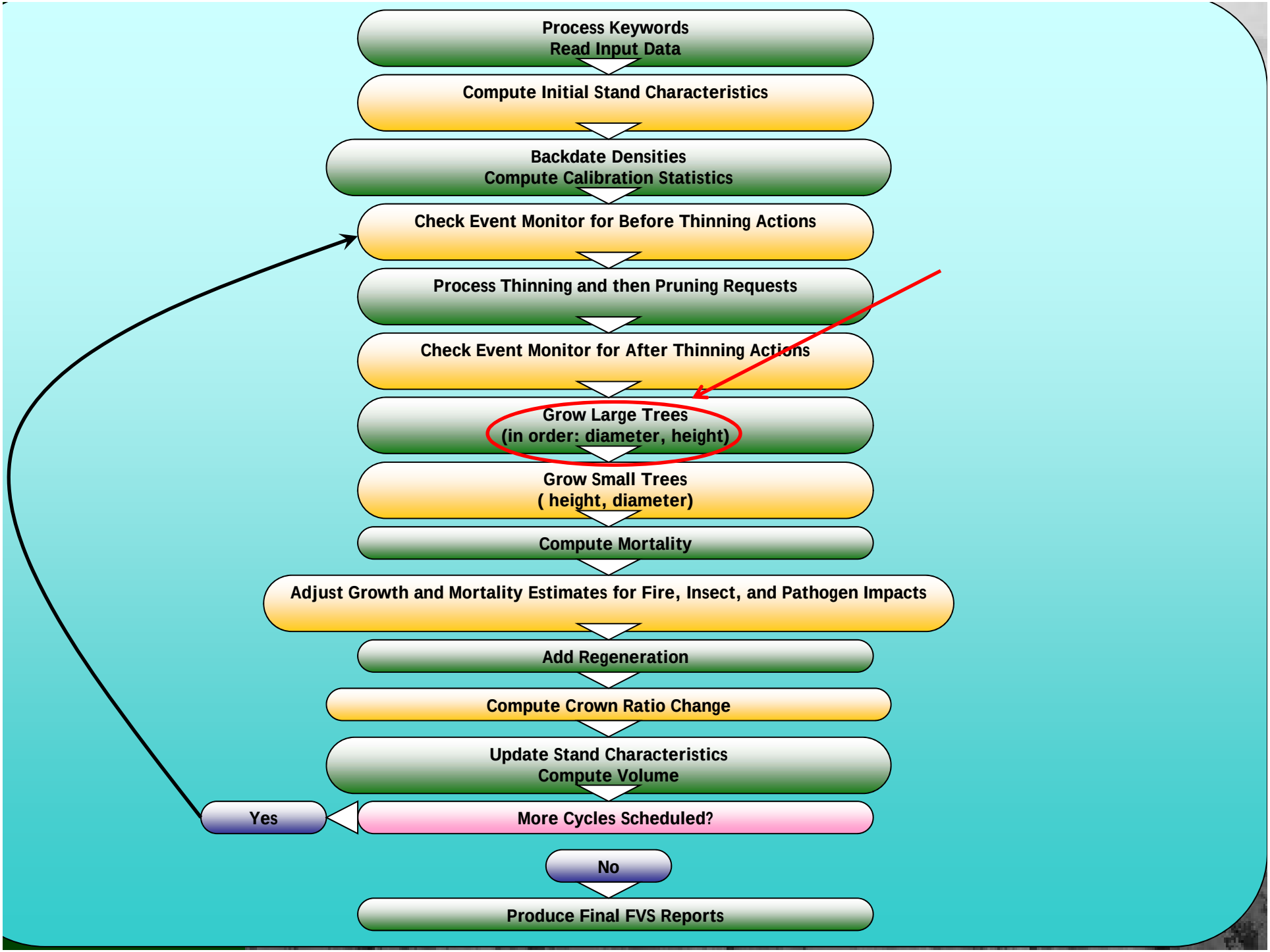
FVS: Stand Inventory Data

Stand/Site:

- Location
- Ecological Code: Ecoregion, Plant Assoc, Habtype
- Slope
- Aspect
- Elevation
- Site Index
- Carrying Capacity (Max SDI/MaxBA)

Tree:

- Species
- **DBH (required)**
- Height
- Crown Ratio
- Past Growth Increment
- Tree Count (from inventory design)


