Atterbury Consultants, Inc.
Professional Forestry Services

Instructions for SuperACE 2023™

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Disclaimer – Error messages may occur when nontypical procedures or use occurs. Closing the program and reopening usually resolves the issue.

For a completely new installation of SuperACE2023, the file SuperACE-23Install.exe is used. If SA20 or later is already installed, the SuperACE-23Upgrade file is used. This will install and update over an existing older version of SA20. Installing for field use uses the same files, the licensing permissions are different.

On a Windows 10 or 11 OS tablet for field use, changing the display to 200% is a reasonable combination of view and screen coverage. Look under settings/accessibility/display/scale.

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SuperACE 2023™ User's Manual

1. Introduction

Forest Inventory and Timber Cruising

Our aim is to give the cruiser the sampling tools and the tree measurement options to get the best results possible. This means when the trees are harvested and scaled or weighed, the result should be within the cruise sampling error of the **scaled volumes.** It is my belief that the volume of cruises and inventories should reflect the volume that will **be harvested and scaled. This can be board feet, cubic, lineal feet, and weight.**

To get these good results; acres must be correct, correct sampling system used, the tree counts accurate on all plots, good tree measurements and estimates, **and log segment lengths recorded that are actually cut with the proper scaling defect deductions that accurately reflect log usage.**

Remember, **logs are the main product from the forest**. They must be sold or delivered to maximize the cash flow. Good log marketing is a key to good returns. SuperACE can help by showing what will or could be produced to sell. Standard log lengths were used in the past, such as 32-foot logs, because we used lookup tables. As the trees got smaller, the errors got larger. **Logs must be cruised as they would be cut**. Computers can easily compute these sizes and volumes.

We have endeavored to provide useful information in a variety of reports. These reports and graphs can be imported into Word and Excel.

Each market has favored log lengths and diameter ranges. This information should be available to cruisers to use. Study scale data if available.

Scaling is done by several methods and log rules. Many board-foot rules, cubic feet, weight, lineal feet (Poles and piling). Almost all loads of logs are weighted because of weight restrictions on roads and highways.

Cubic feet measure the volume in the log, thus has a good relationship with weight. Board feet measure only the small end diameter and length has a poor relationship with weight. Weight is very important because this is what we move, yarding, loading, and hauling. Many logging contracts and log sales are performed using weight as the basis, not volume.

Good cruising and forest inventory should help make money. Inventory work should not be viewed as a cost to be minimized. It is valuable information about a valuable capital asset. A good low intensity inventory is better than a cheap poorly defined intensive one.

Quality is key. A few good plots are better than lots of bad plots.

History

This is the fifth time I (Toby Atterbury) have been involved in creating a version of this cruise and forest inventory program. It began in the early 1960s with Crown Zellerbach on IBM

mainframes. We wrote two complete versions with CZ. After CZ disappeared in 1985, I started ACI, and we wrote a program for PCs. This is the third total rewrite by ACI of this PC program.

SuperACE Today

SuperACE has always been built to provide data that can be used to determine the value of timber. Sort, Grade (Quality), log lengths, scaling diameters, and defect are all used to determine value. Many mills use log lengths to vary the prices. The program uses actual scaling volumes (Tables for Board Feet and equations for Cubic feet) and defect deductions to determine net volumes. The cruiser must have a basic knowledge of sampling, tree measurements and log manufacturing (falling, bucking) and scaling with defect deductions.

Much of the program will have a similar feel and look to the old software, the user should notice faster response, more accurate calculations, and better reports.

This is a tree list program. Each tree is retained in the data base for re-calculating. The program uses taper equations to determine the diameter on any point on the stem and the length to any diameter. These diameters and log lengths can then be used to calculate volumes in cubic feet, tons, and board feet according to the scaling rules used in each region. Each log can be given a sort, grade, and defect, in length, diameter, or percent. The allows the user to price the logs by species, sort, grade, diameter, and length by cubic feet, tons, board feet, or lineal feet according to the prices paid by the log buyers.

Users and Uses

This series of programs is designed for field foresters, strategic and operational forest planners, appraisers, and executives that need forest inventory information to make plans, decisions, and **track the results**. Results can be used to buy, sell, trade, or for loan collateral.

It is important that the scaled harvest volumes be compared to the cruise and or inventory data. **Timber Cruising should be done by well-trained foresters. Technology is no substitute for experience, skill, and judgment. A few good plots are better than many poor done plots.**

Trees grow each year (Annual Increment), some die (Mortality), and various activities by man (harvesting, planting, PCT, and thinning) and nature (wind, fire, floods, volcano, insects, and disease) change the forest each year. The program is capable of growing trees and stands each year and has data maintenance features to adjust the data for current conditions.

SuperACE2022 uses a hybrid system of growth. Stands with trees under a height as defined by you in the default screen use yield tables. Larger stands use an individual tree growth system. Individual tree growth should be tested in your area.

Phase development of the system will be necessary for ease of programming and testing. However, the new program will have new features which slightly change the results compared to previous versions.

The opening menu and tables will be common to all three systems. The database will be common to all systems.

We use the same abbreviations for column headings and on report headers.

To succeed, excel, and thrive in this profession, one must increase the breadth and depth of knowledge and experience and never stop learning.

Before starting to use SuperACE make sure:

- Everyone involved knows the basics of SuperACE and log bucking and scaling.
- **All tables and defaults are set correctly. Everyone has a copy on the handheld.**
- All equipment is in **good repair** and is adjusted to be **accurate**.
- Maps are made with GIS, plots located, and downloaded to field computers.
- All tables must be completed, especially the Species Table.
- Sorts and grades must be defined.

Some things to consider:

- The human eye can see percentages better than diameters.
- Form Factor is a percentage of Dbh.
- Top diameter fraction is a percentage of diameter at Form Point.
- All diameters are measured outside bark.
- Bark Factors must be input for each species. They vary by species, area, and tree size.
- Bark Factors also vary by diameter with some species.
- Small trees and logs weigh more per cubic foot than large logs.
- There is a good relationship between weight and cubic feet, but a poor one with board feet.
- Trees are not round, particularly at Dbh.
- Trees are not straight, they often lean. Repeated laser height measurement from different locations often yields different results.
- Measurements should be accurate, not precise.
- Do not class measurement. If you measure 9.5, it is 9.5 not 9 or 10.
- Cruising 32-foot logs is an average from the days when volumes were calculated by hand. Not necessary with computers. Cruise the logs as they would be cut.

Evaluation

Calculating the value of the forest or stands within the forest is a very important reason to establish and maintain a forest inventory.

SuperACE has all the component parts to determine timber values:

- Cruisers select a sampling method for each stand, measure the plot, and estimate tree measurements, logs lengths as they would be cut, scaling defects, assigns each log a sort and grade.

- Each stand is assigned a yarding system on the master screen.
- Each yarding system gets a cost.
- Log prices are entered by species combination, sort, grade, and log length. Each product class is given a destination.
- Hauling costs are input on the "stand hauling screen" for each destination.
- Poles and Piling are designated by a sort code and are checked for butt and top dimensions and assigned a class.
- Run the Valuation Report.

The valuation report calculates and reports the values, costs, and cash flows. A pole/piling summary is also added and can be run when they are included in the sample.

Cruising gear

- Test everything before going to the field.
- Plot center stick (staff or long stick)
- Handheld or tablet with SuperACE and GIS.
- Relaskop American Scale
- Laser rangefinder
- Increment borer
- Loggers tape with diameter on the back.
- Paper and pencils
- Compass and maps backup for GPS

2. **Home Screen**

The Home screen is the main menu and displays all stands within a SuperACE Project along with their current inventory attributes. There are three levels of menus in the upper left corner of the screen. The top level includes **File, Project, Stands, Ownership, Reports, Tables, Defaults, GIS, Licensing, and Skins** as follows:

The top menu items are organized as Chapters in this manual **starting with "File" as Chapter 10**.

The middle menu row contains convenient program navigation and data filtering tools. *The items in the middle row will change depending on the screen being viewed in the bottom row of menu items listed above.*

Home screen provides a one-line description of each stand in the project.

ST State – input on Stand Master

CTY County – input on Stand Master

Tract – input on Stand Master

Stand# – input on Stand Master

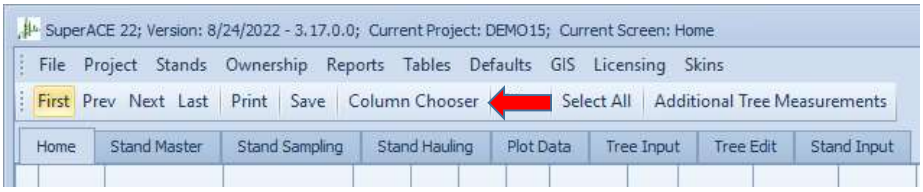
Twp – input on Stand Master

Rge – input on Stand Master

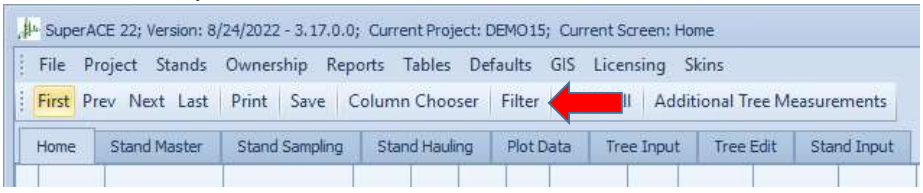
Sec – input on Stand Master

The bottom menu items to the right of the **Home Screen** tab pertain to an individual stand that is selected (highlighted) on the Home Screen. These menu tabs include screens for: **Stand Master, Stand Hauling, Plot Data, Treen Input, Tree Edit, and Stand Input** and are organized in this manual as Chapters beginning with **Stand Master as Chapter 3**. These fields can be moved around to any order you want.

Column Chooser –



Drop down list of all fields on the home menu. Those fields are un-checked so as to not show on the menu. At any time, these fields can be checked back on.



Filter – First check on Select all.
Then make a selection of filters such as “If Net board feet per acre is greater than 40,000, then select OK. Stands that qualify for the filter are listed on the screen.

The stands that qualify for your filter will appear on the screen. Additional filters can be made stands that have been filtered. Clear Filter.

Additional Tree Measurements – This will display the data for any selected stand(s) or all stands if they are all selected.

Home Master Stand Sampling Stand Hauling Plot Data Tree Input Tree Edit Stand Input

This row allows the user to go from one place to another, for example from **Home** to **Tree Input** in one click.

Reading across the headings **of Home Screen** are defined as follows:

ST State - input on Stand Master

CTY County – dropdown list

Tract – input 5 letters and/or numbers

Stand# - input 5 letters and/or numbers

Twp – 3 alphanumeric optional

Rge – 3 alphanumeric optional

Sec – 2 numbers

Acres – From GIS or user input

Src - Source of the data. TC = timber cruise. KB = keyboard. GI = GIS data.

Exam Date – Date data was input.

Grown to - The date the stands have been **grown** to.

NF NS – Non-Forest or Non-Stocked. Drop down menu.

Yarding – input on the Stand Master. This includes costs.

Logging method and cost – Input in tables.

Major Species - the Species with the most trees per acre.

Major Age – The age with most trees per acre.

Trees per Ac – Trees per Acre for all species.

BA/Ac – Basal Area in square feet per acre for all species.

QM Dia – The Quadratic Mean Diameter

Tons per Ac – Tons per Acre (calculated from net cubic feet)

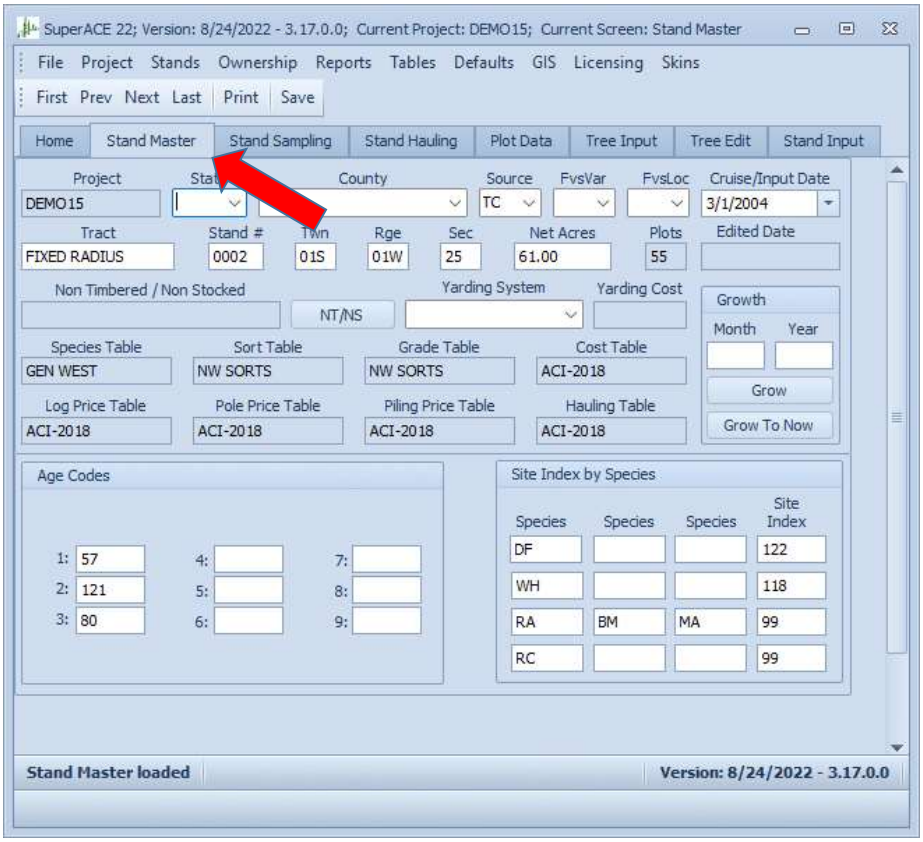
Net CF per Ac - Net Cubic feet per Acre calculated from tree input or from stand table input and yield table calculations.

Net BF per Ac – Net Board feet per Acre calculated from tree input or from stand table input and yield table calculations.

Total Ccf – Total Net Cunits: Cunits = Ccf = 100 cubic feet

Total Mbf – Total Net 1000 board feet

3. Stand Master



When a new project is started, the program goes to Stand Master to input:

State – drop down menu 2 digits, Optional input. Very useful.

County - drop down menu, Optional input. Very useful.

Tract – Mandatory input, user defined. (12) alphanumeric.

Stand # – Mandatory input, user defined. (4) alpha numeric digits.

Twn (3), **Rge** (3), **Sec** (2), are optional. Useful for finding a stand on the map.

Source – Where the data come from, mostly from timber cruise TC or KB keyboard.

FVSLoc – FVS Location

FVSoc – FVS variant

Cruise Input Date – The date plots taken in the field or data of keyboard input.

Net Acres – Usually from GIS. Can be input with the keyboard

Plots – The number of Plots recorded

Edited Date – Date the data were edited

Non-timber / Non-stocked – Dropdown menu. Please define under the table menu.

Yarding System – Must be defined in Tables. This is a drop down, listing all yarding systems that have been input in the table. These define one of the major costs of logging.

Yarding Costs – Input to the cost in dollars. These costs can be aboard trucks or however you would like them.

The Tables displayed are for information only. Make sure these are the tables for the Project. Species Table, Sort Table, Grade Table, Cost Table, Log Price Table, Pole Table, Piling Table, Hauling Table.

Growth for this stand only.

Month - Year

4 2021 Date to grow to.

Grow Start growth

Grow to now (to the current date}.

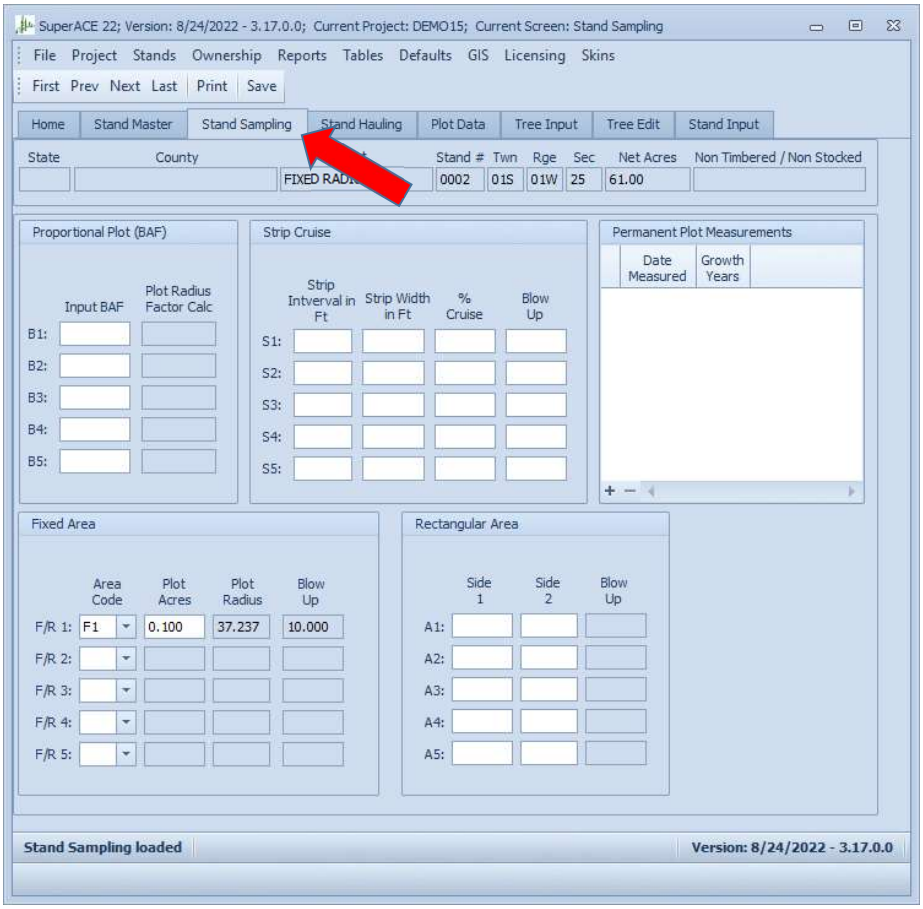
Age Codes – 9 total ages can be input per stand. Most west-side are even aged. East-side stands are usually uneven aged, use 9 year classes. Every stand must have an age. Age is input by user. We have input (50) as a default.

Site Index by Species – 4 lines with 3 species each are available to input sites. Every stand must have a site index. Each species should have a Site Index. They can be grouped in sets of three all with the same site.

ACI has used site index base 50 from yield tables for many years. They were all translated to base 50. The USFS in FVS has used site curves with various bases, from 20 to 100.

We have built a way to translate these curves. However, they use Weyerhaeuser base 50 tables for Douglas-fir and Western Hemlock. The system uses the height at age 50 to determine the site for the USFS FVS curves.

4. Stand Sampling



SuperACE5 allows the user to use several different sampling systems.

See Forestry Field Aids for tables and equations.

100%

A '00' is entered in the PF column for each tree. These trees will each show as one tree in the cruise extension. The volumes are divided by the stand acres to get per acre data. This is used to represent trees that are not part of the main stand i.e. very large trees or high value species. Make sure all trees can be counted. 100% cruises are done when a small number of trees are to be measured.

Strip Cruise

Strip Cruise is recognized by PF of S1 thru S5 and the blowup factors are indicated on the cruise master for the stand.

S1 to S5 Enter the Strip Width and the distance between strip centers. Example Strip Width 50 feet. Distance between strips 100 feet. That means the strip width is 25 feet on each side of the strip centerline. The blowup factor is 100 / 50 = 2.0. Each sample tree is multiplied by two. This is usually used when the area is small or few trees.

Fixed Area Plots

Fixed Area plots F1 to F5 and Fixed Radius plots R1 to R5

Fixed Area Plots F1 thru F5: These plots were easy to work up by hand. A 100^{th} acre plot measures 11.78 feet each sample tree multiplied by 100. Input plot acres. Example 100^{th} input .01. However, an input of 11.78 feet Yields 99. Trees per Acre.

43560/Pie = 13,865.58

Fixed Radius Plots

Plot Radius = Sqrt((43560\pie)*Plot acres)

Fixed Radius Plots R1 thru R5. Fixed radius plots are easier to measure. It is easier to measure a 12 foot plot than 11.78 feet. The computer does the calculations. A laser can easily deter if individual trees are in by a quick shot for the horizontal distance. Example 12 foot plot radius equals 96.289 trees per acre for each tree sampled.

Square or Rectangular Plots

Square or rectangular plots A1 thru A5. Used when the plantation is very regular, like when machine planted. A plantation planted 10 by 10 feet requires plots 20 by 20 feet. Must add half the distance to the next tree. Because the spacing is regular, measuring these plots is very easy.

Variable Radius Plots

Variable radius reforestation V5 thru V26 are entered under the PF column. Each species is entered on a separate line. Variable radius plots are an efficient way to measure stands that are stocked naturally and vary greatly in stocking from acre to acre. Some areas can be overstocked, and others understocked. The idea is to measure out to the 5 trees nearest the plot center. The equation accounts for the area to the next tree. Each tree is allocated a percentage of the total trees per acre for the total plot tree count.

Trees per acre = ((43560 / pie) * # trees on Plot) / (radius^2) * (.05+# trees on plot)

Example Radius 15 feet 5 trees = 260 trees per acre. Each tree is 260/5 = 52 trees per acre.

DF 4 sample trees = 208 trees per acre

RA 1 sample tree = 52 trees per acre

Total = 260 trees per acre

Basal Area Factor "BAF"

B1 thru B5 under the Plot Factor column on the screen or a whole number like 20 for a BAF 20. Use B1 thru B5 for BAF with decimals when using an American Scale Relaskop. On the plot screen indicate if the trees are "in" a FP or Dbh. This is for BAF plots only. This allows form point to be changed when needed.

BAF Count Plots

These plots only require Species and tree count. The basal area of each sample tree (cruised tree) is adjusted by the ratio of the count BA by Species and the plot BA. Sorts and Grades are carried into the data base by the sample trees.

DBH Count Trees

Can be used with all of the above sampling systems. When a tree is input with age, species, Dbh, tree count, volumes will be calculated from a V-bar calculated from the measured trees. Volumes Dbh trees will be reported with no sorts, grades, scaling diameters, or lengths. The program runs a regression line thru the volumes of the cruised trees over Dbh and thus determines volumes for all diameters.

Square and Rectangular Plots

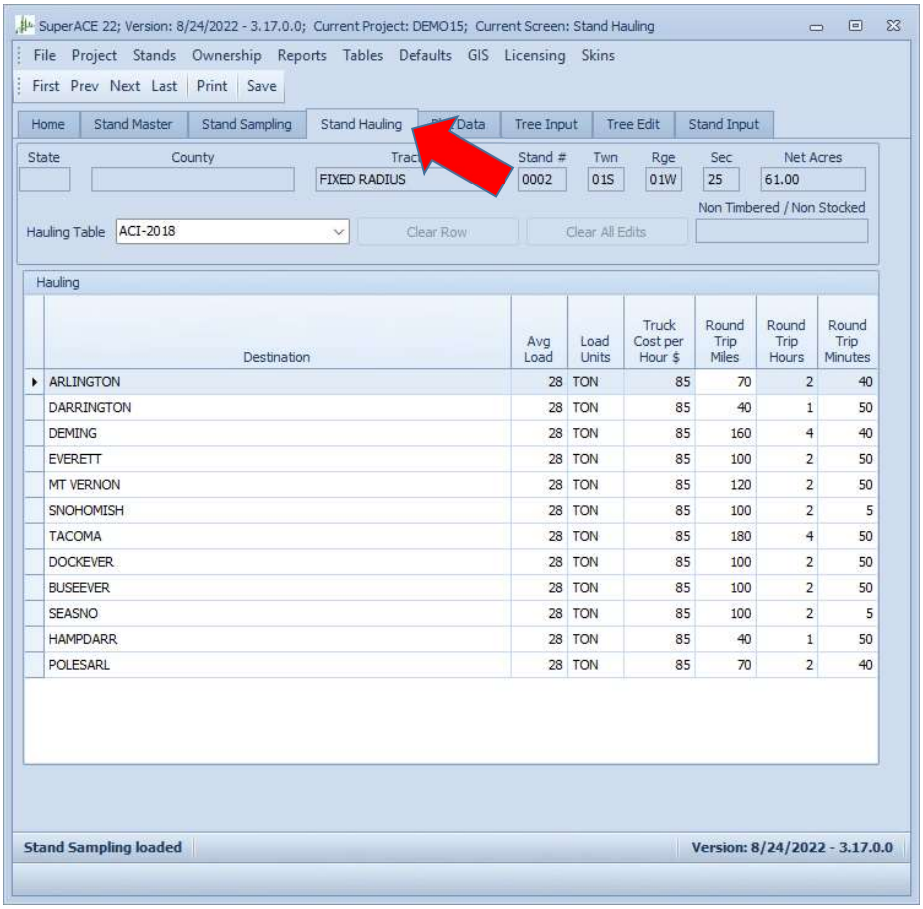
Stands that are very regularly spaced, such as stands that have been machine planted should be measured with square or rectangular plots. Once the spacing is known, the plots are easy to take because the trees contain the survey.

Nested or Combination Sampling.

Sampling systems can be used in combination. Nested plots are often used to sample the entire range of tree sizes in stands. Example would be a two story or multiple story stand. A BAF is used for the merchantable trees and a fixed area or fixed radius plot for the small trees.

When using two or more sampling systems on the same plot centers, please review the plot data screen when you have finished the plot to make sure you have entered all plots correctly.

5. Stand Hauling



Hauling logs from the landing to the Mill or destination is usually a major expense. Trucks haul weight. Weight is calculated by the pounds per cubic foot on the species screen or on the Sort or Grade Screen. The destination of each product is input on the price screen.

Each stand can have its own hauling cost. The same hauling cost can also be assigned to multiple stands in the same area.

Destination - Must be a Destination for each sort/grade combination on the log price screen.

Average Load – Usually close to the weight limit for the truck in the fleet, 5 axle truck = 29 tons max, 9 axle truck = 40 tons max. In actual practice, height limit may be reached before weight. Talk to loggers about their fleet averages.

Units – Tons

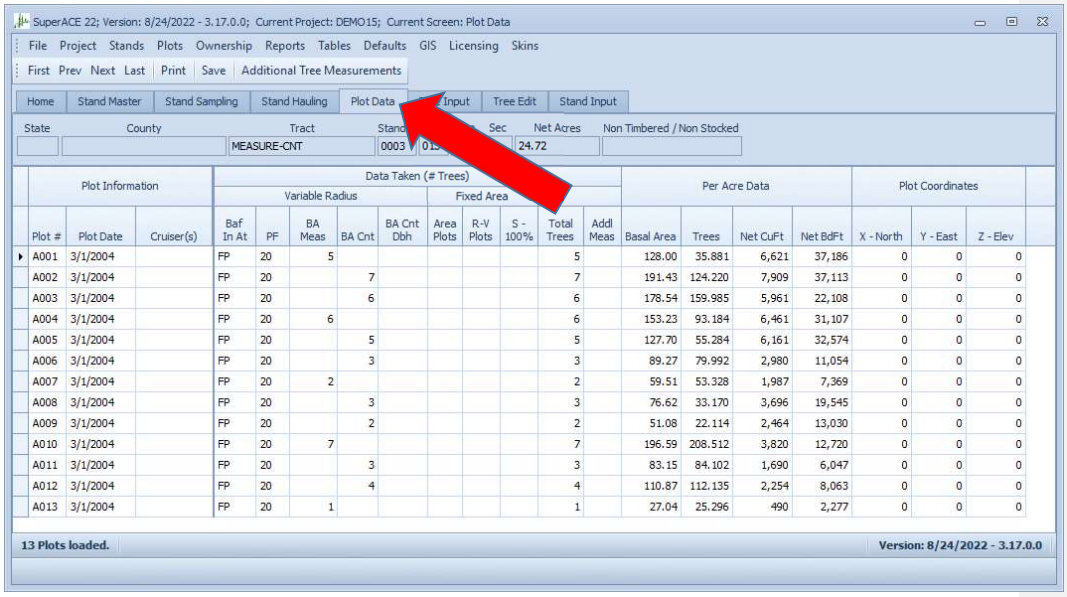
Truck cost per mile - Nearest Dollar

Round Trip Miles – Nearest mile

Round Trip Hours, minutes – includes loading and unloading.

Truck cost per mile.

6. **Plot Data**



The Plot Data Screen Is a one-line display of the cruise results by ***Plot number.*** This screen should help the cruiser judge variation, and make sure enough trees are being recorded on each plot. A default allows the cruiser to enter plot numbers on this screen so only one plot will display on the Tree Input screen. The plot summary attributes included are defined as follows.

Plot Screen Attributes:

Plot # – Plot number, a five-digit alpha numeric code, is a number assigned by the cruiser. The plot numbers should be created in a GIS plot location shapefile used to help navigate to the plot in the field.

Commented [1]: Four in previous versions, will actually take 6 digits, but only displays 5 on a line

Plot Date – Month 2 digits, Day 2 digits, year 4 digits. The date the plot was measured in the field.

Cruiser – 9-digit alpha numeric code. Input the first and part of your last name.

VARIABLE RADIUS PLOTS –

BAF in @ = A dropdown menu. Select either **BH or FP.** Only used for BAF plots.
BA measure = the number of trees having at least a Dbh and a total height.
BA count = The number of trees that have been counted.
BA count with Dbh = The number of trees that have been counted with a Dbh entered.

AREA PLOTS –

The number of trees counted or measured on each plot.
Fixed Area plot = The number of trees counted on the plot.
R V = Reforested Variable plots.
S and 100% = Strip and 100 % trees.

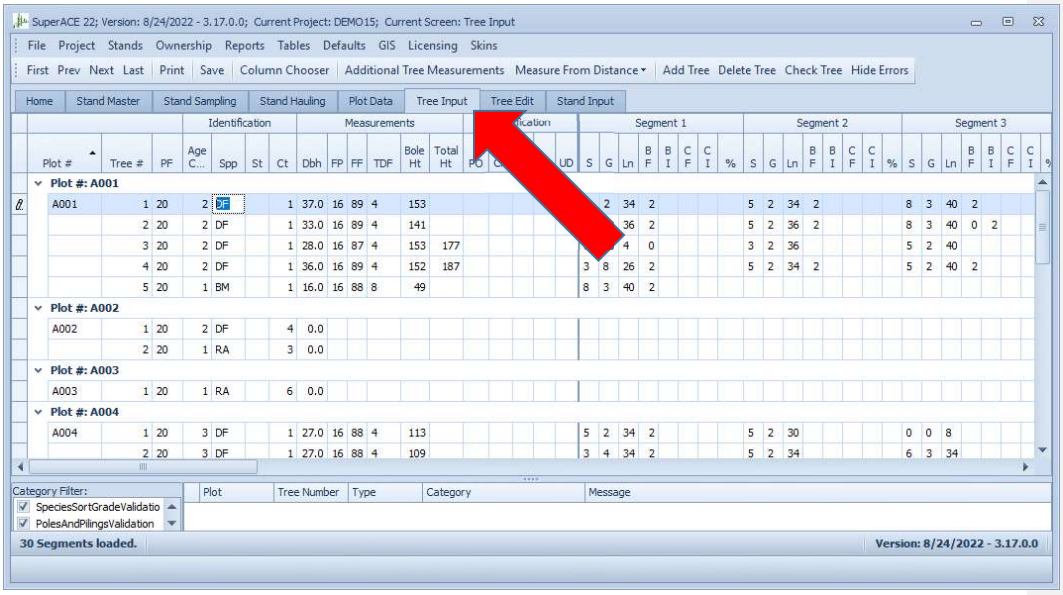
PER ACRE DATA –

Basal Area = in square feet per-acre
Trees = trees per-acre
Net CuFt = net cubic feet per-acre
Net BdFt = net board feet per acre

PLOT COORDINATES –

X North = feet or meters of Northing
Y East = feet or meters of Easting
Z Elevation = feet or meters of Elevation above sea level

7. Tree Input



The **Tree Input** Screen is accessed by clicking on the Tree Input tab of the stand information screen. It is this screen where timber cruise plot/tree data is entered. The data is entered directly into the screen cells and through importing from a handheld device.

Plot No. - Plot Number (required). A four-digit plot number, alpha/numeric, is assigned to each plot. Each plot in a timber type must have a unique number. Duplicate plot number will be computed as one plot. The program will check for duplicate plot numbers when you start entering a plot. Plot numbers should be pre-assigned when more than one cruiser is taking plots in a type. If plot numbers are not pre-assigned, cruisers may use a unique letter or number to identify their plots and prevent plot number duplication.

Commented [2]: Will take 5 as noted earlier

Tree No. - Tree Number. A three-digit numeric field. Tree number is assigned by the computer except when measuring permanent plots. Users input tree numbers when measuring permanent plots for growth and each tree is going to be measured more than once.

PF – **Plot Factor or Prism Factor** (required). A two-digit alpha numeric field. When a two-digit number is entered, the field is a Prism Factor or Basal Area Factor (i.e. 20 equals a 20 BAF). If a decimal value is used for a prism factor, then a B1, B2, B3, B4 or B5 is entered with the prism factor

value defined in the Type/Stand Master screen (i.e. B1 is entered in the PF column and 33.61 is entered next to B1 in the type master screen). Glass prisms should always be checked for the proper prism factor. A letter followed by a number (i.e. F1, R1 or S1) is referring to a Plot Factor in the type master screen. These refer to various sampling systems and plot sizes. If a cruiser requires that a tree be treated as a 100% cruise tree on a cruise plot, enter the tree on a plot with the plot number preceded by a dash (-). A 00 (zero, zero) in the PF column also designates a 100% cruise tree. A 00 PF and tree or trees may be included in a sample plot. For example, a variable plot could also contain 100% trees.

Up to 5 options for each sampling system can be used:

System	Option	Example (As entered in the Cruise Master Screen)
Basal Area Factor:	B1 thru B5	B1 = 27.78
Fixed Area Plots:	F1 thru F5	F1 = 0.25 (One quarter acre plot)
Rectangular plots:	A1 thru A5	
Plot Radius:	R1 thru R5	R1 = 12.00
Strip Cruise Blowup:	S1 thru S5	S1 = 4.00 (25% strip cruise)
100 %	00	

Identification

A –Age (required): A one-digit numeric field for age code. The age in years is input on the cruise master screen. Default age is code 1. Up to nine ages can be input per type. Age is used for calculating the tree form, bark factors, growth, and for age class reports. If no age is assigned, then a default age of 50 is used for volume calculations.

Spp – Species (required): A six-digit alpha/numeric field is provided for species. The numbers or letters must match the active species screen. A species table must be active before the cruise data is entered. Species are very important. It is usually not a good idea to group species. Each individual species should be entered on the species table with appropriate factors and limits.

St – Status (optional): A one digit alpha/numeric field. Input must match codes in the status table. Status is used to indicate dead trees, etc. Poles are designated by P in this field. The P is hardwired as is G for pilings.

CT – Count The number of trees.

Count plots are used to adjust the trees per acre for the trees on the cruise plot. Trees can be counted on the plots by species and diameter. Count plots can be used with BAF, fixed area plots, and strip cruises. Blank plots are entered as a count plot with a species code and a 0 in the Ct. column.

Measurements

DBH – Diameter Breast Height: This field is required when cruising volume plots and optional when cruising count and regeneration plots. DBH is a four-digit numeric field, including the decimal point, is provided for diameter. This diameter is measured four feet or 1.3 meters above the stump outside the bark. Diameters less than 99.9 inches can be input to the nearest tenth inch. Trees larger than 100 inches are input to the nearest inch.

FP – Form Point (required) – A two-digit numeric field is provided for form point. Default is DBH (four feet above the stump). Form point is where Form Factor is measured and/or where the tree taken "in" with a BAF. If form point is defined as four feet, the program will automatically use a form point of 16 feet to calculate Form Factor. Form point can be varied for each tree if needed.

FF – Form Factor (required) – A two-digit numeric code. Form factor is the percent relationship of the diameter at Form Point (16 feet or other) divided by the DBH. Default values for Form Factor by species are input on the species screen. If no form factor is entered, the form factor from the species table will be used.

TD – Top Diameter (required). A one-digit alpha/numeric field. Top diameter is the diameter outside the bark at the top of the tree bole. This is entered as either a single-digit percent value (for 10's of percent), two-digit (actual total percent), or as an alpha character value for diameter, as shown below:

Top Diameter Fractions of FP
TDF = top dia. / dia. at Form Point
2-Digit Code = % of diameter at FP/10 Code = Inches
00 = Total Height
10 = 10%
20= 20%
30= 30%
40 = 40%
50 = 50%
60 = 60%
70 = 70%
80 = 80%
90 = 90%
2-Digit Code = 45 = 45%

Example: If you are sighting trees in/out at 16 feet and you have 5 Relaskop bars at 16 feet, then your 40% TDF will be where the tree bole is 2 Relaskop bars wide.

Top Diameters Alpha Codes

Inches	Alpha Letter Code
1	A
2	B
3	C
4	D
5	E
6	F
7	G
8	H
9	I
10	J
11	K
12	L
13	M
14	N
15	O
16	P
17	Q
18	R
19	S
20	T
21	U
22	V
23	W
24	X
25	Y
26	Z

Bole Ht. – Bole Height – A three-digit numeric field. Bole height is the distance from the stump to the Top Diameter Fraction or the Top Diameter outside the bark to the nearest foot.

Tot Ht. − Total Height (optional) − A three-digit numeric field. Total height is the distance from the stump to the tip of the tree. Maximum tree height for a species is input on the species screen. Bole height and tree height can be entered individually or together. If a “0” (zero) is entered in the TD cell then the Bol Ht value will be automatically copied to the Tot Ht cell.

Classification (optional) Must be defined in Tables.

Po (T1) – Position of tree in canopy
O = over-story – Older age trees, usually residual
D = dominant
C = co-dominant
I = intermediate

S = suppressed
U = under-story – younger trees than the main canopy

CR (T2) – Crown Ratio (2-Digit) percent of the tree length with live limbs.

Vi (T3) – Vigor of the tree
H = healthy, living tree, may have damage
M = alive, but damaged and/or is not normal.
D = dying

Da (T4) – Damage in a tree, caused by. Define as table.
A = animal damage, unknown species
B = bear
C =
D = deer
E =
F = fire
G =
H =
I = insects
J = J rooted when planted
K =
L = landside
M = Mechanical
N =
O =
P =
Q =
R =
S =

T5 – Other (User Defined)

log Segments *- Up to 12 Segments can be described for each tree (required for volume calculation).*

S# - Segment number – two digit automatically assigned by the program. This includes cull segments, breakouts, and logs.

S − Sort − A single alpha or numeric code as described in the ***active sort/grade table***.

G − Grade − A single alpha or numeric code as described in the active sort/grade table.

Ln – Segment length. Two digit numeric. On the final log segment of a tree, a "- -" (dash, dash) may be entered instead of a numeric length.

Log lengths should be entered as they would be bucked. Cruisers should
If a -- is entered, the program will compute the length of the segment to the minimum top diameter or given TDF, whichever comes first. Log length min and max are defined in the species, sort and grade tables.

00– Means no more logs can be made due to growth. The growth function will not add logs beyond this point.

Deductions (made according to scaling rules)

Bd. Ft. F. − Board Foot length deductions.
I. – Board Foot diameter inch deductions

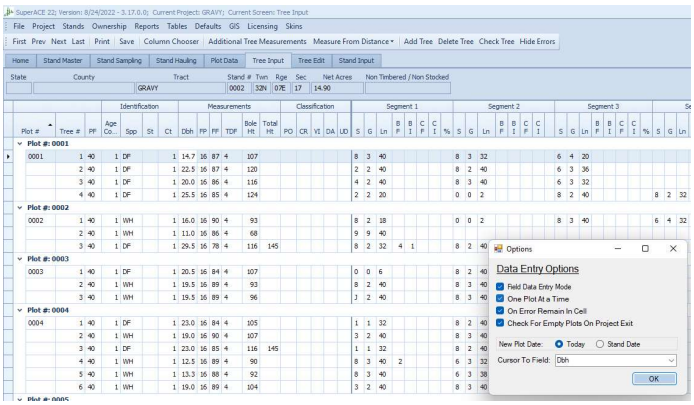
Cu. Ft. F. – Cubic Foot length deductions
I. – Cubic Foot diameter inch deductions

% − Numeric field left blank when using length or diameter deductions. A 1 is entered when percentage deductions for both board foot and cubic feet are to be used. Percentages are entered as whole numbers in the F. I. cells of a tree segment (i.e. 1 0 equals 10% and 0 5 equals 5%).

Log length is very important in planning and appraisal. Log values are often by log length. To determine how logs are bucked in your area, you need to study scale data, log bucking rules, mill price sheets, and spend some time with log scalers.

Poles and piling may be processed in your area. You need to study the pole specs, discuss what if commonly manufactured in your local pole yards and visit them. Poles and piling are difficult to cruise, log, and haul. However, they have the potential of increasing the cash flow significantly. See Tables for pole size dimensions and prices. Poles must have at least one inch of sapwood and be straight.

In the Field – Tree Input

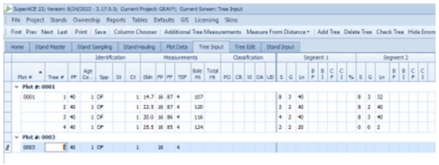


Use Default/Data Entry options and check:

- Field Data Entry Mode
- One Plot At a Time

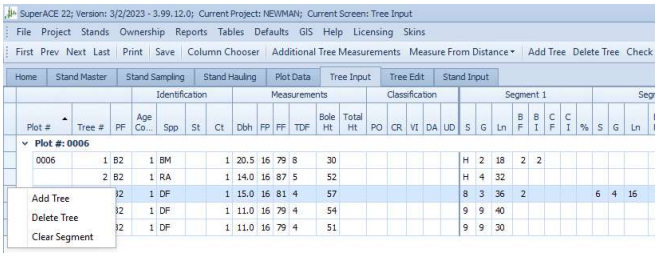
This allows the ordered entry of trees into only the current plot regardless of plot number sequence.

Otherwise, SA will sort plots into numerical order and *insert tree* must be used to add tree data. *One Plot At a Time* allows 2x enter or down arrow to advance to the next tree to measure.

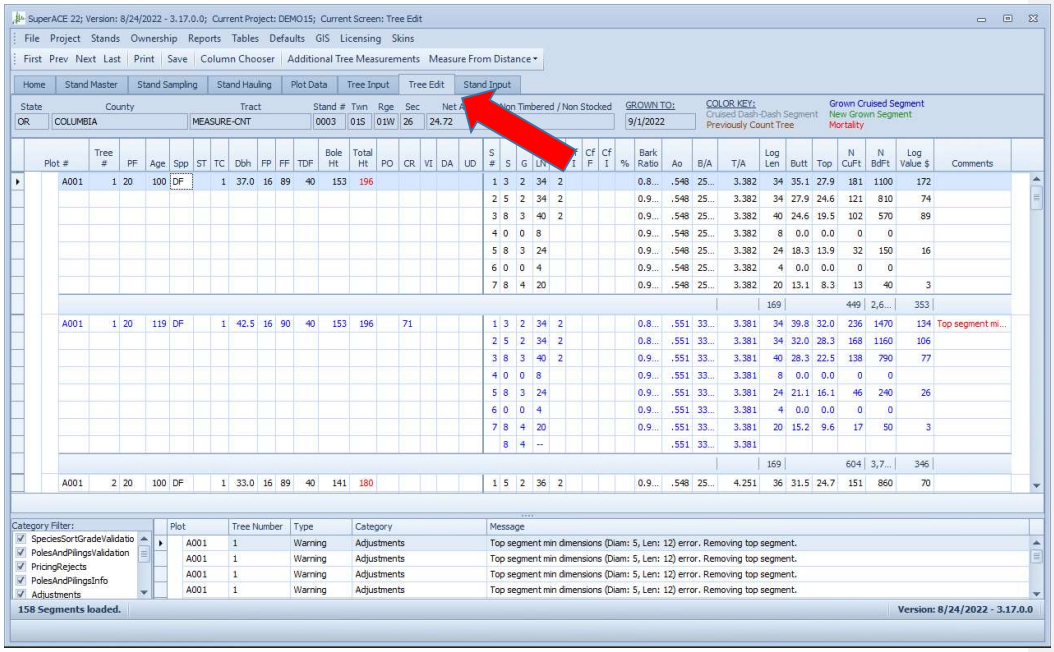


Moving to the plot number cell and changing it to the next or current plot to measure creates a new plot. The previous plot data becomes hidden from view in the Tree Input tab. All plots are visible in the Tree Edit tab.

In the Tree Input screen, to add or delete a tree, highlight the tree data line and RIGHT click the mouse button. A menu will appear as the example below shows.



8. Tree Edit



This screen displays the tree input measurements and each segment of the tree.

This stand has been grown by tree. Each tree is listed twice. First the real measurements, then the projected measurements. Each Segment for each tree is displayed. For each segment:

Seg #

S G Ln F I F I Sort, Grade, log length, Foot deductions for Cubic Feet, Inch deductions for Cubic feet, feet and inch deductions for board feet.

Bark Ratio - The ratio of the bark thickness.

Ao - A value that is calculated by the program that helps determine the true shape of the logs.

B/A - basal area per acre

T/A - trees per acre

Log length in feet

Butt diameter inside bark

Top diameter inside bark

NCuFt - Net Cubic feet

Nbdft – Net Board feet

Log Value – gross value from the price screen.

Comments – possible errors.

Under comments are any errors found. The program checks against the species table and sort grade tables for errors.

Log values come from the log price screen or pole values.

Comments are error messages. They are also listed at the bottom of the screen. Click on these to locate the error.

In the edit screen, to add a segment or tree or delete a segment or tree. Highlight the tree data line, RIGHT click the mouse button and a dropdown menu will appear as in the example below.

When cruising with SuperACE, tree measurements must be:

5 feet in total height to have a Dbh.

Form Point must be over 5 feet.

Form point diameter must be less then Dbh.

Bole height must be greater than form point height.

Top Diameter must be less than the diameter at the form point.

Total height must be more than bole length.

This screen displays the tree input measurements and each segment of the tree.

Each Segment for each tree is displayed. For each segment:

Seg #

S G Ln F I F I Sort, Grade, log length, Foot deductions for Cubic Feet, Inch deductions for Cubic feet, Feet and inch deductions for board feet.

Bark Ratio - The ratio of the bark thickness.

Ao - A value that is calculated by the program that helps determine the true shape of the logs.