Process Keywords
Read Input Data
Compute Initial Stand Characteristics
Backdate Densities
Compute Calibration Statistics
Check Event Monitor for Before Thinning Actions
Process Thinning and then Pruning Requests
Check Event Monitor for After Thinning Actions
Grow Large Trees
(in order: diameter, height)
Grow Small Trees
(height, diameter)
Compute Mortality
Adjust Growth and Mortality Estimates for Fire, Insect, and Pathogen Impacts
Add Regeneration
Compute Crown Ratio Change
Update Stand Characteristics
Compute Volume
More Cycles Scheduled?
Yes
No
Produce Final FVS Reports

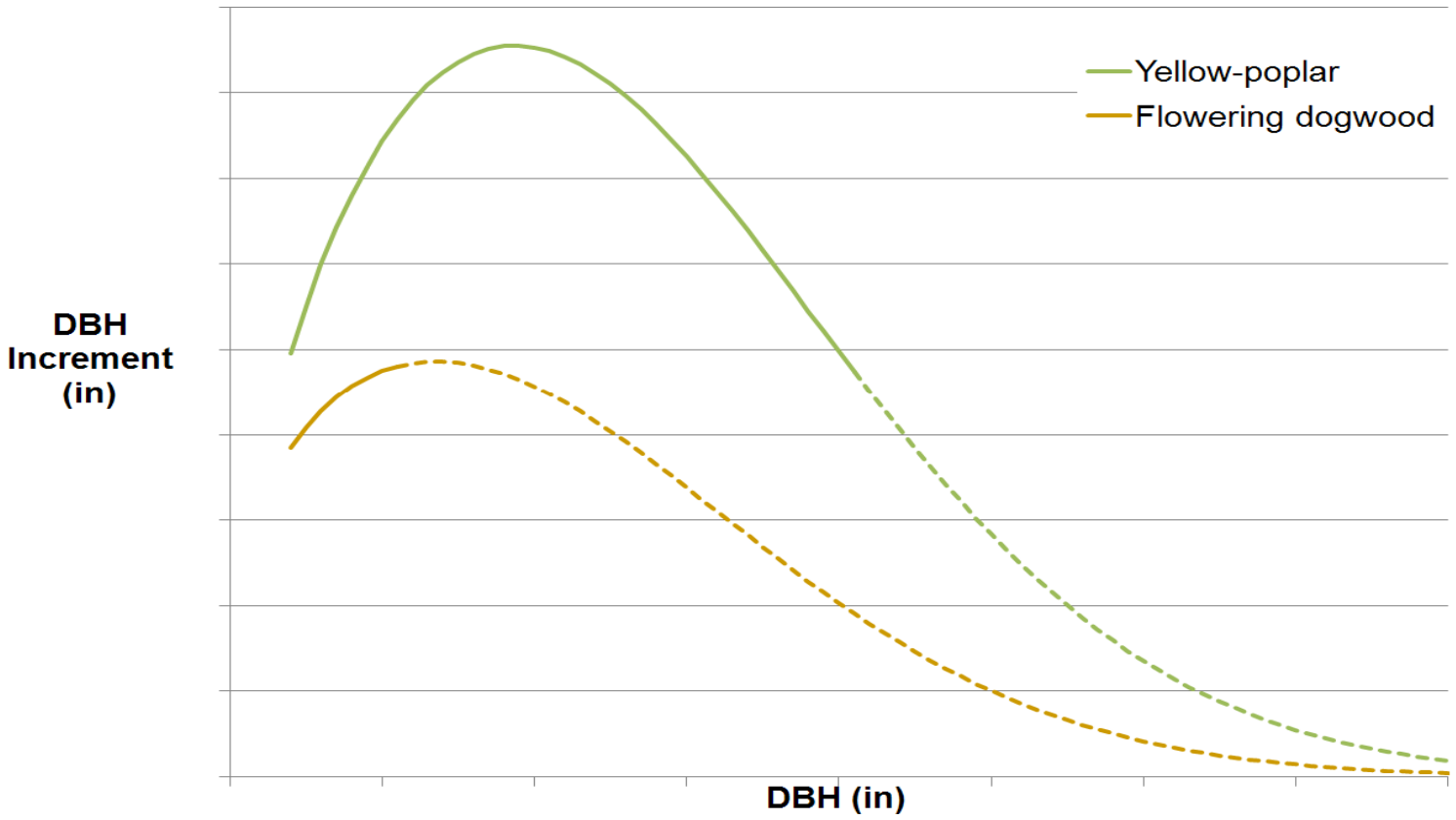
FVS: Diameter Increment Model

- Based on a prediction of a mean growth rate that is corrected for tree size, site quality, and the level of competition
- Derive diameter increment (DG) from predicted periodic change in squared inside-bark diameter (DDS)
  - equivalent to a basal area increment model
  - linear relationship between ln(dds) & ln(DBH)