B/A - basal area per acre

T/A - trees per acre

Log length in feet

Butt diameter inside bark

Top diameter inside bark

NCuFt - Net Cubic feet

Nbdft – Net Board feet

Log Value – gross value from the price screen.

Comments – possible errors.

Under comments are any errors found. The program check against the species table and sort grade tables for errors.

Log values come from the log price screen or pole values. These are gross log values and come from the log price screen or the pole value screen as tables.

Comment is for error messages. They are also listed at the bottom of the screen. Click on these to locate the error.

When cruising with SuperACE, tree measurements must be:

5 feet in total height to have a Dbh.

Form Point must be over 5 feet.

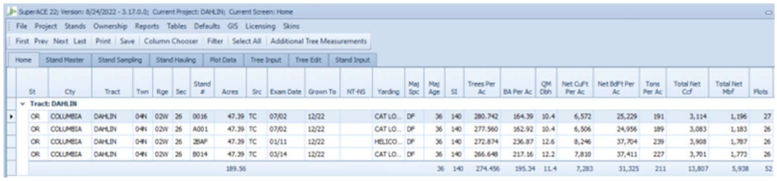
Form point diameter must be less then Dbh.

Bole height must be greater than form point height.

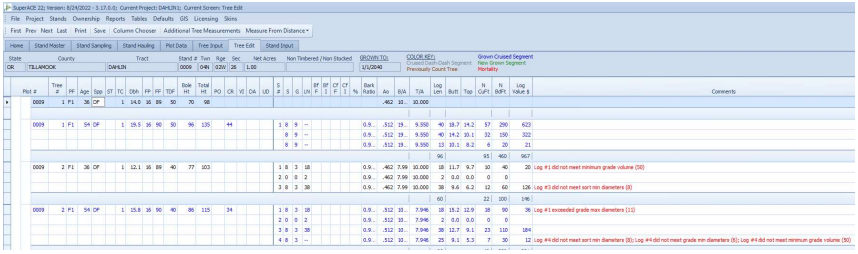
Top Diameter must be less than the diameter at form point.

Total height must be more than bole length.

Grown Tree Data

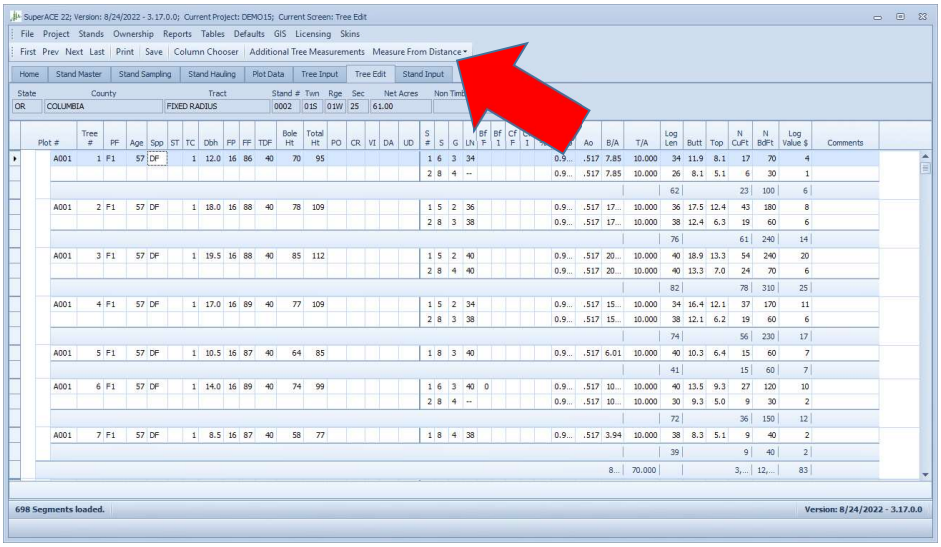


The above dataset was measured in 2002, 2011 & 2014, then grown to now, 12/22. This results in the Tree Edit displaying as below.



This screen displays the original tree input measurements and each segment of the tree, then, in blue, what projected growth has occurred in the tree and log segments.

9. Measure from Distance



This new feature allows the cruise to use the rangefinder and the relaskop (or RD1000) to measure tree heights and diameter from some distance from the tree.

Enter a Dbh on the tree you are measuring. This will be replaced by your measurements. This tells the computer which tree you are measuring. If you do not fill in Dbh or another number for a placeholder, SA will revert to the above tree line when you engage the Measure from Distance function. You can use a 1 or estimated diameter.

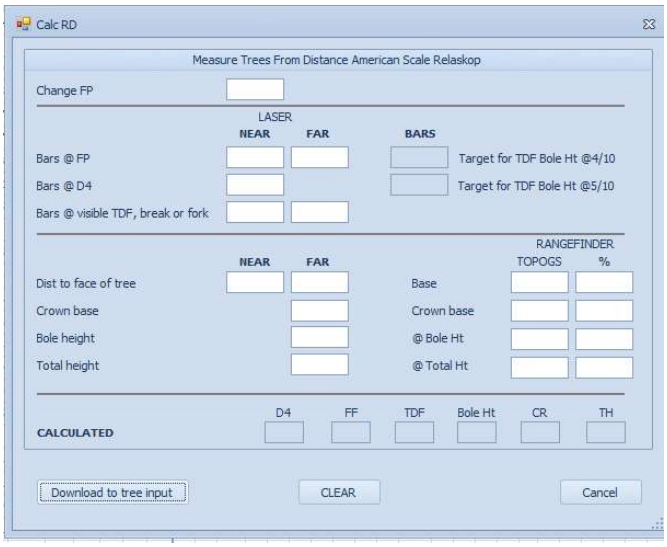
Choose the instruments you are using: Relaskop or RD1000.

The program allows the user to measure each tree from two distances. One up close to get accurate measurements of Dbh and Form. Another set of measurements can be taken from a longer distance to stay with the sensible angles for upper stem measurements.

Use a staff when using these instruments. It steadies the instrument for easier reading and it keeps the same distance when changing instruments. Please read the Relaskop to the 1/10 bar. If you are 99 from the tree each bar is worth 6 inches.

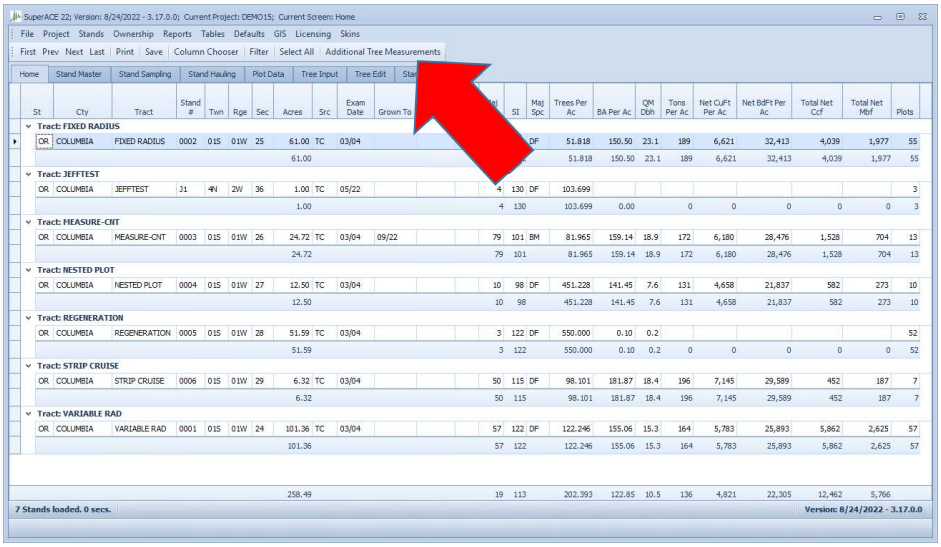
The measurements can be taken in any order. Two good times to use this feature are: 1.) when you view a line tree; one half of the bottom is done. 2.) when approaching the plot and one or more of the obvious plot trees are visible.

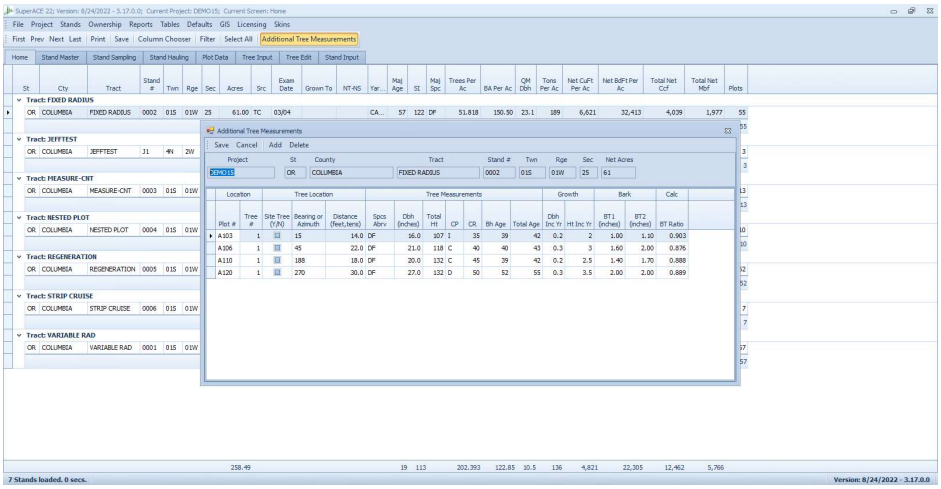
Once the data is taken, review the results and press "**download to tree input**".



BARS Target for TDF bole height cells are a simple help function for convenience. That is the number of Relaskop bars at which you would measure bole height to for 4/10th or 5/10ths.

10. Additional Tree Measurements





Plot Number - carried down from tree input

Tree Number - carried down from tree input

Site Tree – yes or no

Bearing – growth plots to be remeasured can be installed with a plot center and bearing and distance to each tree.

Distance – growth plots to be remeasured can be installed with a plot center and bearing and distance to each tree.

Species - carried down from tree input

Dbh - carried down from tree input

Total Ht - carried down from tree input

CP – crown position carried down from tree input

CR – Crown ratio carried down from tree input

Breast Ht Age – The ring count at Dbh.

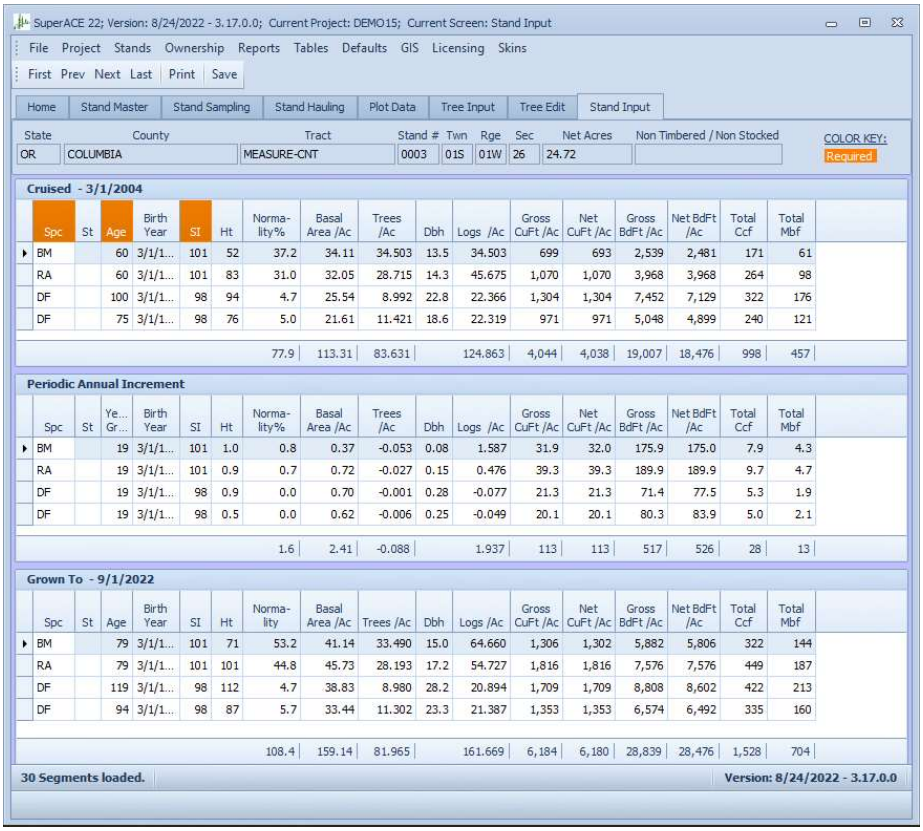
Total Age – The total age of the tree.

Dia. Inc. per year – The annual diameter growth. Usually the average of the last few years.

Ht. Inc. per year - The average current height growth. The height growth seen in the tree.

Bark thickness – B1 and B2 - The bark thickness, measured from the outside ridges of the bark. Two measurements please, on opposite sides of the tree. Bark ratios are very important to the calculation of volume, which is usually measured inside bark.

11. Stand Input



Stand Input creates the opportunity to input those stands that have not been cruised. It is most useful for stands that have been recently planted. It also displays the results of cruise, then the growth, and finally the data as grown.

Stand input display data from tree input and Stand input. Stands that are input here are always grown with yield tables.

Stand input creates the opportunity to input those stands that have not been cruised. It is most useful for stands that have been recently planted. It also displays the results of cruise, then the growth, and final the data as grown.

The headings are:

Spc. – Species, must be a valid species on the species table.

St. - Status

Age - Age in years

Birthdate = this is calculated from age and the current date.

SI = Site index by species

Ht – Stand height

Normality – The percentage of the Basal area to that of the Yield Table for that species.

BA/Ac – square feet per acre, unless normality is used.

Trees/Ac = The number of Trees per Acre, must have.

GCuFt/Ac - Gross cubic feet per acre if available.

NCuFt/Ac - Net cubic feet per acre if available.

GBf/Ac – Gross board feet per acre

NBf/ac – Net board feet per acre

Total Ccf – Total 100 cubic feet in the stand

Total Mbf – Total 1000 board feet in the stand

When entering a Non-Cruised stand the following minimum items are required:

Spc

Age or birthdate

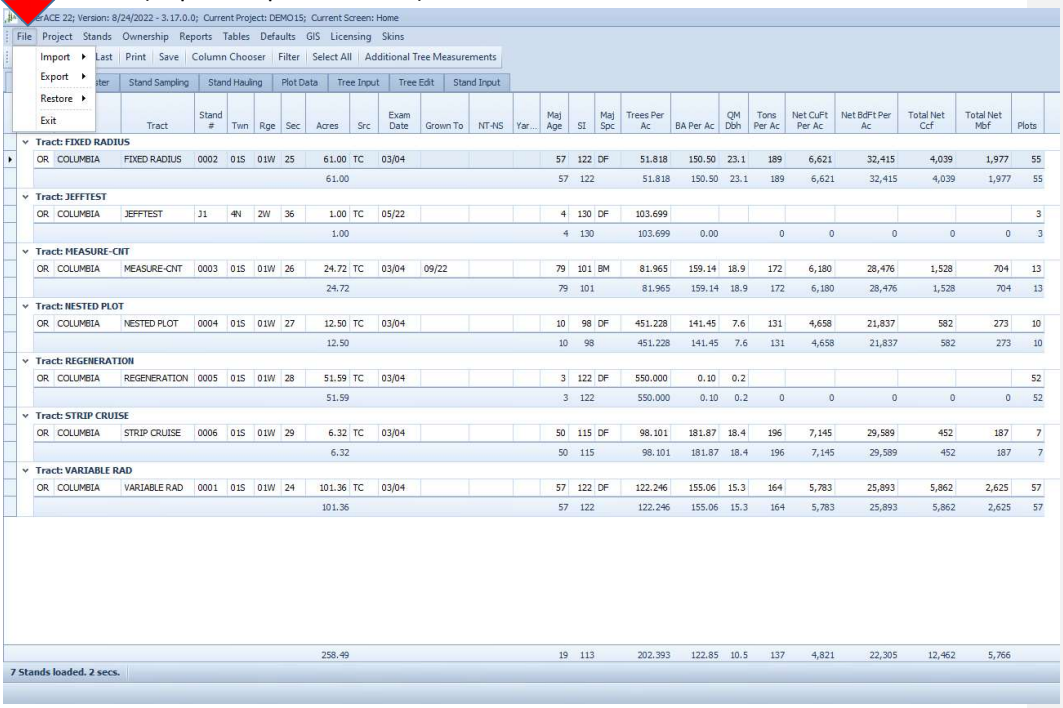
SI

Normality

Trees / Ac.

If you have other data please input it.

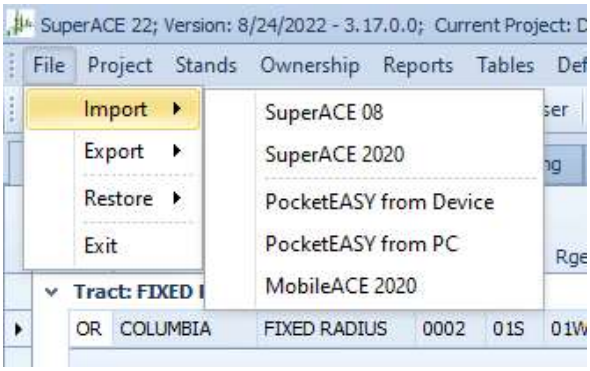
File – (Import, Export, Restore)



SuperACE allows Timber Cruise and Inventory Project data to be imported from and exported to a variety of formats on PC and Handheld Devices. Projects can also be Restored from Automatic Backups the system makes after a Project has been Edited.

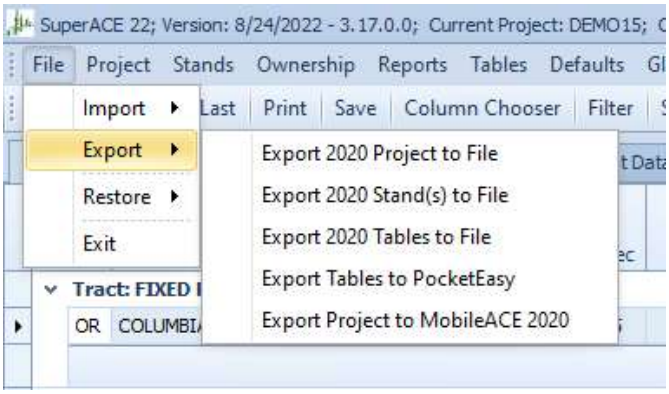
Windows Mobile Device Center and the fix that allows it to run on updated Windows 10 & 11 PCs must be installed in order to connect to and download from Windows Mobile handhelds running PocketEasy. Data is sent from the handheld first then imported to SuperACE 2022.

File Import – (Cruise & Inventory Project Data)



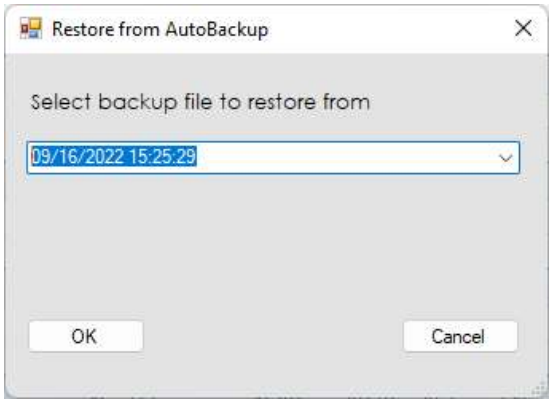
If cruise data has been collected on a Windows 10 or 11 tablet, then a cruise project can be exported as an SuperACE file and then imported to another computer. There are options to combine cruise data from different cruisers into 1 cruise file.

File Export

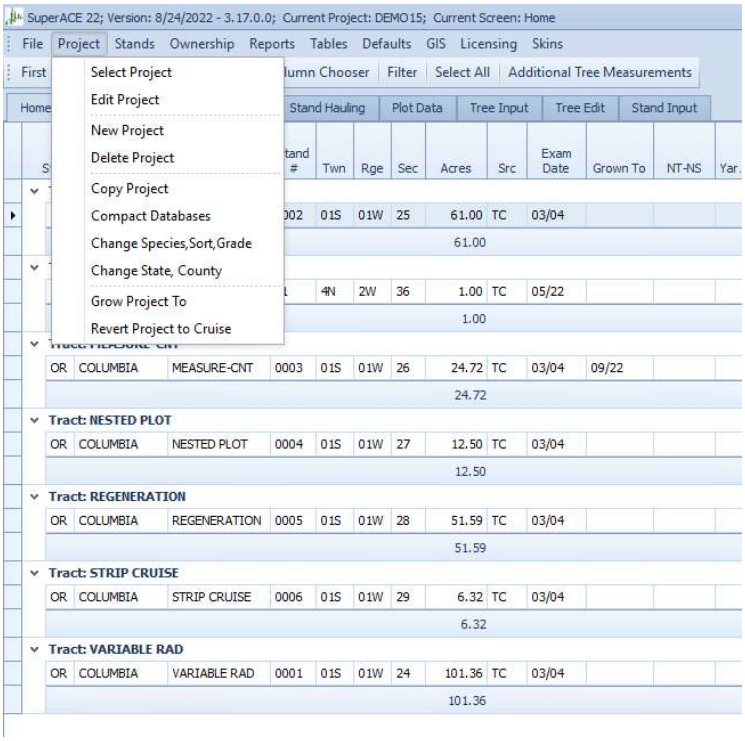


An exported SA2020 project can be emailed or blue toothed and imported to a desktop or other PC with SA2020 or later installed.

Restore (From Automatic Backup)

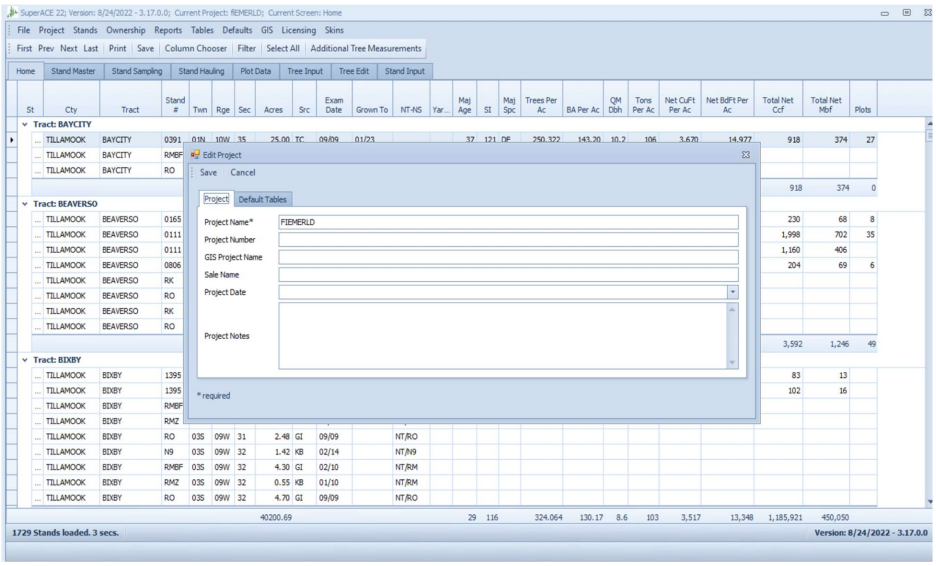


12. Project

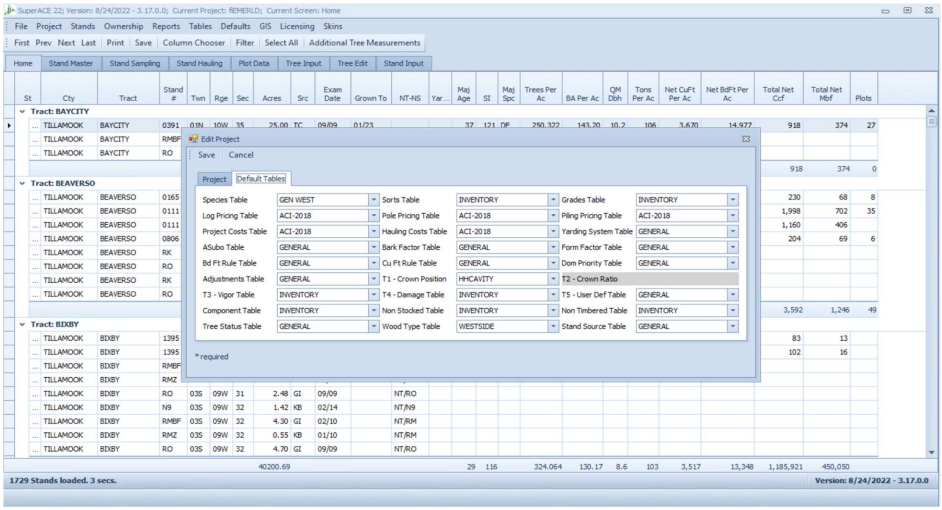


Select Project - all projects that are available are listed.
One click on the project you want will populate the screens.

Edit Project

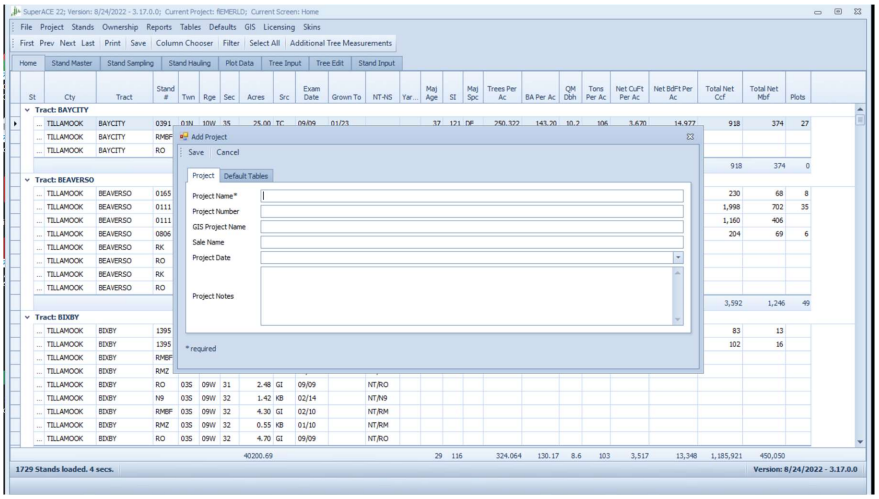


Each project must have a name. The rest of the information is for your use.



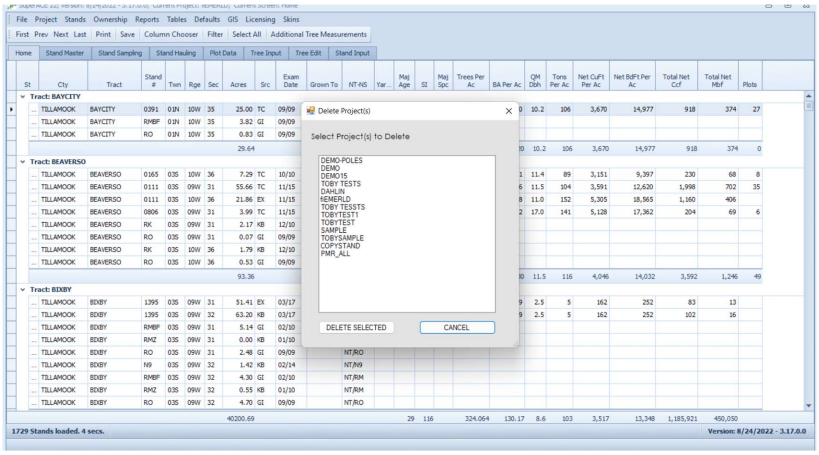
This screen lists all of the table now in use by the program.

New Project



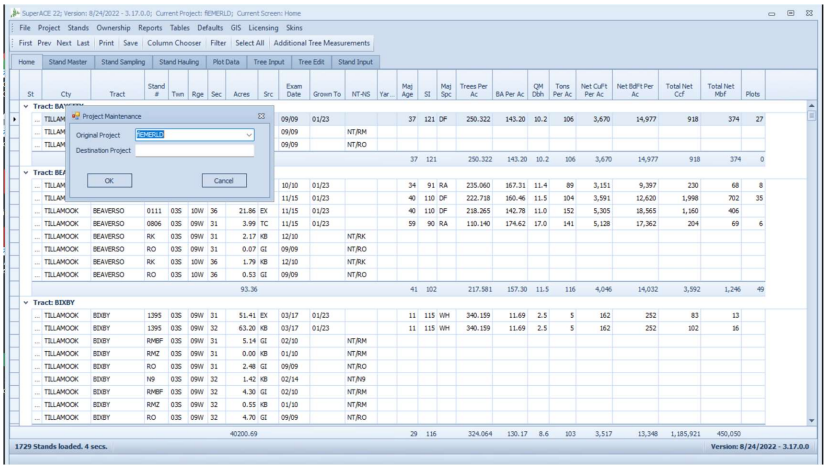
Type in the information you or your organization will need. At least the project name.

Delete Project



Select the program to delete.

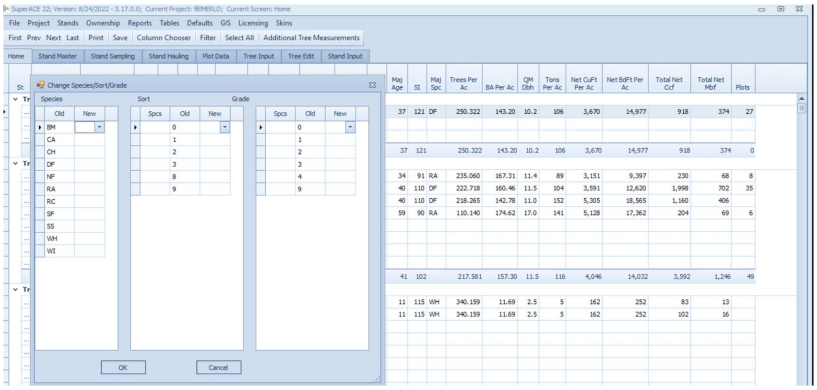
Copy Project



Compact Databases

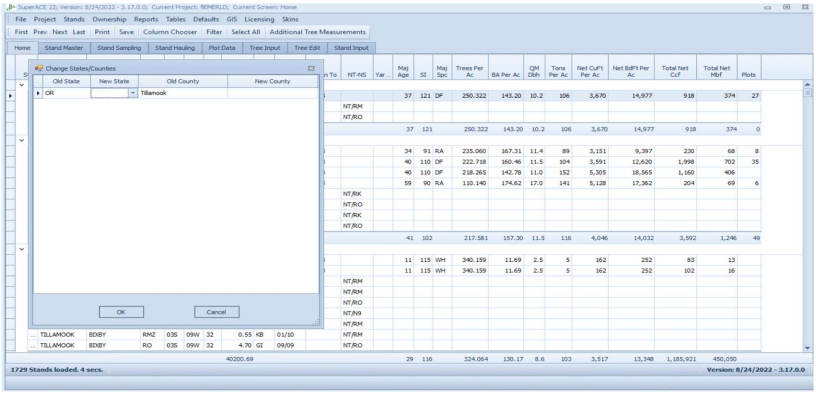
Maintenance function.

Changed Species, Sort, Grade



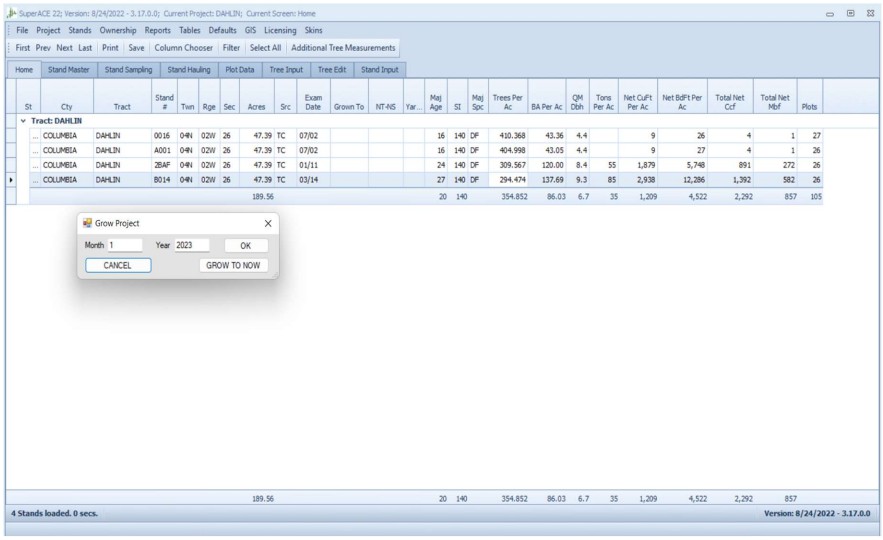
Allows correction of miscoding or use of non-conforming project codes. Stuff happens, this fixes it.

Change State, County

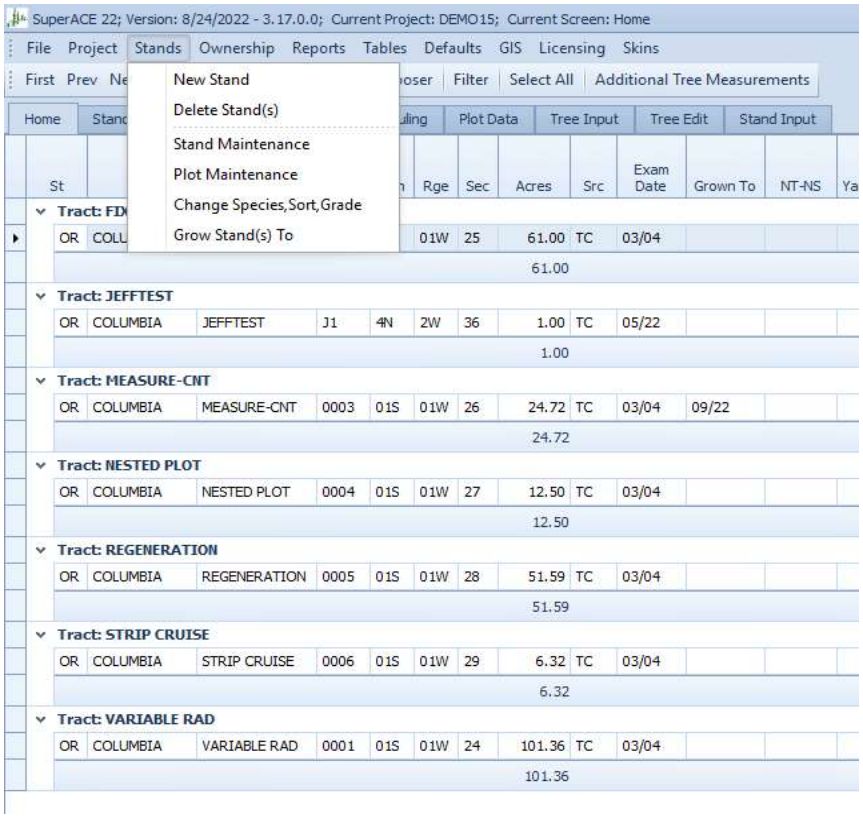


This function also allows for filling in state and county in old data where these were not required. State and county specify the FVS variant used for growth.

Grow Project To

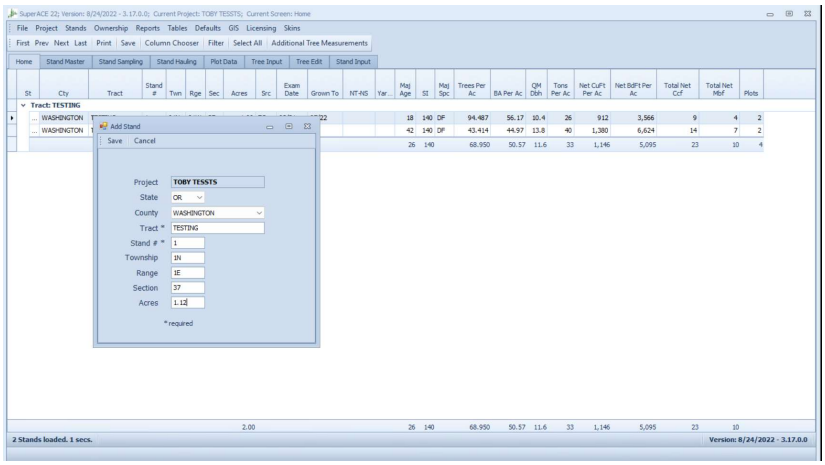


13. Stands



New Stand

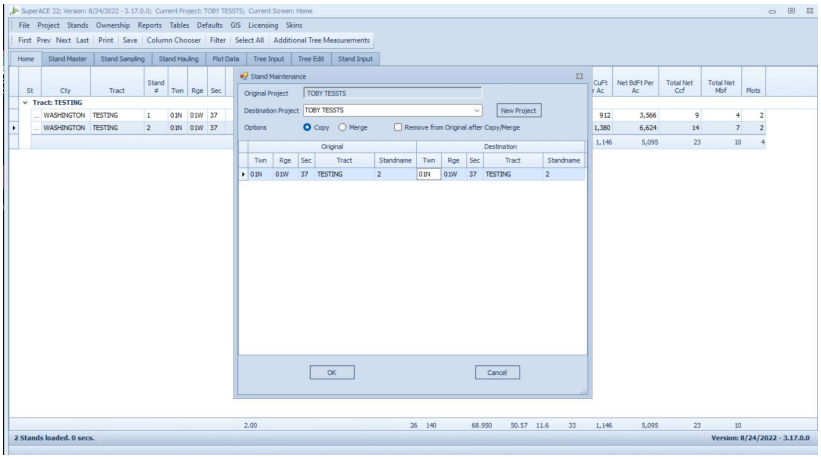
New stand brings up the add stand dialog box to fill in new stand details.



Delete Stand(s)

To Delete a stand. Point to it with the curser then hit delete.

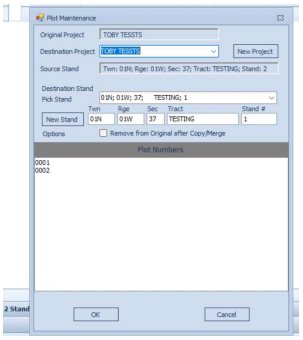
Stand Maintenance



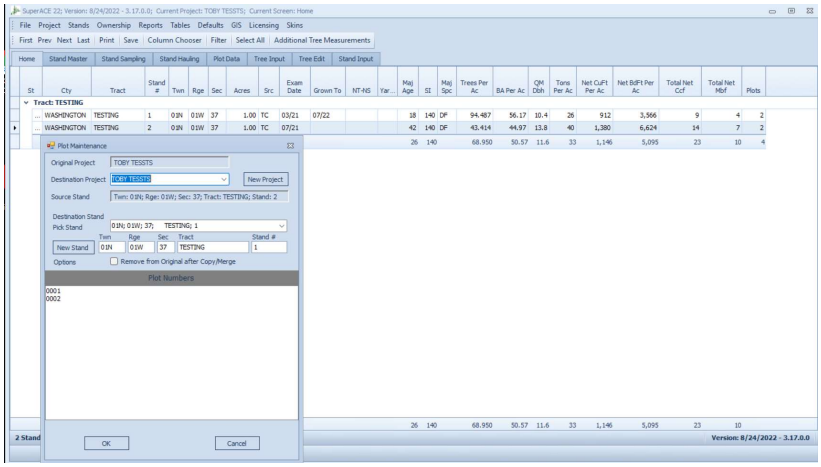
This allows copy, merge plots rename stand, Twn, Rge, Sec or Tract. Either within the current project, or into a new project.

Plot Maintenance

Select plots to copy, merge or delete.

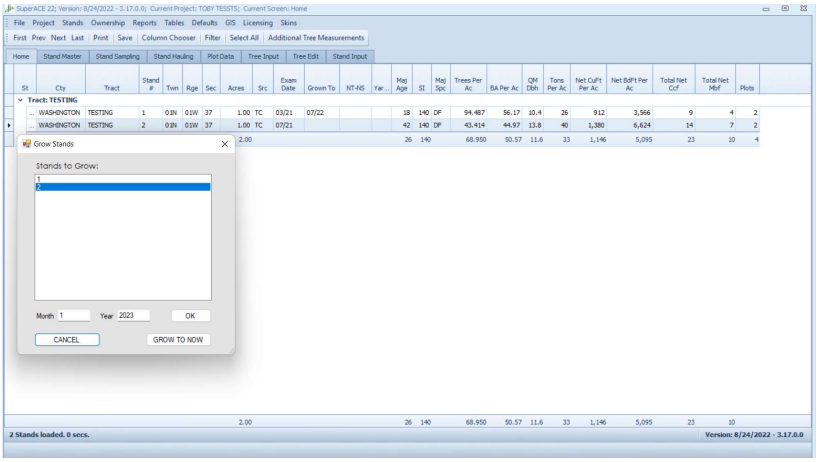


Change Species, Sort, Grade



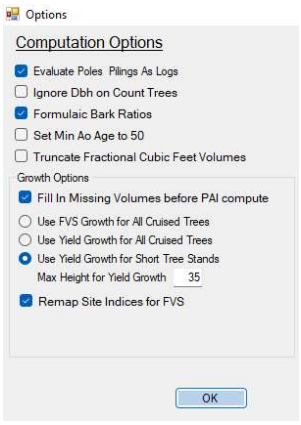
Stuff happens, change coding within stands.

Grow Stands To

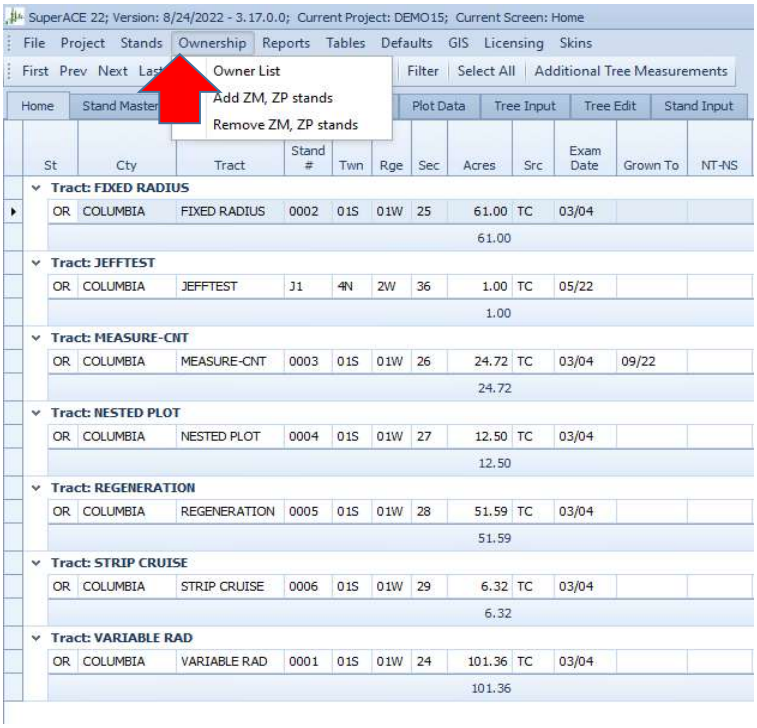


This dialog box used calendar date to set month & year of Grow To.

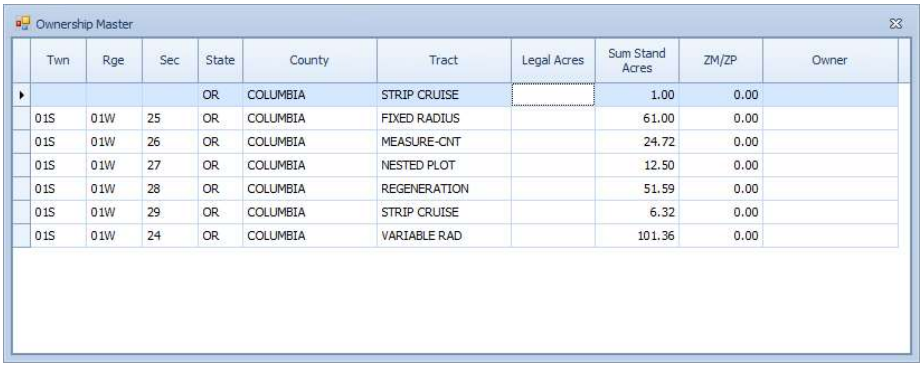
In Defaults, set whether yield curves or FVS is used for growth and if FVS is used, at what stand height it it used? Yield curve growth is more accurate than FVS for very young stands whereas FVS is better at stands that have reached approximately 35 feet and taller average height.



14. Ownership

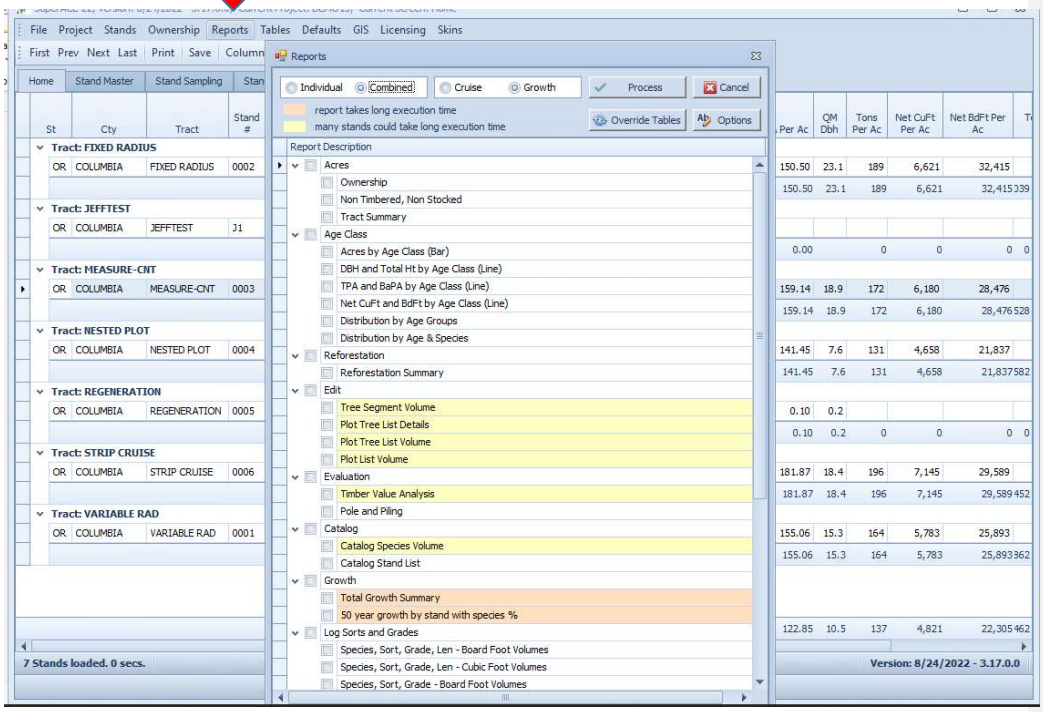


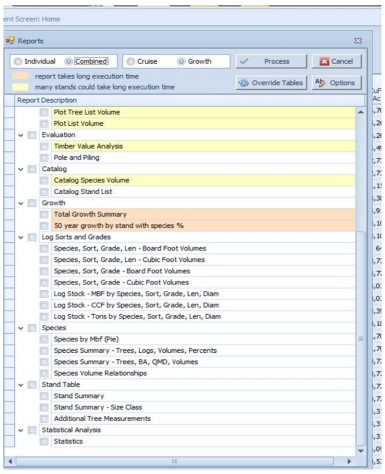
Owner List



The Owner List provides a convenient way to balance GIS Stand acres to Legal acres by section using ZM (minus acres) and ZP (Plus acres) by Ownership, Township, Range, Section, Tract, State, and County. This is done automatically through **Add ZM, ZP Stands and Remove ZM, ZP Stands** when Legal acres are entered.