$$\ln(dds) = SIZE + SITE + COMPETITION$$

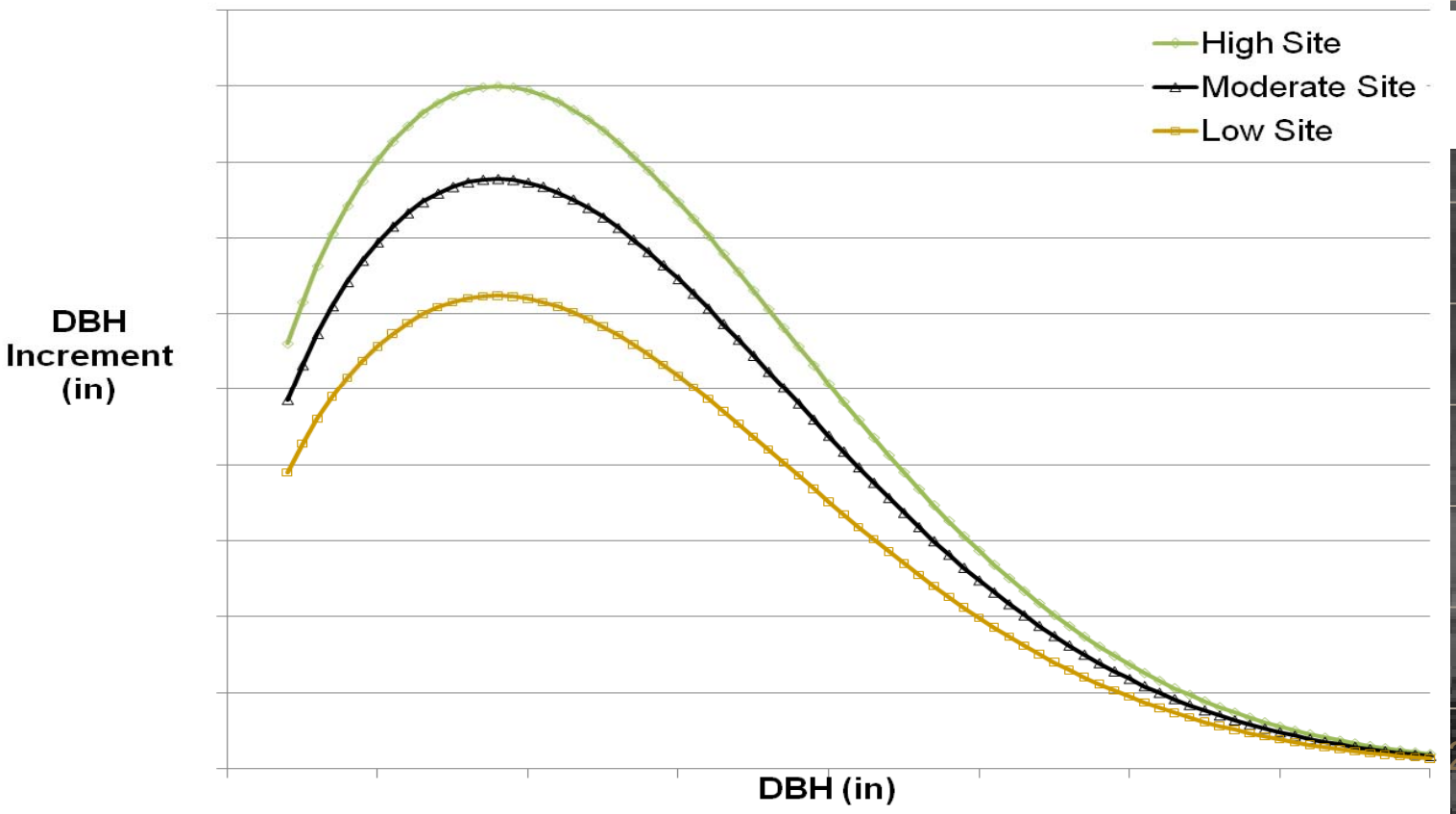
$$DG = \sqrt{dib^2 + dds} - dib$$

FVS: Tree Size Effects



Size = ln(DBH) + DBH^2

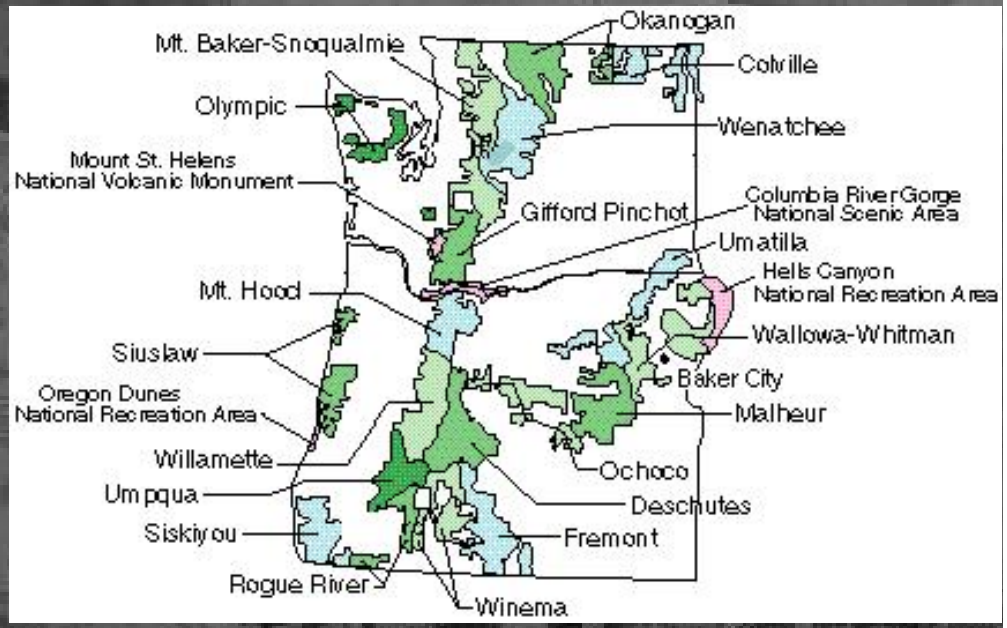
FVS: Site Effects



Site = fx{ Location, Habitat Type, Site Index, Elevation, Slope, Aspect}

FVS: Site Conditions

- Location
  - US Forest Service National Forest
  - code is based on Region, Forest



FVS: Site Conditions

- Site Index
  - single measure that integrates the effects of soil and climate on tree growth for a given site
  - used to identify potential height growth and affects diameter growth
- Habitat Type
  - Montana, Idaho (R1&R4)
  - List are in the back of the variant overviews
  - Embedded in diameter growth equations

FVS: Site Conditions

- Slope, Aspect, Elevation
  - combined measures that integrate the effects of topography on tree growth for a given site
  - can identify an optimal location for growth
  - affects diameter growth