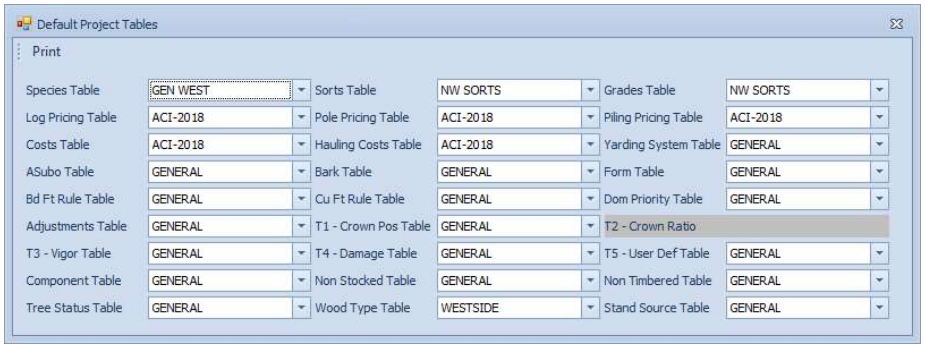
15. Reports



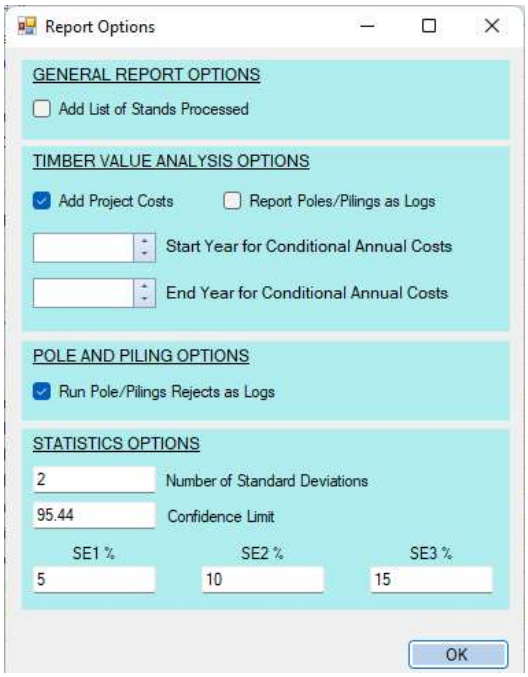


Reports may be run on all, or a portion of Stands selected from the Home Screen. The reports may also be run individually by stand for multiple selected stands, or all selected stands combined by selecting the “Individual” or “Combined” radio button. Combined is the default (see top left of following page).

Reports can be processed on either the original cruise data or the grown data by selecting the radio button at the top of the Report screen. After selecting report(s) press the **Process** or **Cancel** button. The **Reports** screen also allows the user to switch any of the Tables on-the-fly while running reports by selecting the **Override Tables** button that brings up the following **Default Project Tables** dialog box.



An additional **General Report Option** exists for printing a list of processed stands at the end of the printed report. Options also exist for the **Timber Value Analysis report**, **Pole and Piling report**, and **Statistics reports**.



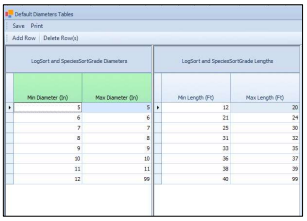
Note that some reports will take longer to process using *Grown* data when multiple stands are selected. These reports are color-coded on the Reports screen list.

Once processed, a report can be exported in a variety of file formats. This includes properly formatted spreadsheet files.

For timber cruising and inventory 1 standard deviation is appropriate (68% confidence limit). SE1% - SE3% can be user defined, defaults are shown. For calculations in the **Statistics Report** these are the percentages of sample error at 1, 2 and 3 standard deviations. In the **Statistics Report**, the number of plots needed to reach that percentage of SE is shown.

Log Sorts and Grades Reports

These reports display cruise data by species, sort, grade, log length and scaling diameter. The log length and scaling diameter ranges are set in *Defaults / Lengths and Diameters*. There is currently one table, shown below, that defines the range of log lengths and scaling diameter used for reports and in the *Log Price table.*



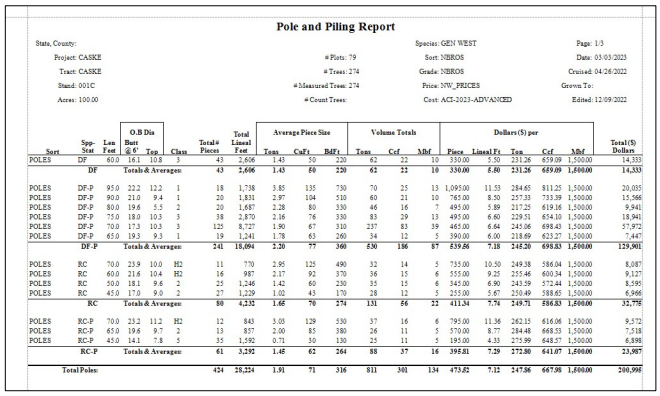
There is room for eight lines for scaling diameter and lengths. Number ranges are editable by users to fit needs. Typically, the ranges are set to reflect market pricing or preferences for log lengths and diameters.

Status of a tree may be used to define trees as Dead, Pole, Piling, Site or other defining characteristic that needs to be identified and shown separate from the rest of the species. D is hardwired in SuperACE for dead trees. Dead trees are not grown.

Pole and Piling Report

This shows cruised poles by species, length, and class. Prices in the Pole Pricing Table and/or the Piling Pricing are used to calculate values.

Status can be used to separate trees suitable for poles. Poles are defined by a hardwired P for sort in SuperACE. Piling is defined by a hardwired G in the program.



Pole and Piling Report

State, County:
Project: CASKE
Tract: CASKE
Stand: 001C
Acres: 100.00
Species: GEN WEST
Sort: NBROS
Grade: NBROS
Price: NW_PRICES
Count Trees:
Plots: 79
Trees: 274
Measured Trees: 274
Cost: ACI-2023-ADVANCED
Page: 1/3
Date: 03/03/2023
Cruised: 04/26/2022
Grown To:
Edited: 12/09/2022

Sort	Spp-Stat	Len Feet	O.B Dia Butt @ 6'	O.B Dia Top	Class	Total # Pieces	Total Lineal Feet	Average Piece Size: Tons	Average Piece Size: CuFt	Average Piece Size: BdFt	Volume Totals: Tons	Volume Totals: Ccf	Volume Totals: Mbf	Dollars ($) per: Piece	Dollars ($) per: Lineal Ft	Dollars ($) per: Ton	Dollars ($) per: Ccf	Dollars ($) per: Mbf	Total ($) Dollars
POLES	DF	60.0	16.1	10.8	3	43	2,606	1.43	50	220	62	22	10	330.00	5.50	231.26	659.09	1,500.00	14,333
	DF		Totals & Averages:			43	2,606	1.43	50	220	62	22	10	330.00	5.50	231.26	659.09	1,500.00	14,333
POLES	DF-P	95.0	22.2	12.2	1	18	1,738	3.85	135	730	70	25	13	1,095.00	11.53	284.65	811.25	1,500.00	20,035
POLES	DF-P	90.0	21.0	9.4	1	20	1,831	2.97	104	510	60	21	10	765.00	8.50	257.33	733.39	1,500.00	15,566
POLES	DF-P	80.0	19.6	5.5	2	20	1,687	2.28	80	330	46	16	7	495.00	5.89	217.25	619.16	1,500.00	9,941
POLES	DF-P	75.0	18.0	10.3	3	38	2,870	2.16	76	330	83	29	13	495.00	6.60	229.51	654.10	1,500.00	18,941
POLES	DF-P	70.0	17.3	10.3	3	125	8,727	1.90	67	310	237	83	39	465.00	6.64	245.06	698.43	1,500.00	57,972
POLES	DF-P	65.0	19.3	9.3	1	19	1,241	1.78	63	260	34	12	5	390.00	6.00	218.69	623.27	1,500.00	7,447
	DF-P		Totals & Averages:			241	18,094	2.20	77	360	530	186	87	539.86	7.18	248.20	698.83	1,500.00	129,901
POLES	RC	70.0	23.9	10.0	H2	11	770	2.95	125	490	32	14	5	735.00	10.50	249.38	586.04	1,500.00	8,087
POLES	RC	60.0	21.6	10.4	H2	16	987	2.17	92	370	36	15	6	555.00	9.25	255.46	600.34	1,500.00	9,127
POLES	RC	50.0	18.1	9.6	2	25	1,246	1.42	60	230	35	15	6	345.00	6.90	242.59	572.44	1,500.00	8,595
POLES	RC	45.0	17.0	9.0	2	27	1,229	1.02	43	170	28	12	5	255.00	5.67	250.49	588.65	1,500.00	6,966
	RC		Totals & Averages:			80	4,232	1.65	70	274	131	56	22	411.34	7.74	249.71	586.83	1,500.00	32,775
POLES	RC-P	70.0	23.2	11.2	H2	12	843	3.03	129	530	37	16	6	795.00	11.36	262.15	616.06	1,500.00	9,572
POLES	RC-P	65.0	19.6	9.7	2	13	857	2.00	85	380	26	11	5	570.00	8.77	284.48	668.53	1,500.00	7,518
POLES	RC-P	45.0	14.1	7.8	5	35	1,592	0.71	30	130	25	11	5	195.00	4.33	275.99	648.57	1,500.00	6,898
	RC-P		Totals & Averages:			61	3,292	1.45	62	264	88	37	16	395.81	7.29	272.80	641.07	1,500.00	23,987
	Total Poles:					424	28,224	1.91	71	316	811	301	134	473.82	7.12	247.86	667.98	1,500.00	200,998

Pole Mbf is determined by appropriate scaling rules for long logs unless log segments in a pole are called in lengths by the cruiser and the log segments joined by a + or – in the log detail percent cell. Use of different log lengths or scaling rules will have a significant impact on the board feet determined for a pole or piling.

Timber Value Analysis Report

This report ties several new features of SuperACE together. Hauling costs per log destination, yarding system and log prices. The initial install file for SuperACE 2023 contains two **Project** Cost Tables, ACI-2023 and ACI-2023 Advanced. ACI-2023 represents a typical setup for timber sales or appraisal of a stand. ACI-2023 Advanced contains cost items that would occur in larger scale and long term forest inventory management. The included tables may be copied and renamed, lines may be added and deleted according to user preference. Line item is a drop down for category. Use **MISC** or **OTHER** for desired items that are not named in the drop down.

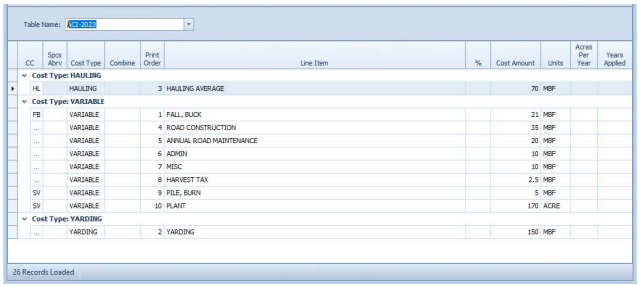


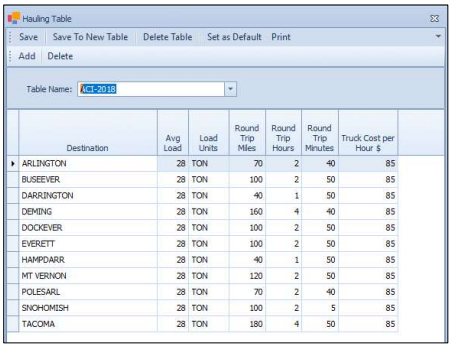
Table Name: ACI-2023

CC	Spcs Abrv	Cost Type	Combine	Print Order	Line Item	%	Cost Amount	Units	Acres Per Year	Years Applied
Cost Type: HAULING										
HL		HAULING		3	HAULING AVERAGE		70	MBF		
Cost Type: VARIABLE										
FB		VARIABLE		1	FALL, BUCK		21	MBF		
...		VARIABLE		4	ROAD CONSTRUCTION		35	MBF		
...		VARIABLE		5	ANNUAL ROAD MAINTENANCE		20	MBF		
...		VARIABLE		6	ADMIN		10	MBF		
...		VARIABLE		7	MISC		10	MBF		
...		VARIABLE		8	HARVEST TAX		2.5	MBF		
SV		VARIABLE		9	FILE, BURN		5	MBF		
SV		VARIABLE		10	PLANT		170	ACRE		
Cost Type: YARDING										
...		YARDING		2	YARDING		150	MBF		

26 Records Loaded

The **Hauling Table** below is tied to destinations in the **Log Price Table**. Tons of logs to a destination are used to calculate average hauling costs which go into the **Timber Value Analysis** report. Likewise yarding system costs from the **Yarding System Table** are tied to Yarding System set in a **Stand Master**. In a **Project Costs Table**, percentages of other systems and costs can be added. Costs can be per Mbf, ton, or acre.

As with all other reports the **Timber Value Analysis** report can be exported as a formatted spreadsheet for customization in a report or analysis.



Destination	Avg Load	Load Units	Round Trip Miles	Round Trip Hours	Round Trip Minutes	Truck Cost per Hour $
ARLINGTON	28	TON	70	2	40	85
BUSEEVER	28	TON	100	2	50	85
DARRINGTON	28	TON	40	1	50	85
DEMING	28	TON	160	4	40	85
DOCKEVER	28	TON	100	2	50	85
EVERETT	28	TON	100	2	50	85
HAMPDARR	28	TON	40	1	50	85
MT VERNON	28	TON	120	2	50	85
POLESARL	28	TON	70	2	40	85
SNOHOMISH	28	TON	100	2	5	85
TACOMA	28	TON	180	4	50	85

The load capacity of a standard log truck is 29 tons. Actual average loads will depend on truck fleet configuration (how many axles to the trucks) and log size. Small logs weigh more per cubic foot than large logs. Well sorted loads will be closer to the maximum capacity weight than mixed loads. Loads may reach height limits before weight capacity. Ask your logger what his average haul weights are or check scale weights.

Timber Value Analysis

Log Revenues by Species and Product

Species-Stat	Sorts Products	Log Metrics: Avg Dia	Avg Len	# Logs	Volume Totals: Tons	Ccf	Mbf	Dollars ($) per: Log	Acre	Ton	Ccf	Mbf	Total ($) Dollars
DF	saw log	13.0	37	2,987	4,271	1,499	715	70.22	5,244.57	49.12	139.99	293.57	209,783
DF	utility	10.7	34	432	412	145	64	28.64	309.16	30.00	85.50	193.38	12,366
DF	japan	20.6	38	238	757	266	158	273.00	1,625.67	85.91	244.83	410.53	65,027
DF		**13.2**	**37**	**3,657**	**5,440**	**1,909**	**937**	**78.52**	**7,179.40**	**52.79**	**150.45**	**306.51**	**287,176**
Total Logs:		**13.2**	**37**	**3,657**	**5,440**	**1,909**	**937**	**78.52**	**7,179.40**	**52.79**	**150.45**	**306.51**	**287,176**
STAND(s)	**TOTALS & AVERAGES:**				**5,440**	**1,909**	**937**	**78.52**	**7,179.40**	**52.79**	**150.45**	**306.51**	**287,176**

Cost By Line Item

Cost Type	Cost Item	$/Log	$/Acre	$/Ton	$/Ccf	$/Mbf	Total Dollars
VARIABLE	FALL, BUCK	5.27	491.89	3.62	10.31	21.00	19,676
YARDING	YARDING	32.90	3,068.46	22.56	64.30	131.00	122,739
HAULING	HAULING AVERAGE	0.00	1,159.58	8.53	24.30	49.51	46,383
VARIABLE	ROAD CONSTRUCTION	8.79	819.82	6.03	17.18	35.00	32,793
	ANNUAL ROAD MAINTENANCE	5.02	468.47	3.44	9.82	20.00	18,739
	ADMIN	2.51	234.23	1.72	4.91	10.00	9,369
	MISC	2.51	234.23	1.72	4.91	10.00	9,369
	HARVEST TAX	0.63	58.56	0.43	1.23	2.50	2,342
	PILE, BURN	1.26	117.12	0.86	2.45	5.00	4,685
	PLANT	1.82	170.00	1.25	3.56	7.26	6,800
Totals / Averages		73.15	6,822.37	50.16	142.97	291.26	272,895
Pre-Tax Profit or Loss		**5.37**	**357.03**	**2.63**	**7.48**	**15.24**	**14,281**

Transportation - Log Delivery

Description	Product	Spp	Round Trip: Hours	Minutes	Miles	Ave Load: Ton	Ccf	Mbf	# Loads	Truck Cost /Hour	Cost /Mile	Total Tons	Total Net Ccf	Total Net Mbf	Haul $: /Ton	/Ccf	/Mbf	Total Haul Costs
Darrington	saw log	DF	1	50	40	27.55	9.67	4.61	155	100.00	4.58	4,271	1,499	715	6.65	18.96	39.77	28,417
everett	japan	DF	4	5	100	27.03	9.49	5.66	28	100.00	4.08	757	266	158	15.10	43.05	72.18	11,433
everett	utility	DF	4	5	100	25.76	9.04	4.00	16	100.00	4.08	412	145	64	15.85	45.17	102.17	6,533
Transportation Totals:			2	20	53	27.34	9.59	4.71	199	100	4.38	5,440	1,909	937	8.53	24.3	49.51	46,383

**Displayed numbers are rounded, calculations for totals use actual.*

The detail in this report allows for analysis and comparisons for alternate buyers, prices, and destinations.

16. Tables

Tables are used for many functions in the program. They must be properly completed before data is processed correctly. It is a very good idea to check over the tables before running reports. The most important table is the "Species Table". Scaling rules used to determine log Scribner board foot volume and cubic volume are set in the **Species Table**.

Every table is included with each copy of the program that is delivered. Each user can use this as a guide to fill out their own tables.

Tables should be carefully thought out because once the data is taken in the field it is hard to change in the office. The cruiser is the only one that actually see's the trees and can correctly measure or classify them.

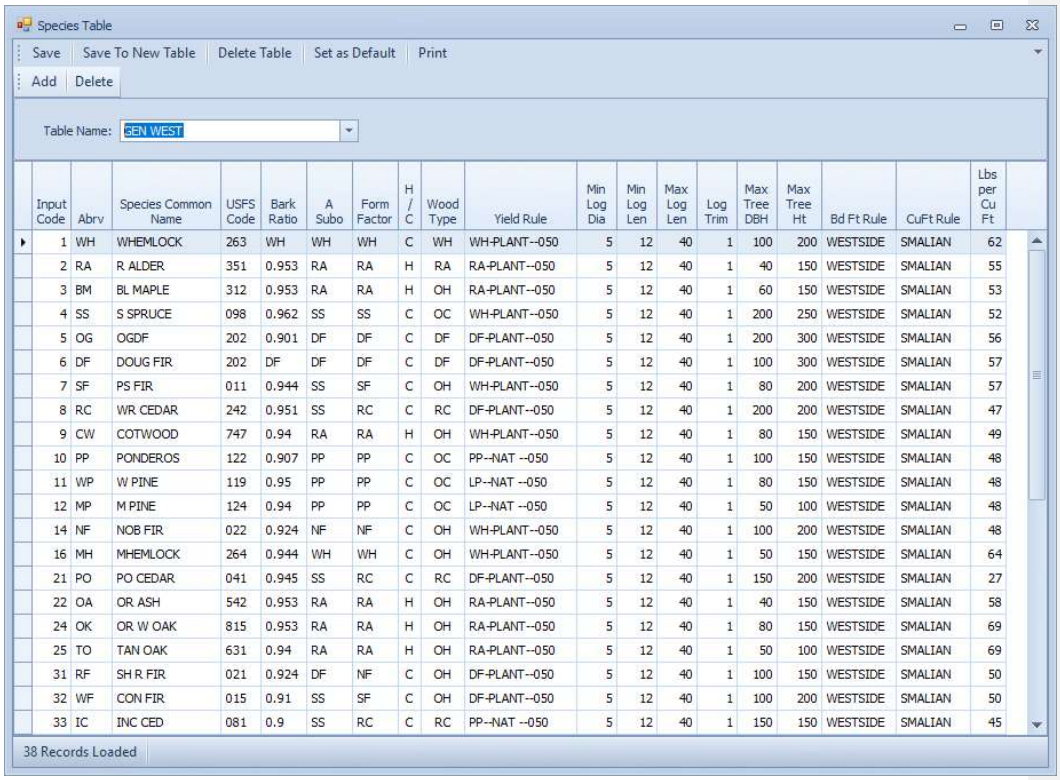
Tables within the software include:

- Species
- Sort/Grade
- Price
- Cost
- Transportation
- Yield Tables Normality
- Poles & Piling by Species, length and class, sizes and prices
- Bark
- Stand Data Source
- Harvest Method
- Non-stocked
- Non-forest
- Non-timber
- Status
- Wood Type/Component

Species Table

The species table is used for many functions in the program. It is the most important table in the system. Species is a key variable in determining the volume and value of a forest. A table can be used for many projects. It should be designed to be used in a whole region. Changing codes for the species can be done. The data will be automatically sorted and organized beginning with number one (1).

Copy to new table to create user specific names for a Species Table.