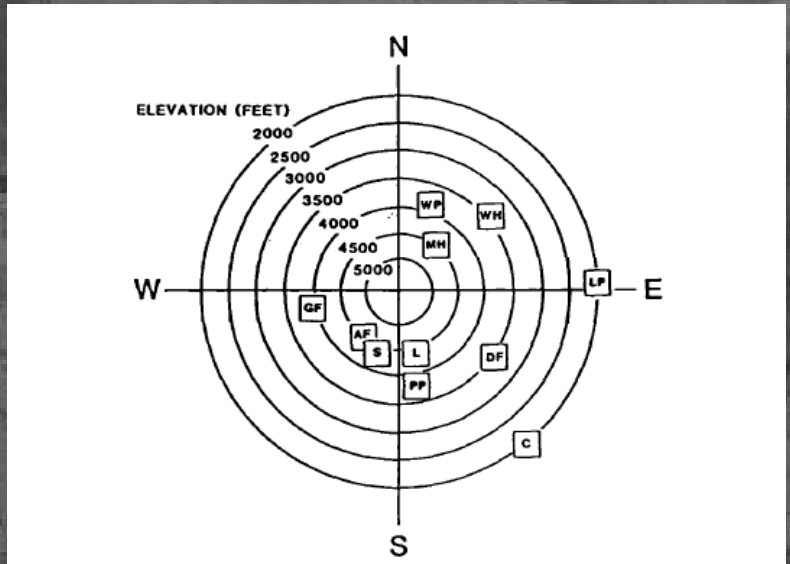
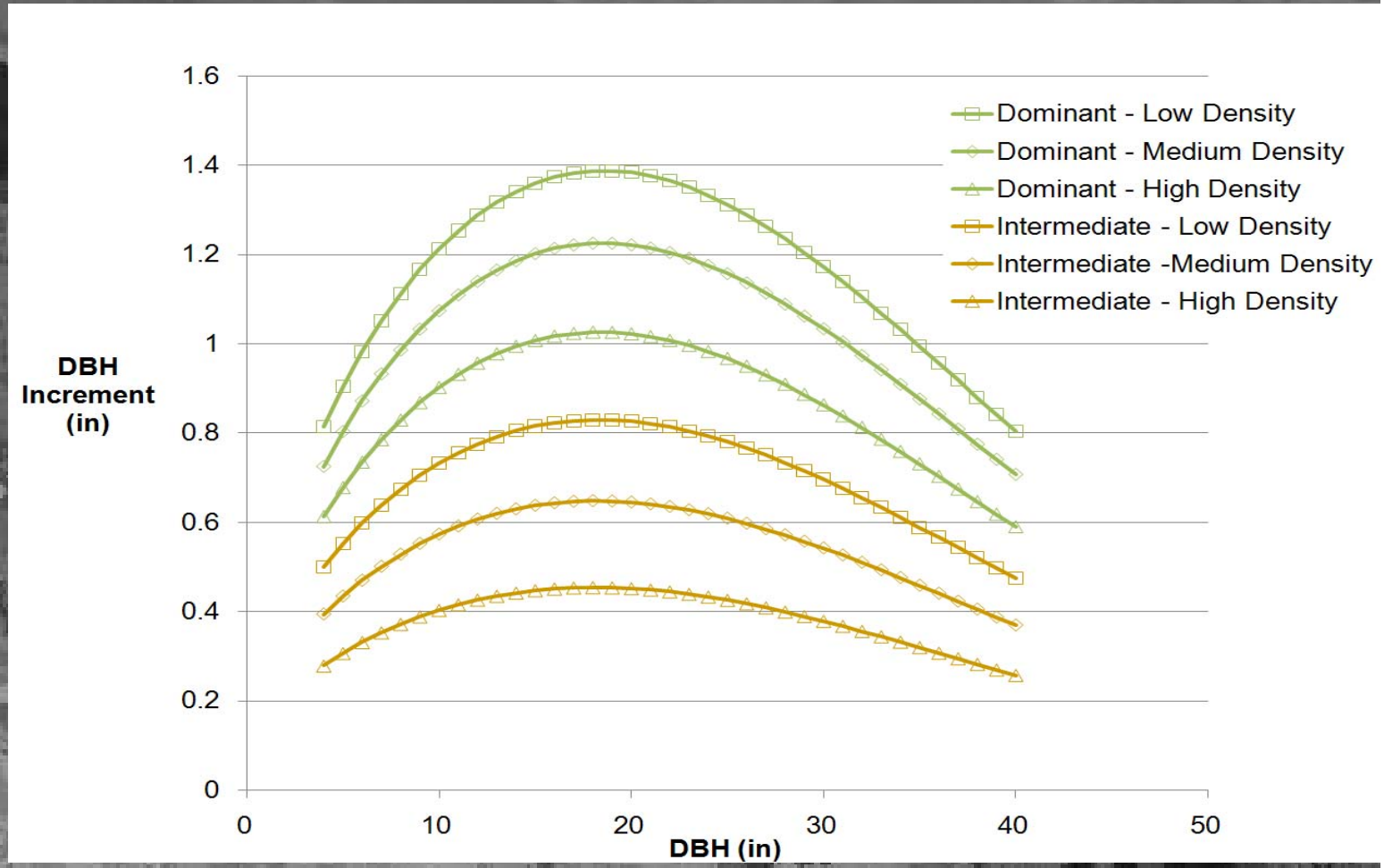


FIGURE 10. Elevation and aspect associated with maximum predicted increment with all other effects held constant. Species codes are listed in Table 1.

Wykoff 1990, Forest Science 36(4): 1077-1104

FVS: Competition Effects

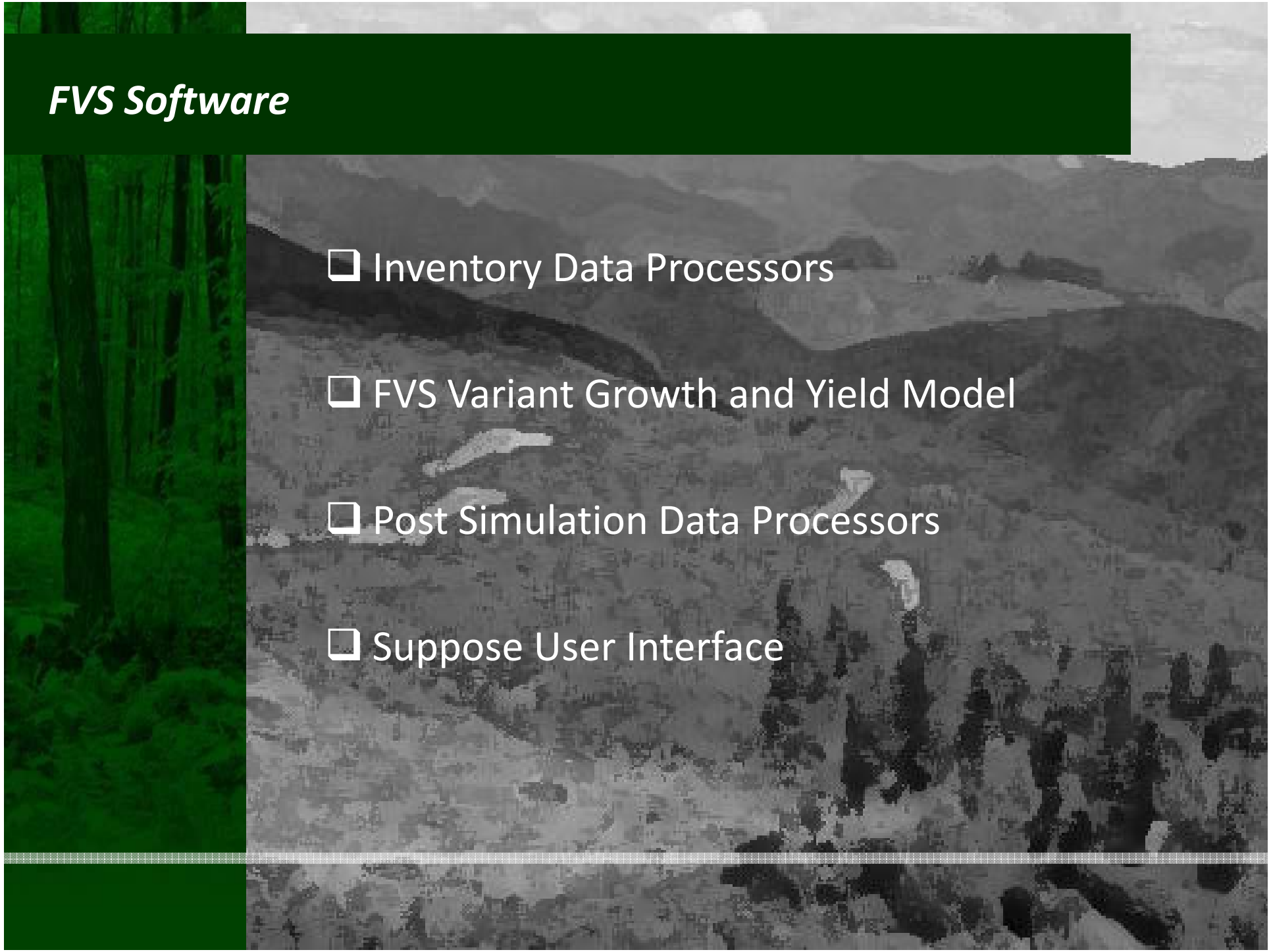


Competition = fx{Crown ratio, Relative Height, Crown Competition Factor , Basal Area, Basal Area in Larger Trees, Plot Level Basal Area in Trees Larger }