Input Code	Abrv	Species Common Name	USFS Code	Bark Ratio	A Subo	Form Factor	H / C	Wood Type	Yield Rule	Min Log Dia	Min Log Len	Max Log Len	Log Trim	Max Tree DBH	Max Tree Ht	Bd Ft Rule	CuFt Rule	Lbs per Cu Ft
1	WH	WHEMLOCK	263	WH	WH	WH	C	WH	WH-PLANT--050	5	12	40	1	100	200	WESTSIDE	SMALIAN	62
2	RA	R ALDER	351	0.953	RA	RA	H	RA	RA-PLANT--050	5	12	40	1	40	150	WESTSIDE	SMALIAN	55
3	BM	BL MAPLE	312	0.953	RA	RA	H	OH	RA-PLANT--050	5	12	40	1	60	150	WESTSIDE	SMALIAN	53
4	SS	S SPRUCE	098	0.962	SS	SS	C	OC	WH-PLANT--050	5	12	40	1	200	250	WESTSIDE	SMALIAN	52
5	OG	OGDF	202	0.901	DF	DF	C	DF	DF-PLANT--050	5	12	40	1	200	300	WESTSIDE	SMALIAN	56
6	DF	DOUG FIR	202	DF	DF	DF	C	DF	DF-PLANT--050	5	12	40	1	100	300	WESTSIDE	SMALIAN	57
7	SF	PS FIR	011	0.944	SS	SF	C	OH	WH-PLANT--050	5	12	40	1	80	200	WESTSIDE	SMALIAN	57
8	RC	WR CEDAR	242	0.951	SS	RC	C	RC	DF-PLANT--050	5	12	40	1	200	200	WESTSIDE	SMALIAN	47
9	CW	COTWOOD	747	0.94	RA	RA	H	OH	WH-PLANT--050	5	12	40	1	80	150	WESTSIDE	SMALIAN	49
10	PP	PONDEROS	122	0.907	PP	PP	C	OC	PP--NAT --050	5	12	40	1	100	150	WESTSIDE	SMALIAN	48
11	WP	W PINE	119	0.95	PP	PP	C	OC	LP--NAT --050	5	12	40	1	80	150	WESTSIDE	SMALIAN	48
12	MP	M PINE	124	0.94	PP	PP	C	OC	LP--NAT --050	5	12	40	1	50	100	WESTSIDE	SMALIAN	48
14	NF	NOB FIR	022	0.924	NF	NF	C	OH	WH-PLANT--050	5	12	40	1	100	200	WESTSIDE	SMALIAN	48
16	MH	MHEMLOCK	264	0.944	WH	WH	C	OH	WH-PLANT--050	5	12	40	1	50	150	WESTSIDE	SMALIAN	64
21	PO	PO CEDAR	041	0.945	SS	RC	C	RC	DF-PLANT--050	5	12	40	1	150	200	WESTSIDE	SMALIAN	27
22	OA	OR ASH	542	0.953	RA	RA	H	OH	RA-PLANT--050	5	12	40	1	40	150	WESTSIDE	SMALIAN	58
24	OK	OR W OAK	815	0.953	RA	RA	H	OH	RA-PLANT--050	5	12	40	1	80	150	WESTSIDE	SMALIAN	69
25	TO	TAN OAK	631	0.94	RA	RA	H	OH	RA-PLANT--050	5	12	40	1	50	100	WESTSIDE	SMALIAN	69
31	RF	SH R FIR	021	0.924	DF	NF	C	OH	DF-PLANT--050	5	12	40	1	100	150	WESTSIDE	SMALIAN	50
32	WF	CON FIR	015	0.91	SS	SF	C	OH	DF-PLANT--050	5	12	40	1	100	200	WESTSIDE	SMALIAN	50
33	IC	INC CED	081	0.9	SS	RC	C	RC	PP--NAT --050	5	12	40	1	150	150	WESTSIDE	SMALIAN	45

38 Records Loaded

Table Name - Each table is given an eight-digit alpha numeric code (Name) by the user. Default species tables with SuperACE are GEN WEST & EASTSIDE. These table names relate to Bureau scaling rules set in the tables.

Species Table Columns

Code – (Species) code.
This is a three-digit numeric code which when input, will change on the screen to the abbreviation for the species. Example, a code 6 will become DF for Douglas-fir. When entering data, each species entered is checked against the specifications in this table. If the species entered is not on the table, an error message will occur. New species can be entered on this screen. Make sure each column is completed. A species must be on this table to be used by this system.

Abv abbreviation for the species
This is a two-digit alpha code. This is the abbreviation for the species. This abbreviation refers to a species for which there is an equation for Ao. Ao values change the shape of the tree bole.

Species Name -
This 20-digit alpha code is the common name for the species. This description is printed in some reports.

USFS Code –
This is the national Forest Inventory and Analysis code for a species. FVS relates to these codes. Hard set, not user changeable.

Bark Ratio -
This is a 2-digit alpha code. This code refers to an equation within the BARK table. Bark ratios may change for the same species in a geographic area. Bark ratios change either larger or smaller up along the stem.

The **Bark Thickness Table** species abbreviation is entered into this column. If the bark factor is a constant, enter a decimal number, such as 0.921 and the remaining columns enter 0. If data is available for an equation, enter all the equation constants. In some species the bark gets thicker as diameter increases, others will get proportionally thinner bark.

Bark Ratio

DIB = Diameter inside bark
DOB = Diameter outside bark
S = Slope of the line
I = Intercept
BTR = Bark Thickness Ratio

BTR = DOB * S + I
DIB = BTR * DOB

Notes:
The entry on the species screen will be a species code refering to this table
The species codes must be exactly the same as those on the species scree
Data Limits for the equations is indicated by the dark line.
Copy the BTR for diameter larger than the data limit.
Bark thickness ratio for species with no equation are entered in the Intercept column.
All species must have a bark factor.

Bark Ratio Table

Code	SPP	Intercept	Slope
1	WH	0.919965168	0.001624599
2	RA	0.953	-
3	BM	0.953	-
4	SS	0.962	-
5	OG	0.939428961	(0.001366904)
6	DF	0.939428961	(0.001366904)
7	SF	0.919965168	0.001624599
8	RC	0.951	-
9	CW	0.940	-
10	PP	0.900	-
11	WP	0.950	-
12	MP	0.940	-
14	NF	0.924	-
16	MH	0.944	-
21	PO	0.945	-
22	OA	0.953	-
24	OK	0.953	-
25	TO	0.940	-
31	RF	0.924	-
32	WF	0.910	-
33	OC	0.900	-
34	YC	0.941	-
41	GF	0.944	-
42	LP	0.960	-
43	SP	0.870	-
44	WL	0.900	-
45	ES	0.962	-
46	AF	0.940	-
47	QA	0.940	-
48	MA	0.940	-
49	CQ	0.940	-
50	CH	0.940	-
51	BF	0.940	-
52	RW	0.900	-

Examples

	DF		WH		RA	
DOB	BTR	DIB	BTR	DIB	BTR	DIB
5.00	0.933	4.66	0.928	4.64	0.953	4.77
10.00	0.926	9.26	0.936	9.36	0.953	9.53
15.00	0.919	13.78	0.944	14.17	0.953	14.30
20.00	0.912	18.24	0.952	19.05	0.953	19.06
25.00	0.905	22.63	0.961	24.01	0.953	23.83
30.00	0.898	26.95	0.969	29.06	0.953	28.59
35.00	0.892	31.21	0.969	33.90	0.953	33.36
40.00	0.885	35.39	0.969	38.75	0.953	38.12
45.00	0.878	39.51	0.969	43.59	0.953	42.89
50.00	0.871	43.55	0.969	48.44	0.953	47.65
55.00	0.871	47.91	0.969	53.28	0.953	52.42
60.00	0.871	52.27	0.969	58.12	0.953	57.18
65.00	0.871	56.62	0.969	62.97	0.953	61.95
70.00	0.871	60.98	0.969	67.81	0.953	66.71
75.00	0.871	65.33	0.969	72.65	0.953	71.48
80.00	0.871	69.69	0.969	77.50	0.953	76.24
85.00	0.871	74.04	0.969	82.34	0.953	81.01
90.00	0.871	78.40	0.969	87.18	0.953	85.77
95.00	0.871	82.75	0.969	92.03	0.953	90.54
100.00	0.871	87.11	0.969	96.87	0.953	95.30
105.00	0.871	91.46	0.969	101.71	0.953	100.07
110.00	0.871	95.82	0.969	106.56	0.953	104.83

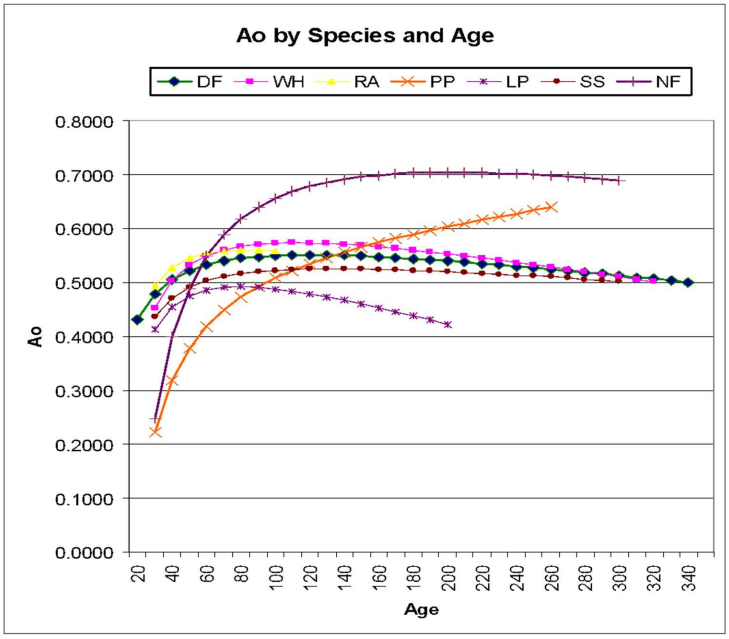
A SubO – Ao is an equation constant used in Behre's hyperbola, which describes tree form. Each tree volume is calculated using a tree taper equation. This constant determines the shape of the curve between the measurements of the tree. Enter one of the following species codes to use an Ao factor base upon age (DF, LP, WH, RA, PP, SS, SF, RC or NF). For example, red alder and cottonwood have a similar tree bole form, so for both species in this column, RA may be entered (the Ao for red alder). Age must be defined for each species in every stand. The age is defined on the Stand master screen. If age is not defined on the Stand master, the program uses a default age of 50 years old. An Ao factor may also be entered as a numeric value to be run against all ages for the specified species (i.e. 0.593 for WH).

All species must use one of the following species for the "Ao" constant equations. A constant value may also be directly input in the "a" column (with blanks in "b" & "c").

Ao by Species and Age

Ao = a + b (age) + c (1/age)

Species	Equation Constants		
	a	b	c
Douglas-fir	0.6462056696	-0.00036662	-6.153895459
Western hemlock	0.6942932623	-0.00053741	-6.750065896
Red alder	0.6804385228	-0.00072337	-4.950805641
Ponderosa pine	0.5813471067	0.00038794	-11.14531440
Lodgepole pine	0.6462056696	-0.00096662	-6.153895459
SS, SF, RC	0.5917642732	-0.00024862	-4.436954777
NF	0.8908600929	-0.00046180	-18.895778950


Ao by Species and Age
DF
WH
RA
PP
LP
SS
NF
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
Ao
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
Age

Form Factor –
Form Factor is a two-digit numeric code. Form Factor is the Dib @ Form Point outside bark divided by DBH outside bark. The best practice is to measure or estimate the form of each tree. If form factor is not entered and the tree has a DBH and a total height, the following equation will calculate a Form Factor.

Form Factor Calculation for Form Point 16 feet

Table Name: CASCADE
Form Factor = DBH*(a+b*(16.5/h)^2)/DBH

Species Code	Species	Description	Constant A	Constant B
1	WH	Western hemlock	0.948000013 8	-0.7170000076
2	RA	Red Alder	0.968999981 9	-1.0340000391
4	SS	Sitka spruce	0.921999990 9	-1.1189999580
6	DF	Douglas-fir	0.911000013 4	-0.7210000157
7	SF	Silver fir	0.949999988 1	-0.7749999762
8	RC	Western Redcedar	0.810000002 4	0.021 9999999
10	PP	Ponderosa pine	0.889999985 7	-0.6000000238
14	NF	Noble fir	0.916999995 7	-0.1940000057
42	LP	Lodgepole pine	0.920000016 7	-0.8000000119

Examples

		Calculated Form Factors								
DBH	Total Ht	WH	RA	SS	DF	SF	RC	PP	NF	LP
5	30	0.73	0.66	0.58	0.69	0.72	0.82	0.71	0.86	0.68
7	40	0.83	0.79	0.73	0.79	0.82	0.81	0.79	0.88	0.78
9	60	0.89	0.89	0.84	0.86	0.89	0.81	0.84	0.90	0.86
11	75	0.91	0.92	0.87	0.88	0.91	0.81	0.86	0.91	0.88
13	90	0.92	0.93	0.88	0.89	0.92	0.81	0.87	0.91	0.89
15	120	0.93	0.95	0.90	0.90	0.94	0.81	0.88	0.91	0.90
20	140	0.94	0.95	0.91	0.90	0.94	0.81	0.88	0.91	0.91
25	160	0.94	0.96	0.91	0.90	0.94	0.81	0.88	0.91	0.91
30	180	0.94	0.96	0.91	0.90	0.94	0.81	0.88	0.92	0.91

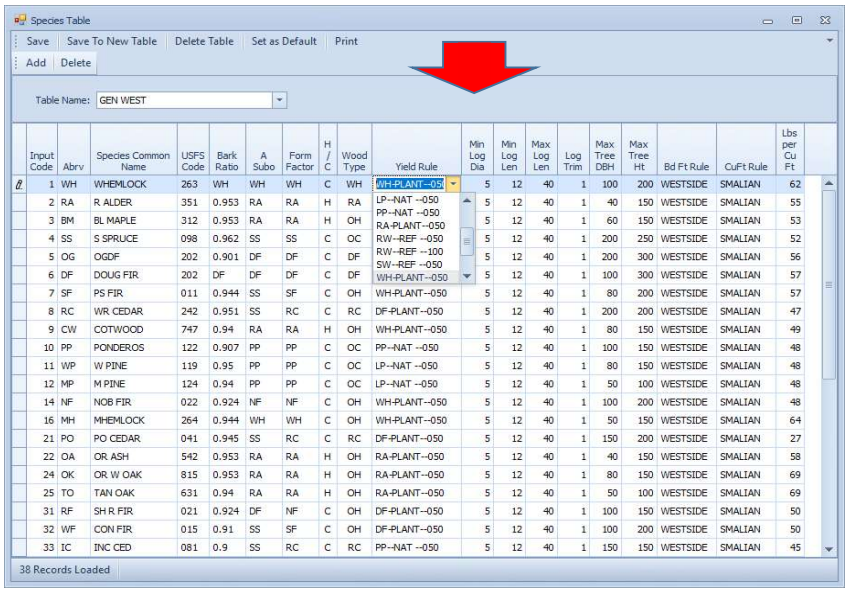
Spp Group -
Species group is a two-digit alpha code and is used for two basic functions. First, it is used to group species for various reports. Second, it is used in pricing logs in the price screen. If a species is not represented in the price screen and is present in the inventory data, it uses the species group log prices.

There is no species group table. They are grouped by entering the species alpha codes in this column. The species code used must be the same as a species within the species table.
In some of the reports, there are eight columns for species groups. The first five will report all the species in those groups. The first five groups are determined by total volume in the group. All other species are totaled as **other conifers "OC"** or **other hardwoods "OH".**

H or C – (Hardwoods or Conifers)
This is a one-digit alpha code and can only be an H or a C. This is used to organize species in various reports and is used to report other Conifers and other Hardwoods.

Growth Models – The system currently uses FVS (Forest Vegetation Simulator) which is an individual tree growth model developed by the US Forest Service for cruised stands with tree data greater than 35-feet tall. For stands lacking tree data and younger stands with tree heights averaging less than 35-feet the system can use the Yield Tables to estimate and grow stand-level data.

Stand Yield & Normality Tables
This drop-down menu refers to Stand Yield Models that grow the types on a stand-level basis. Yield table codes refer to yield tables that are built in the system. They are used for filling in missing data and can be used to grow stand-level data ahead in time. New yield tables can be entered.



Input Code	Abrv	Species Common Name	USFS Code	Bark Ratio	A Subo	Form Factor	H / C	Wood Type	Yield Rule	Min Log Dia	Min Log Len	Max Log Len	Log Trim	Max Tree DBH	Max Tree Ht	Bd Ft Rule	CuFt Rule	Lbs per Cu Ft
1	WH	WHEMLOCK	263	WH	WH	WH	C	WH	WH-PLANT--05	5	12	40	1	100	200	WESTSIDE	SMALIAN	62
2	RA	R ALDER	351	0.953	RA	RA	H	RA		5	12	40	1	40	150	WESTSIDE	SMALIAN	55
3	BM	BL MAPLE	312	0.953	RA	RA	H	OH		5	12	40	1	60	150	WESTSIDE	SMALIAN	53
4	SS	S SPRUCE	098	0.962	SS	SS	C	OC		5	12	40	1	200	250	WESTSIDE	SMALIAN	52
5	OG	OGDF	202	0.901	DF	DF	C	DF		5	12	40	1	200	300	WESTSIDE	SMALIAN	56
6	DF	DOUG FIR	202	DF	DF	DF	C	DF		5	12	40	1	100	300	WESTSIDE	SMALIAN	57
7	SF	PS FIR	011	0.944	SS	SF	C	OH	WH-PLANT--050	5	12	40	1	80	200	WESTSIDE	SMALIAN	57
8	RC	WR CEDAR	242	0.951	SS	RC	C	RC	DF-PLANT--050	5	12	40	1	200	200	WESTSIDE	SMALIAN	47
9	CW	COTWOOD	747	0.94	RA	RA	H	OH	WH-PLANT--050	5	12	40	1	80	150	WESTSIDE	SMALIAN	49
10	PP	PONDEROS	122	0.907	PP	PP	C	OC	PP--NAT --050	5	12	40	1	100	150	WESTSIDE	SMALIAN	48
11	WP	W PINE	119	0.95	PP	PP	C	OC	LP--NAT --050	5	12	40	1	80	150	WESTSIDE	SMALIAN	48
12	MP	M PINE	124	0.94	PP	PP	C	OC	LP--NAT --050	5	12	40	1	50	100	WESTSIDE	SMALIAN	48
14	NF	NOB FIR	022	0.924	NF	NF	C	OH	WH-PLANT--050	5	12	40	1	100	200	WESTSIDE	SMALIAN	48
16	MH	MHEMLOCK	264	0.944	WH	WH	C	OH	WH-PLANT--050	5	12	40	1	50	150	WESTSIDE	SMALIAN	64
21	PO	PO CEDAR	041	0.945	SS	RC	C	RC	DF-PLANT--050	5	12	40	1	150	200	WESTSIDE	SMALIAN	27
22	OA	OR ASH	542	0.953	RA	RA	H	OH	RA-PLANT--050	5	12	40	1	40	150	WESTSIDE	SMALIAN	58
24	OK	OR W OAK	815	0.953	RA	RA	H	OH	RA-PLANT--050	5	12	40	1	80	150	WESTSIDE	SMALIAN	69
25	TO	TAN OAK	631	0.94	RA	RA	H	OH	RA-PLANT--050	5	12	40	1	50	100	WESTSIDE	SMALIAN	69
31	RF	SH R FIR	021	0.924	DF	NF	C	OH	DF-PLANT--050	5	12	40	1	100	150	WESTSIDE	SMALIAN	50
32	WF	CON FIR	015	0.91	SS	SF	C	OH	DF-PLANT--050	5	12	40	1	100	200	WESTSIDE	SMALIAN	50
33	IC	INC CED	081	0.9	SS	RC	C	RC	PP--NAT --050	5	12	40	1	150	150	WESTSIDE	SMALIAN	45

LP--NAT --050
PP--NAT --050
RA-PLANT--050
RW--REF --050
RW--REF --100
SW--REF --050
WH-PLANT--050

Min Log Dia – Minimum log scaling diameter.
Minimum log scaling diameter is a two-digit numeric code. It is the smallest log scaling diameter acceptable for the cruise. Logs that are smaller than this will have the length reduced until this number is achieved.
Min Log Len – Minimum log length.
Minimum log length is a two-digit numeric code. If a log length is shorter than this length the log segment will be a cull.
Max Log Len – Maximum log length
Maximum log length is a two-digit numeric code. A log longer than this number will be split-scaled by the log scaling rules. Poles and Piling volumes will be scaled by the scaling rules and will be split-scaled unless the logs are entered with a '+' or '–' within the percent field. Values will be calculated for both poles and saw logs.
Log trim –
Log trim is a three-digit numeric code. The feet and tens of feet allowed for trim in each log.
Max Tree Dia – Maximum tree diameter for the species
Maximum tree diameter is a three-digit numeric and is the largest know diameter for the species. If a diameter is entered larger than this number, it is flagged as an error.
Max Tree Ht – Maximum tree height for the species
Maximum tree height is a three-digit numeric code and is the tallest know height for the species. If a tree height is entered larger than this number, it is flagged as an error.

Bd Ft Rule – Board Foot Log Scaling Rules

This is a one-digit alpha numeric code. Several log scaling rules for calculating board feet for each log are available. This is a drop-down menu.

SuperACE 5 Log Scaling Rules

Log Scaling Rules Board Feet

Code	Name	Reference Book	Equation	Volume Table	Dia	Split Log Length	Split Log Rule	Taper
B	BIA	Idaho Log Scaling Manual	No	Idaho Scribner	Nearest Inch	20	Long Segment bottom	Actual
D	Doyle		Yes	Formula	BF = (d-4)^2 * L/16	20	Long Segment bottom	Actual
E	Eastside	Northwest Log Rules	No	Northwest Log Rules	Nearest Inch	20	Long Segment bottom	Actual
I	Idaho	Idaho Log Scaling Manual	No	Idaho Scribner	Nearest Inch	20	Long Segment bottom	Actual
L	Doyle Len		Yes	Formula	BF = (d-4)^2 * L/16	20	BF no smaller than log length	Actual
Q	International 1/4	New Hampshire Best Log Scaling Practices	No	Table lookup	Nearest Inch	20	Long Segment bottom	Actual
R	International 1/8		Yes	Formula	Nearest Inch	20	See attached sheet	Actual
W	Westside	Northwest Log Rules	No	Scribner Volume Table	Drop Fractional Inche	40	Long segment top	1"-10'

Codes in old SuperACE98

C	California	Same as Eastside Rules
G	Gilchrist	Same as Eastside Rules
J	Salmon River	Same as Idaho rule
O	Omak	Same as Eastside Rules
S	Southern	Unkown
T	Targee	Same as Idaho Rules

These codes will appear on the Species Table. Each species must have a Board Foot and a Cubic Foot code.
The Northwest log rules and Idaho Log Rules have replace many we have in the current system. These are indicated in red.
When translating data from the old system to the new, use these codes.

Publications

Official Rules for the following Log Scaling Bureaus **(NWLRAG)**. July 1, 2003 Edition, Reprinted June 1, 2006
Idaho Log Scaling Manual 2008 Edition.
New Hampshire Best Log Scaling Practices Guide

Cu Ft Rule – Cubic foot log rules

This is a one-digit alpha-numeric code. Several log scaling rules for calculating cubic feet are available. This is a drop-down menu.

Log Scaling Rules Cubic Feet

Code	Name	Reference Book	Volume Table	Max log length to split scale	Dia	Taper	
1	Northwest	Northwest Log Rule	Westside Cubic E	40	Drop Fractions	1"-10'	CF = .005454(L+T)*((d+0.7)^2+(D+0.7)^2+(d+0.7)*(D+0.7))/3
2	S Weyco			20	Nearest Inch	Dia both ends	CF = ((d^2+D^2+d*D)/3)*(L*.005454154)
N	National			20	Nearest Inch	Dia both ends	CF = .002727*(D^2+d^2)*L
S	Samilian			20	Nearest Inch	Dia both ends	CF = ((Bd+BD)/2)*L
T	Newton			20	Nearest Inch	Dia both ends	CF = ((Bs+4BDm+BD)/6)*L
W	Weyco			40	Drop Fractions	1"-10'	CF = .005454(L+T)*((d+0.5)^2+(D+0.5)^2+(d+0.5)*(D+0.5))/3

B = Basal Area Square feet = .005454154*Dia^2
CF = Cubic Feet
D = Large Diameter inches
d = Small Diameter inches
Dm = Mid Diameter inches
L = Log Length feet including Trim
T = Trim feet
1 NW Rules and W Wetco trim for logs under 17 feet = 0.7 feet, over 17 feet 1.0 feet.

Newton	CF = ((Bs+4BDm+BD)/6)*L	
Huber	CF = (BDm)*L	
Smalian	CF = ((Bd+BD)/2)*L	
NW Rules	CF = .005454(L+T)*((d+0.7)^2+(D+0.7)^2+(d+0.7)*(D+0.7))/3	Drop fractional inches
Subneiloid R	CF = ((.005454)*((d+D)/2)^2)*L	
Bruce Butt L	CF = (.005454)*(.25D^2 + .75d^2)*(L + T)	
Weyco Nort	CF = .005454(L+T)*((d+0.5)^2+(D+0.5)^2+(d+0.5)*(D+0.5))/3	
Weyco Sout	CF = ((d^2+D^2+d*D)/3)*(L*.005454154)	
Sorenson	CF = (.005454(d+L/20)^2)*L	
National	CF = .002727*(D^2+d^2)*L	

Lbs – Pounds **(Lbs per CuFt) –** This is the pounds per Cubic foot that a species will weigh when crossing the weight scales. This varies by the time of the year, the time between falling and weighing, and other factors.

Pounds per cubic foot is the best way to calculate weight. Large logs weigh less per cubic foot than small logs due to the percentage of sapwood, which is heavier than bark. Wood density also varies by species.

This is a five-digit numeric field. The relationship with board feet to weight is very poor because taper is not part of the board foot calculation.

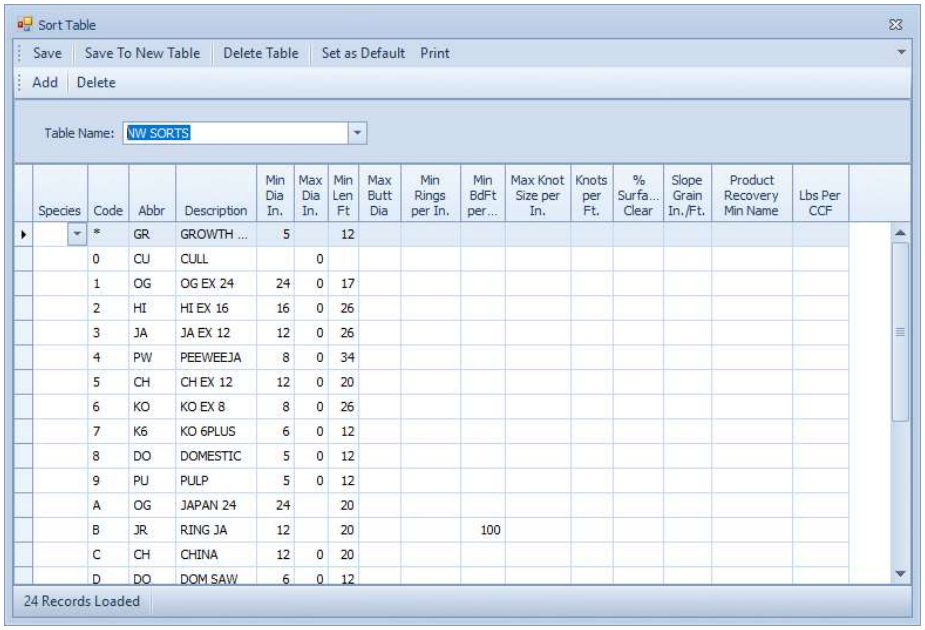
Per – This designated the unit of measure of wood volume in either CCF (100 Cubic feet) or MBF (1000 board feet).

This is a drop-down menu with two choices, CCF or MBF.

Sort/Grade Tables

Sorts by Species **–** The sort/grade table is the table in which the project's sorts and grades are defined. These definitions or classifications will be used when generating reports that have a reference to tree sorts and grades.

Specifying species that sorts or grades apply to allows for different log specifications and use of the same code. This helps keep things simple and helps in edit review. For example a hardwood 3 saw is 10 inches while conifer is 6 inches & minimum 50 Bdft. Both can be coded as 3 for grade and the edit function will check according to species log parameters set here. Following is a description of the fields of the sort/grade table.



Species	Code	Abbr	Description	Min Dia In.	Max Dia In.	Min Len Ft	Max Butt Dia	Min Rings per In.	Min BdFt per...	Max Knot Size per In.	Knots per Ft.	% Surfa... Clear	Slope Grain In./Ft.	Product Recovery Min Name	Lbs Per CCF
	*	GR	GROWTH ...	5		12									
	0	CU	CULL		0										
	1	OG	OG EX 24	24	0	17									
	2	HI	HI EX 16	16	0	26									
	3	JA	JA EX 12	12	0	26									
	4	PW	PEEWEEJA	8	0	34									
	5	CH	CH EX 12	12	0	20									
	6	KO	KO EX 8	8	0	26									
	7	K6	KO 6PLUS	6	0	12									
	8	DO	DOMESTIC	5	0	12									
	9	PU	PULP	5	0	12									
	A	OG	JAPAN 24	24		20									
	B	JR	RING JA	12		20			100						
	C	CH	CHINA	12	0	20									
	D	DO	DOM SAW	6	0	12									

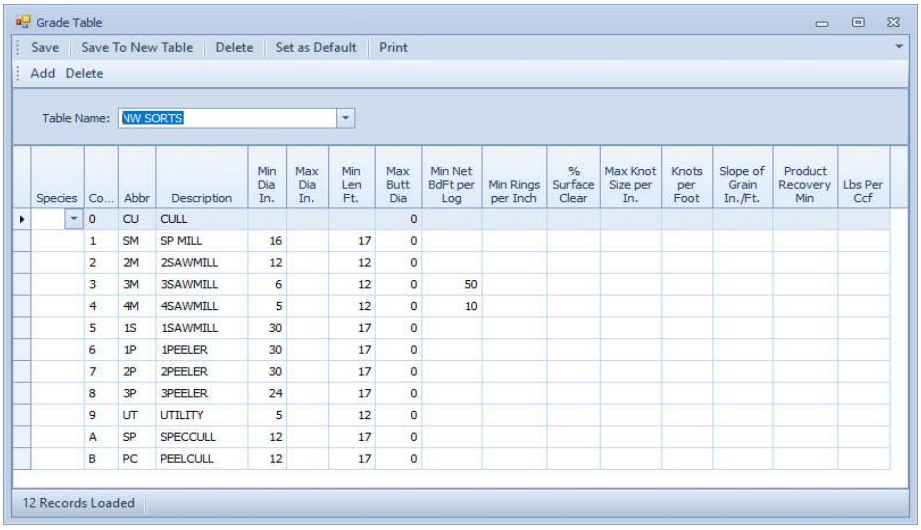


Table Name (required) - The table name reflects the choice of sort table made from the Table Names dropdown list box (of existing tables) located at the bottom left of the screen. These tables may be existing, or newly created. See Creating a New Table.

Sort (required) - One-character wide alphanumeric field, representing a specific sort. For example, an export table might assign a 0 to a cull log, a 1 to an old growth log, a 4 for a peewee Japan log, an H for hardwood sawlog, etc.

Grade (required) - A one-character wide alphanumeric field that represents a specific grade.

Abrv (required) - Two-character wide alphabetic field, representing a specific sort. For example, an export table might assign CU to a cull log, OG to an old growth log, PW for a peewee Japan log, an HD for a hardwood sawlog, etc.

Description (required) - An alphanumeric field, describing a specific sort. It may relate to a log's probable destination or to its surface characteristics. For example, a Japan export with a 12-inch minimum diameter might have a description such as JA EX 12.

Min Dia (required) - The minimum acceptable small end diameter to meet a specific Sort requirement. (e.g. a China export may have a minimum diameter of 12 inches on the small end of the log). If a log does not meet a Min Dia requirement the volume and assigned sort and grade are still reported. A message will appear in the SuperACE-Tree Edit screen noting the discrepancy.

Max Butt (optional) - The maximum acceptable large end diameter of a log to meet a specific Sort requirement.

Min Len (required) - The minimum acceptable log length for a given log Sort. For example, for a PeeWee Japan log, the minimum length accepted by the buyer might be 34 feet.

Min Net Vol Bf/Log (optional) - The minimum amount of BF volume that a log must contain to be classified as a given Sort.

Min Rings Per Inch (optional) - The minimum number of rings per inch that the butt end of a log must contain to be classified as a given sort. For user information only, not used in the program.

% Surface Clear (optional) – Percentage of surface clear of knots and damage required for Sort/Grade.

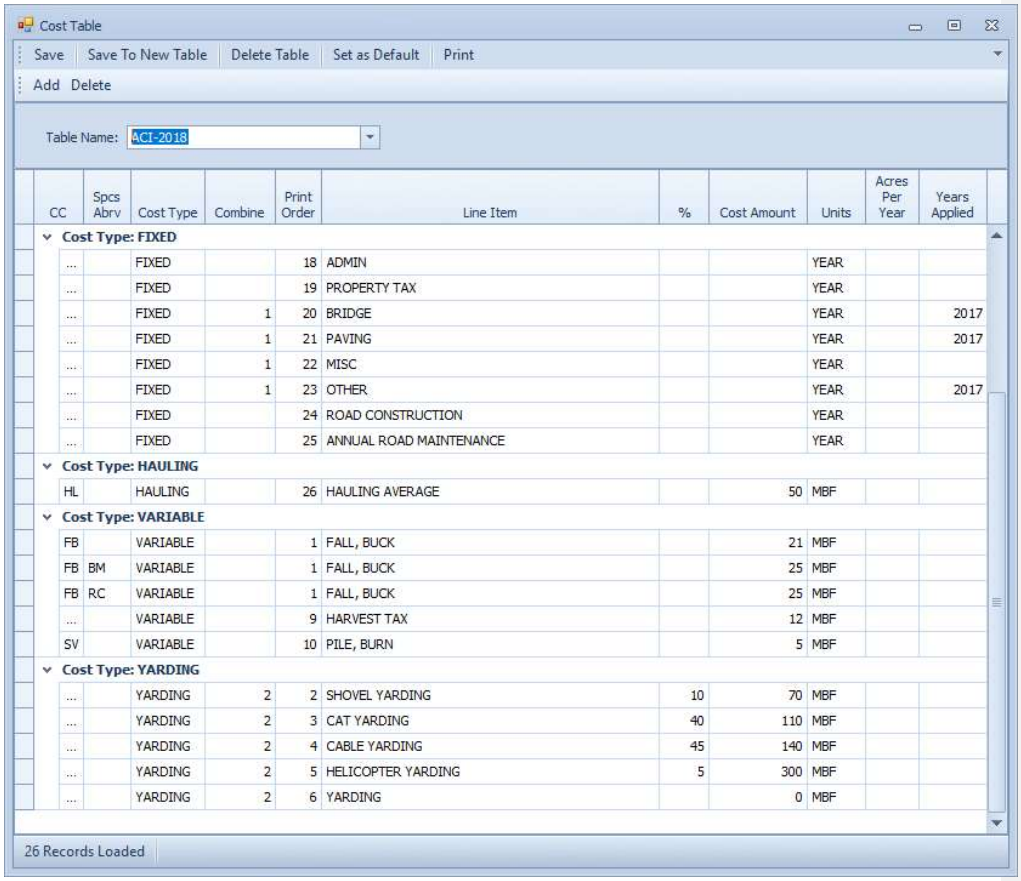
Knots (Frequency) per-Foot (optional) - The maximum number of knots per foot allowable for a given log Sort/Grade. For user information only, not used in the program.

Slope of Grain (inches/foot) (optional) - Enter the number of inches per foot of twist or spiral grain in this column to express whether the log is straight or not. For user information only, not used in the program.

Product Recovery Min (optional) – Enter minimum product requirement for log Sort/Grade (e.g. Fiber, Sawlog, Veneer, etc.). For user information only, not used in the program.

Lbs per-Ccf (optional) - The weight, in pounds per Cunit (100 cubic feet). This information can be gathered from scaling bureaus, state forestry departments, timberland owners, etc.

Project Costs Table



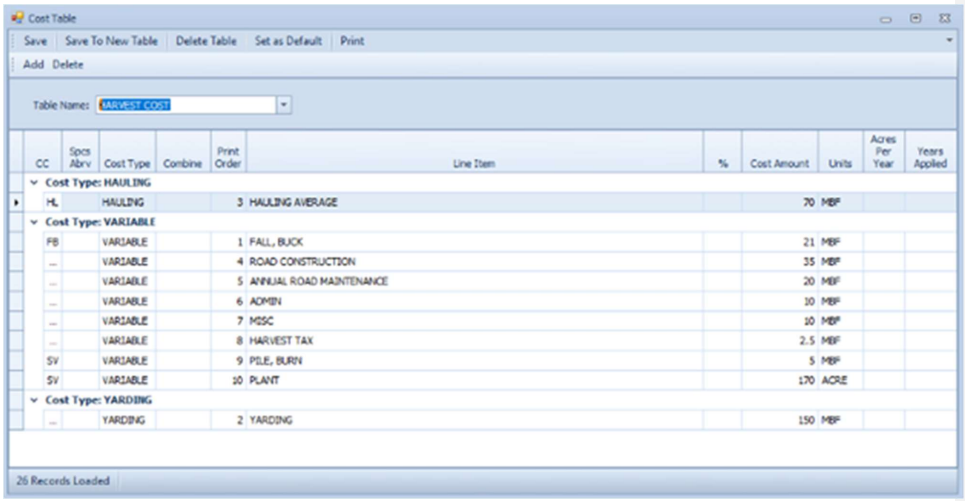
CC	Spcs Abrv	Cost Type	Combine	Print Order	Line Item	%	Cost Amount	Units	Acres Per Year	Years Applied
Cost Type: FIXED										
...		FIXED		18	ADMIN			YEAR		
...		FIXED		19	PROPERTY TAX			YEAR		
...		FIXED	1	20	BRIDGE			YEAR		2017
...		FIXED	1	21	PAVING			YEAR		2017
...		FIXED	1	22	MISC			YEAR		
...		FIXED	1	23	OTHER			YEAR		2017
...		FIXED		24	ROAD CONSTRUCTION			YEAR		
...		FIXED		25	ANNUAL ROAD MAINTENANCE			YEAR		
Cost Type: HAULING										
HL		HAULING		26	HAULING AVERAGE		50	MBF		
Cost Type: VARIABLE										
FB		VARIABLE		1	FALL, BUCK		21	MBF		
FB	BM	VARIABLE		1	FALL, BUCK		25	MBF		
FB	RC	VARIABLE		1	FALL, BUCK		25	MBF		
...		VARIABLE		9	HARVEST TAX		12	MBF		
SV		VARIABLE		10	PILE, BURN		5	MBF		
Cost Type: YARDING										
...		YARDING	2	2	SHOVEL YARDING	10	70	MBF		
...		YARDING	2	3	CAT YARDING	40	110	MBF		
...		YARDING	2	4	CABLE YARDING	45	140	MBF		
...		YARDING	2	5	HELICOPTER YARDING	5	300	MBF		
...		YARDING	2	6	YARDING		0	MBF		

This table has costs that are likely to occur in management of a larger, varied tree farm. The simplified table below is more useful in valuing currently merchantable stands or a timber sale.

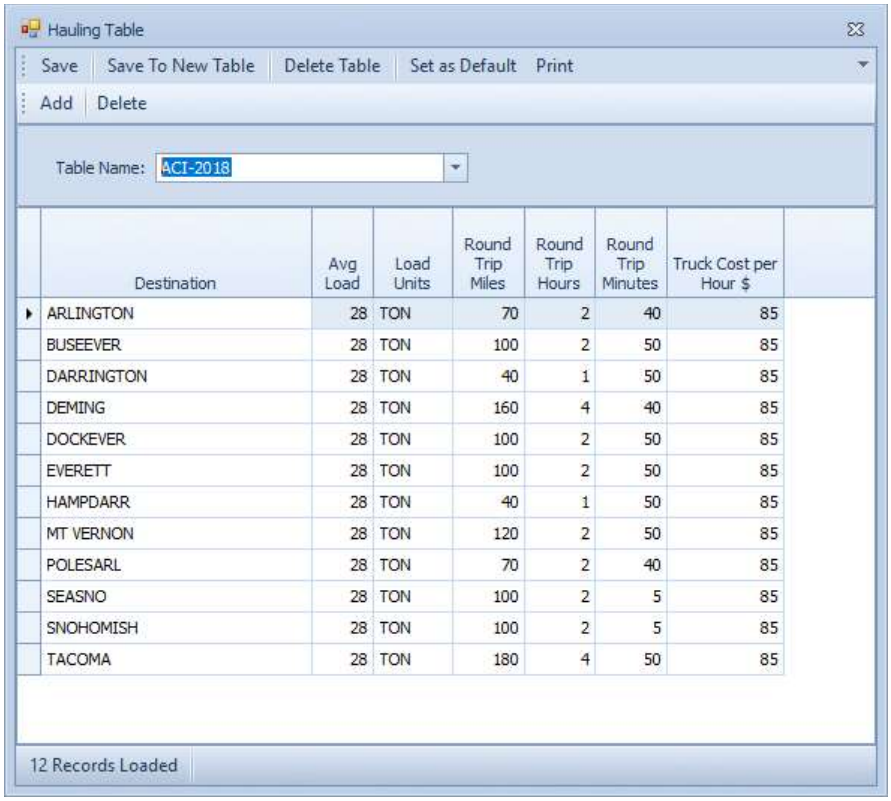
Cost lines may be added or deleted as desired. Line items are from a dropdown menu, select the item name reasonably close to what you would call an item. Change cost amount and units as desired.

Hauling cost interacts with the Hauling Table, Yarding interacts with the Yarding Table.

Simple Project Costs Table



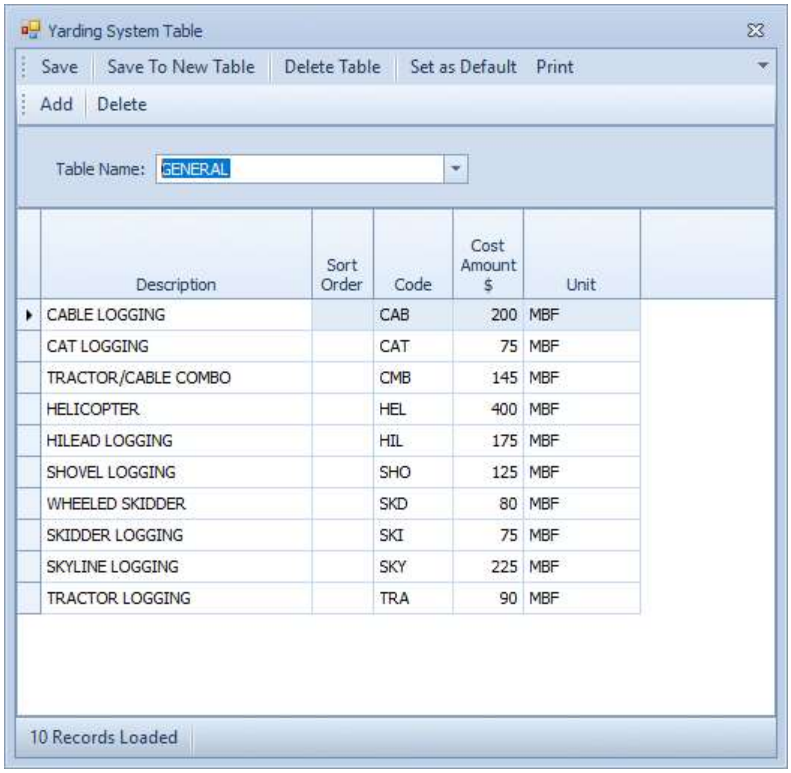
Hauling Table



Destination	Avg Load	Load Units	Round Trip Miles	Round Trip Hours	Round Trip Minutes	Truck Cost per Hour $
ARLINGTON	28	TON	70	2	40	85
BUSEEVER	28	TON	100	2	50	85
DARRINGTON	28	TON	40	1	50	85
DEMING	28	TON	160	4	40	85
DOCKEVER	28	TON	100	2	50	85
EVERETT	28	TON	100	2	50	85
HAMPDARR	28	TON	40	1	50	85
MT VERNON	28	TON	120	2	50	85
POLESARL	28	TON	70	2	40	85
SEASNO	28	TON	100	2	5	85
SNOHOMISH	28	TON	100	2	5	85
TACOMA	28	TON	180	4	50	85

Save to New Table for your area of interest and fill in Destinations as needed. Lines can be added or deleted as needed. Input average tons per truck for your fleet, RT miles, RT hours, RT minutes and truck cost per hour. Include load & unload time in RT hours and minutes. Destinations ties to the Price Table destinations. Average hauling cost is calculated using tons of sort going to designated destinations.

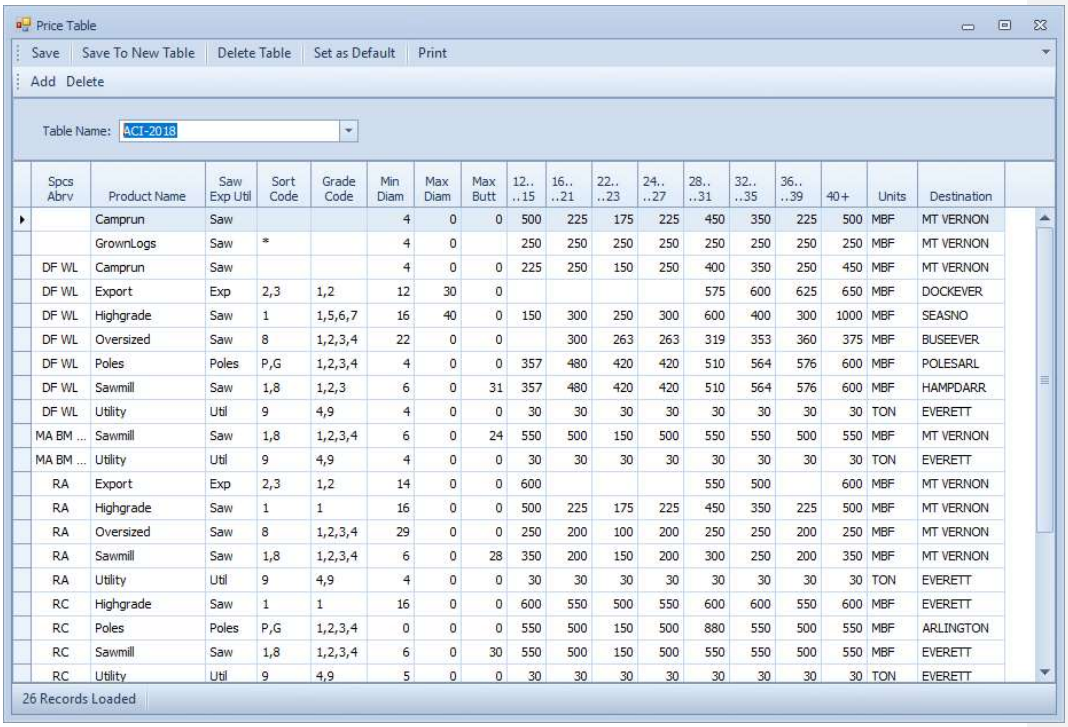
Yarding System Table



This table ties to the Stand Master and sets cost of yarding when a system from the Yarding System dropdown menu is selected. If Yarding System in the master is left blank, SuperACE will use the yarding cost input in the Project Cost table.