FVS: Model Behavior

- The diameter increment model shows how FVS is designed to handle differences in stand structure
- Focusing on the growth of individual trees allows FVS to handle most stand structures
  - even aged stands
  - two-aged stands
  - uneven-aged Stands

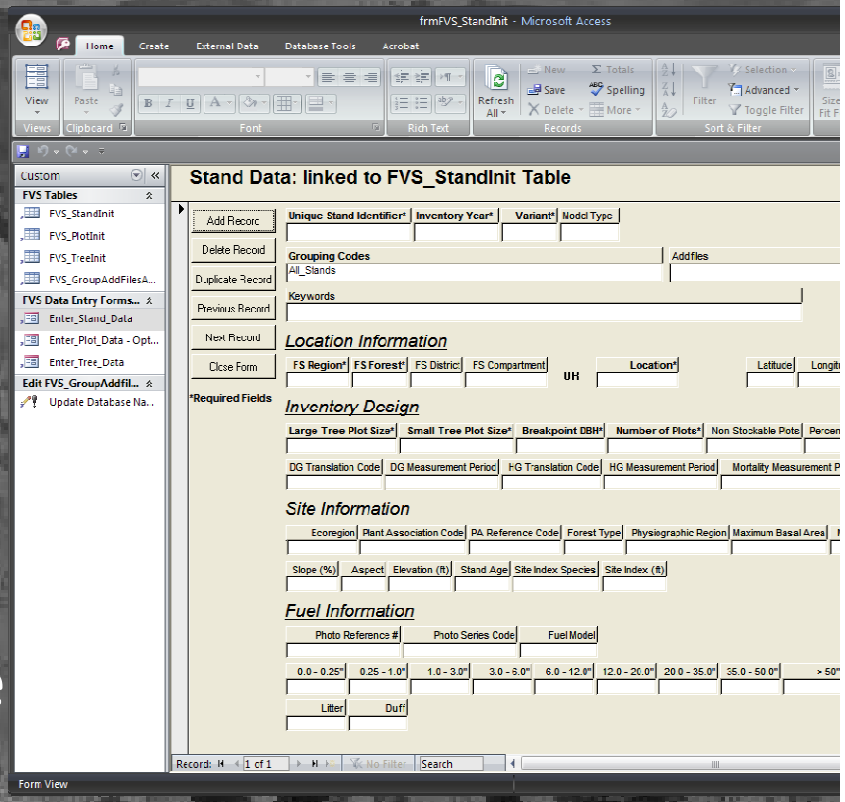
FVS Software



- Inventory Data Processors
- FVS Variant Growth and Yield Model
- Post Simulation Data Processors
- Suppose User Interface

FVS: Inventory Data Processors

- FSVeg (Field Sampled Vegetation tool)
- FFI(FEAT/FIREMON Integrated tool)
- FIA2FVS (Forest Inventory and Analysis)
- MS Access database

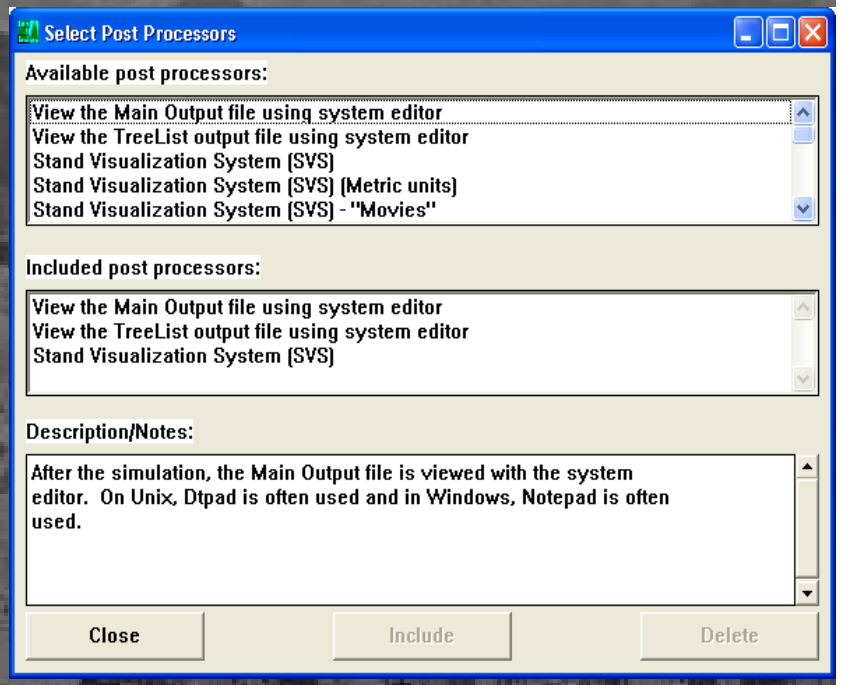


FVS: Growth and Yield

- Projects single or multiple stands in a single simulation
- Models stand development with and without taking into consideration forest health concerns
- Simulates user-defined management actions
  - thinning
  - regeneration harvests
  - fuels and fire management

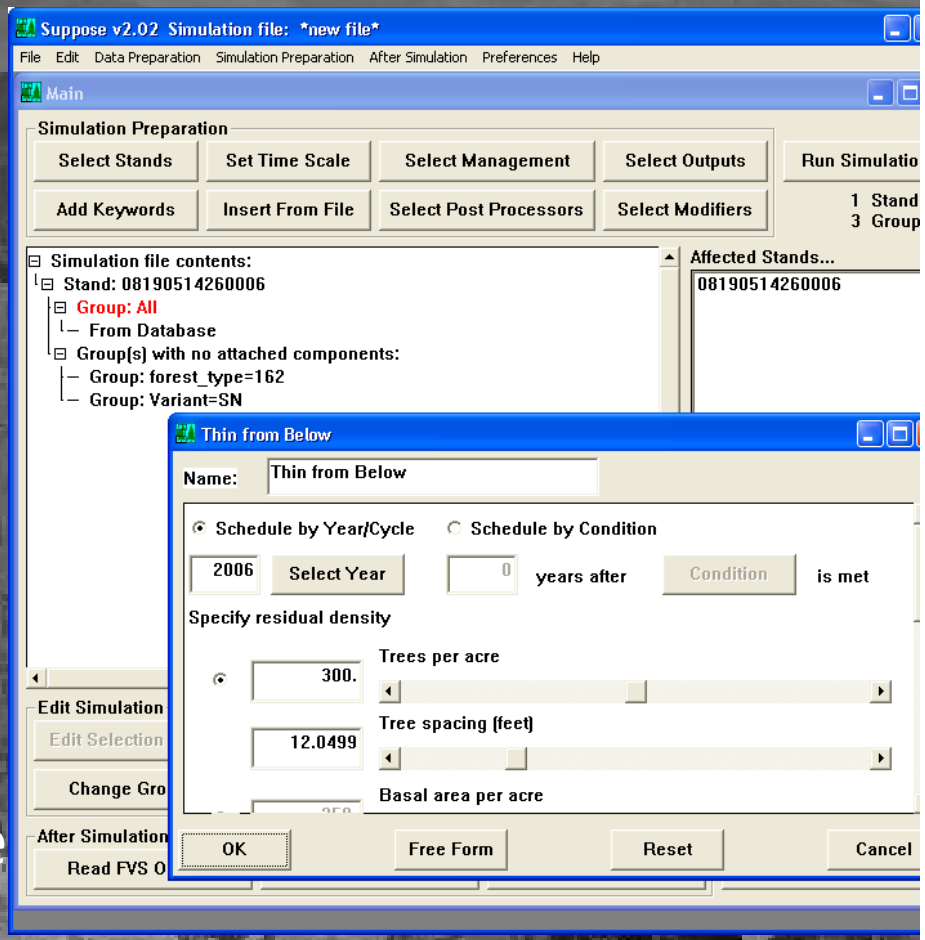
FVS: Post Simulation Data Processors

- Viewing stand and tree outputs
  - Yield tables
  - Stand and stock tables
  - Stand images (SVS)
  - linkages to GIS



FVS: Suppose User Interface

- Graphical user interface
- Uses common Windows based options
- Is an easy way to run FVS without having to understand the complex structure of the model



FVS: Support and Development

- Model is supported by Forest Management Service Center: A sub-staff of the USDA Forest Service National Forest System National Headquarters Forest Management Staff
- Located in Fort Collins, CO