Copy to new table and name for your specific needs.

Log Pricing Table



Spcs Abrv	Product Name	Saw Exp Util	Sort Code	Grade Code	Min Diam	Max Diam	Max Butt	12.. ..15	16.. ..21	22.. ..23	24.. ..27	28.. ..31	32.. ..35	36.. ..39	40+	Units	Destination
	Camprun	Saw			4	0	0	500	225	175	225	450	350	225	500	MBF	MT VERNON
	GrownLogs	Saw	*		4	0		250	250	250	250	250	250	250	250	MBF	MT VERNON
DF WL	Camprun	Saw			4	0	0	225	250	150	250	400	350	250	450	MBF	MT VERNON
DF WL	Export	Exp	2,3	1,2	12	30	0					575	600	625	650	MBF	DOCKEVER
DF WL	Highgrade	Saw	1	1,5,6,7	16	40	0	150	300	250	300	600	400	300	1000	MBF	SEASNO
DF WL	Oversized	Saw	8	1,2,3,4	22	0	0		300	263	263	319	353	360	375	MBF	BUSEEVER
DF WL	Poles	Poles	P,G	1,2,3,4	4	0	0	357	480	420	420	510	564	576	600	MBF	POLESARL
DF WL	Sawmill	Saw	1,8	1,2,3	6	0	31	357	480	420	420	510	564	576	600	MBF	HAMPDARR
DF WL	Utility	Util	9	4,9	4	0	0	30	30	30	30	30	30	30	30	TON	EVERETT
MA BM ...	Sawmill	Saw	1,8	1,2,3,4	6	0	24	550	500	150	500	550	550	500	550	MBF	MT VERNON
MA BM ...	Utility	Util	9	4,9	4	0	0	30	30	30	30	30	30	30	30	TON	EVERETT
RA	Export	Exp	2,3	1,2	14	0	0	600				550	500		600	MBF	MT VERNON
RA	Highgrade	Saw	1	1	16	0	0	500	225	175	225	450	350	225	500	MBF	MT VERNON
RA	Oversized	Saw	8	1,2,3,4	29	0	0	250	200	100	200	250	250	200	250	MBF	MT VERNON
RA	Sawmill	Saw	1,8	1,2,3,4	6	0	28	350	200	150	200	300	250	200	350	MBF	MT VERNON
RA	Utility	Util	9	4,9	4	0	0	30	30	30	30	30	30	30	30	TON	EVERETT
RC	Highgrade	Saw	1	1	16	0	0	600	550	500	550	600	600	550	600	MBF	EVERETT
RC	Poles	Poles	P,G	1,2,3,4	0	0	0	550	500	150	500	880	550	500	550	MBF	ARLINGTON
RC	Sawmill	Saw	1,8	1,2,3,4	6	0	30	550	500	150	500	550	550	500	550	MBF	EVERETT
RC	Utility	Util	9	4,9	5	0	0	30	30	30	30	30	30	30	30	TON	EVERETT

26 Records Loaded

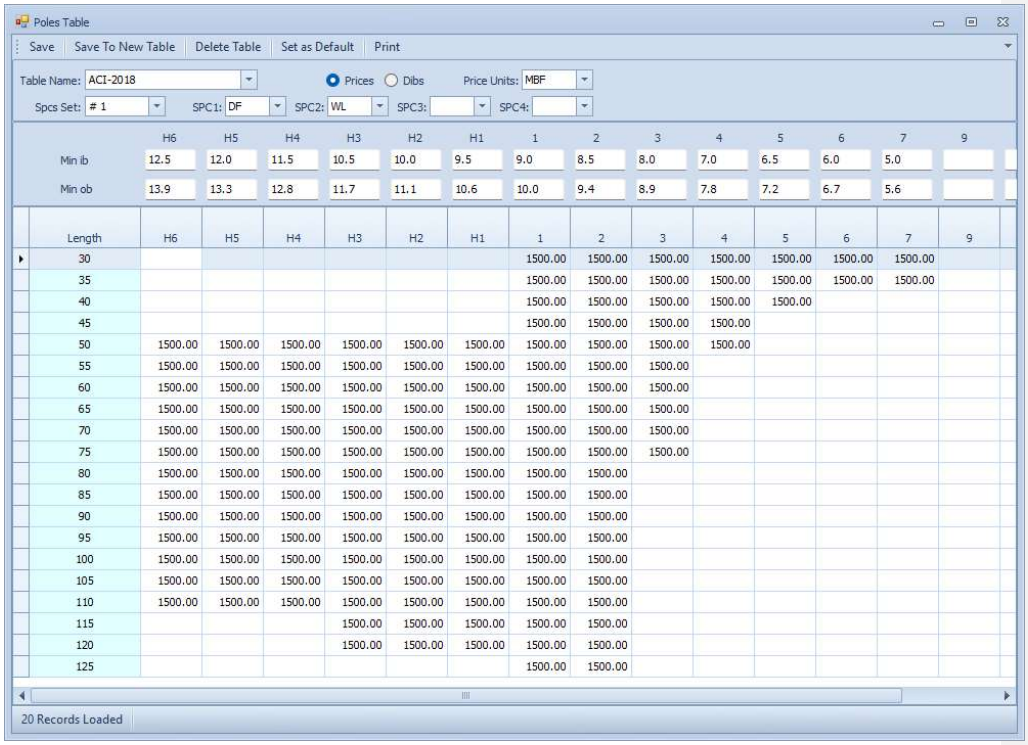
Log Price Table – This table is designed to provide the user with flexibility in providing log prices. Save to a new table to create your own. Lines may be added or deleted by selecting a line and using the Add or Delete buttons on the menu.

In the main menu, under Defaults / Lengths and Diameters is where log length brackets are set for log pricing.

Spcs Abrv – Allow the input of two species.
Product Name – provides the user with the ability to name the product to be sold.
Saw, Exp, Util – General description of the end use. Examples: Sawmill, Export, Utility, Poles (and piling), plywood, etc.
Sort Code –
Grade Code –
Min Dia – inside bark scaling diameter.

Max Dia – Inside bark scaling dismeter.
Max Butt – This is a function of the barking devise used in the mill.
Log Prices by length class –
Units – Mbf, Ccf, tons.
Destination – Where the products (logs) will be deliver. These same names must be used in the stand hauling cost screen.

Pole Pricing Table

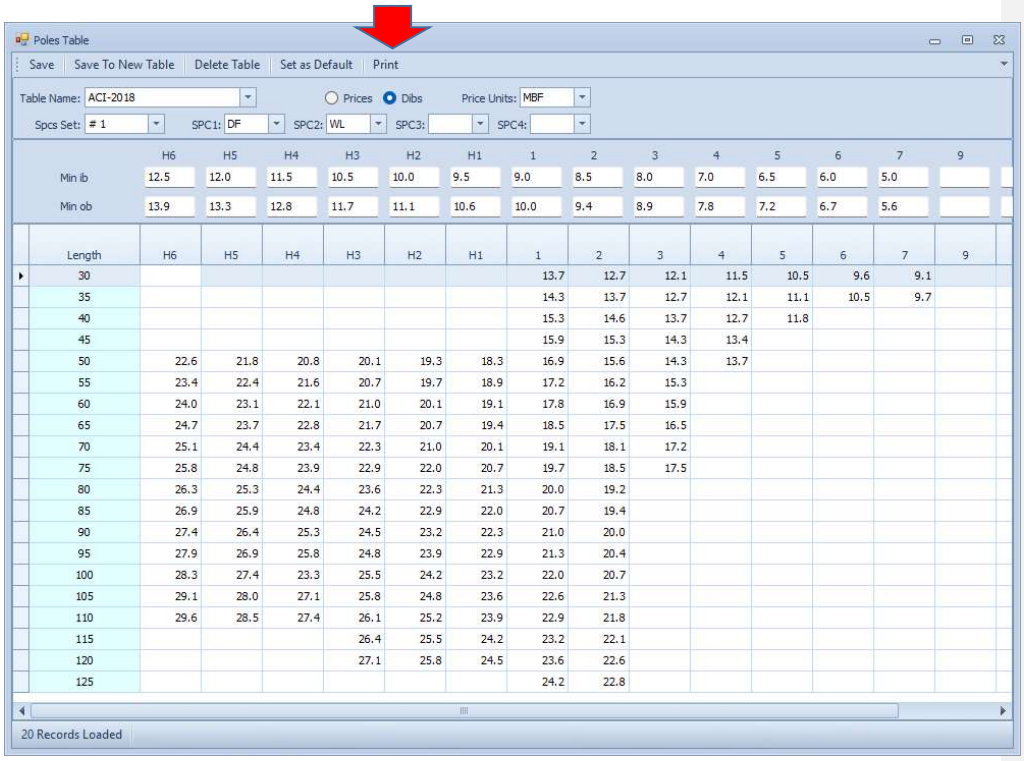


Length	H6	H5	H4	H3	H2	H1	1	2	3	4	5	6	7	9
30							1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	
35							1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	
40							1500.00	1500.00	1500.00	1500.00	1500.00			
45							1500.00	1500.00	1500.00	1500.00				
50	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00				
55	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00					
60	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00					
65	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00					
70	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00					
75	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00					
80	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00						
85	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00						
90	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00						
95	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00						
100	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00						
105	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00						
110	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00						
115				1500.00	1500.00	1500.00	1500.00	1500.00						
120				1500.00	1500.00	1500.00	1500.00	1500.00						
125							1500.00	1500.00						

A price should be entered for each length and class. Prices can be per Mbf, per CCF, Per ton, per piece, and per lineal foot.

Species set covers all species that the prices and pole specifications cover.

Pole Sizing Table



Poles Table

Save | Save To New Table | Delete Table | Set as Default | Print

Table Name: ACI-2018 | Prices | Dibs | Price Units: MBF

Spcs Set: # 1 | SPC1: DF | SPC2: WL | SPC3: | SPC4:

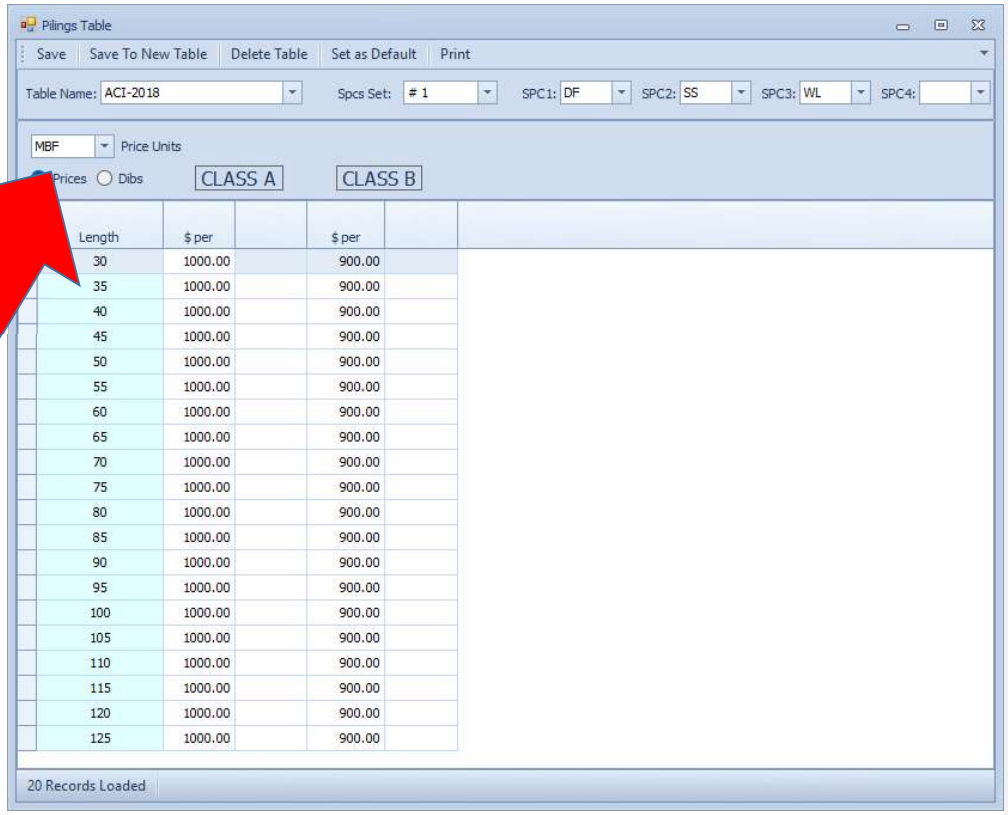
	H6	H5	H4	H3	H2	H1	1	2	3	4	5	6	7	9
Min ib	12.5	12.0	11.5	10.5	10.0	9.5	9.0	8.5	8.0	7.0	6.5	6.0	5.0	
Min ob	13.9	13.3	12.8	11.7	11.1	10.6	10.0	9.4	8.9	7.8	7.2	6.7	5.6	

Length	H6	H5	H4	H3	H2	H1	1	2	3	4	5	6	7	9
30							13.7	12.7	12.1	11.5	10.5	9.6	9.1	
35							14.3	13.7	12.7	12.1	11.1	10.5	9.7	
40							15.3	14.6	13.7	12.7	11.8			
45							15.9	15.3	14.3	13.4				
50	22.6	21.8	20.8	20.1	19.3	18.3	16.9	15.6	14.3	13.7				
55	23.4	22.4	21.6	20.7	19.7	18.9	17.2	16.2	15.3					
60	24.0	23.1	22.1	21.0	20.1	19.1	17.8	16.9	15.9					
65	24.7	23.7	22.8	21.7	20.7	19.4	18.5	17.5	16.5					
70	25.1	24.4	23.4	22.3	21.0	20.1	19.1	18.1	17.2					
75	25.8	24.8	23.9	22.9	22.0	20.7	19.7	18.5	17.5					
80	26.3	25.3	24.4	23.6	22.3	21.3	20.0	19.2						
85	26.9	25.9	24.8	24.2	22.9	22.0	20.7	19.4						
90	27.4	26.4	25.3	24.5	23.2	22.3	21.0	20.0						
95	27.9	26.9	25.8	24.8	23.9	22.9	21.3	20.4						
100	28.3	27.4	23.3	25.5	24.2	23.2	22.0	20.7						
105	29.1	28.0	27.1	25.8	24.8	23.6	22.6	21.3						
110	29.6	28.5	27.4	26.1	25.2	23.9	22.9	21.8						
115				26.4	25.5	24.2	23.2	22.1						
120				27.1	25.8	24.5	23.6	22.6						
125							24.2	22.8						

20 Records Loaded

This table shows diameters outside bark at 6 feet from butt, i.e., “barkie” poles.

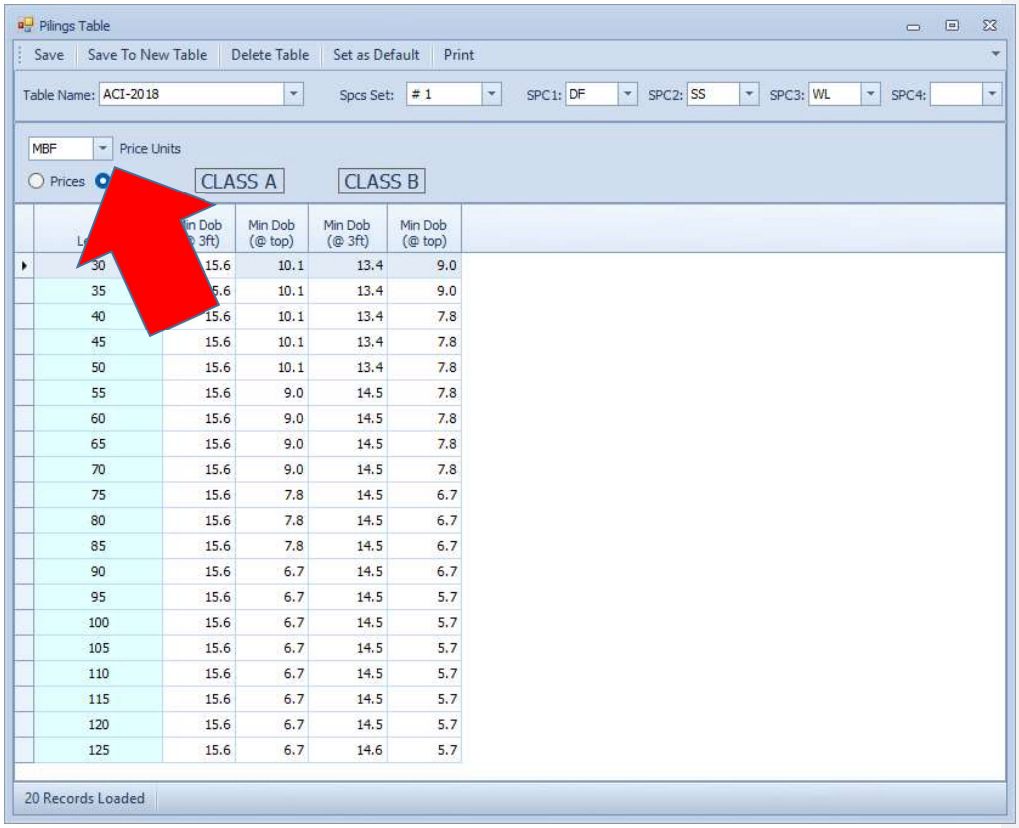
Piling Pricing Table



A price should be entered for each length and class. Prices can be per Mbf, per CCF per ton, per piece and per lineal foot.

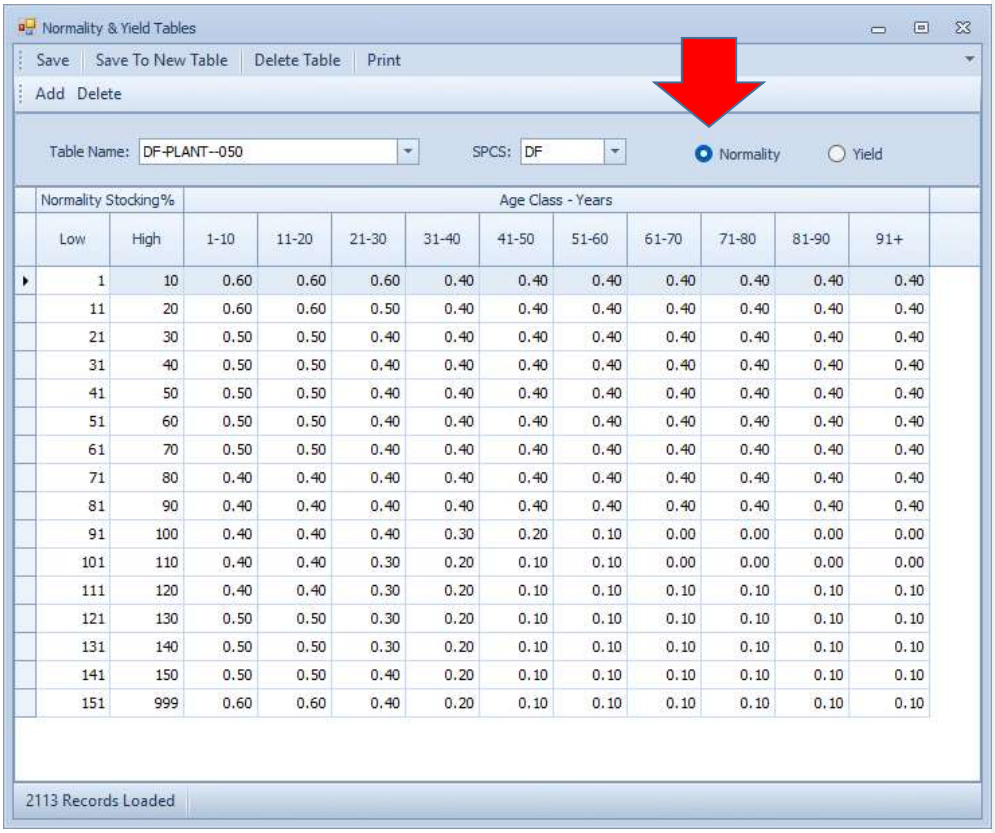
Species set covers all species that the prices and piling specifications cover.

Piling Sizing Table



Outside bark, “barkie” piling specifications. Save to new table and edit for specific clients or areas.

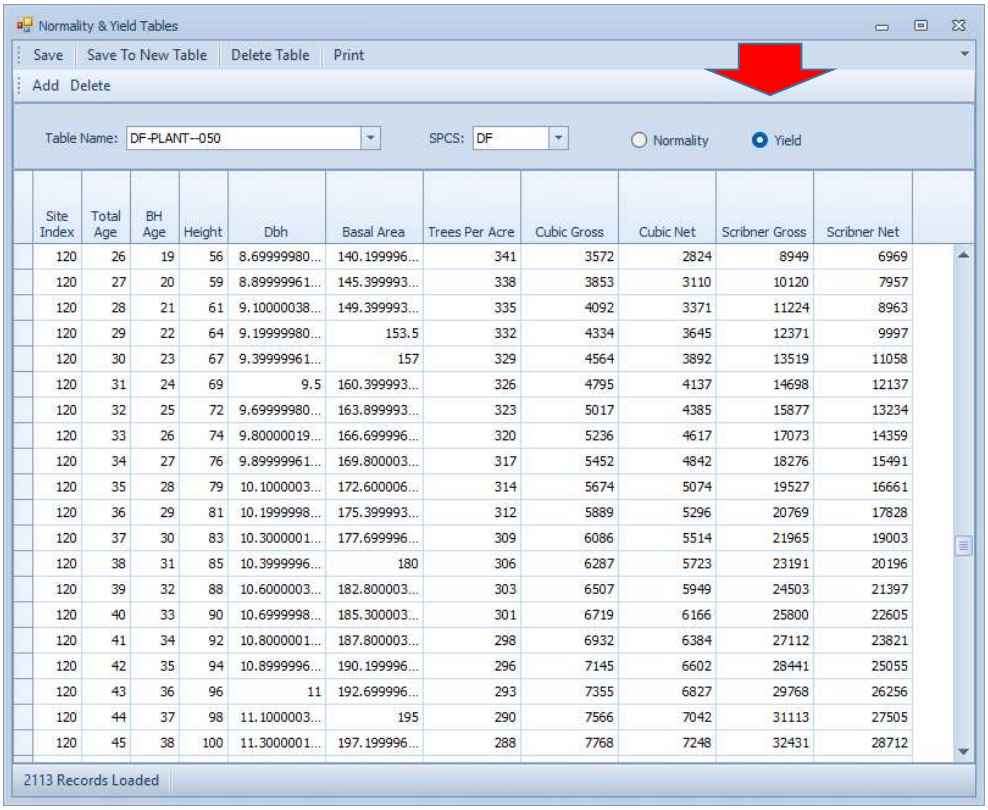
Normality Tables



Normality Stocking%		Age Class - Years									
Low	High	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
1	10	0.60	0.60	0.60	0.40	0.40	0.40	0.40	0.40	0.40	0.40
11	20	0.60	0.60	0.50	0.40	0.40	0.40	0.40	0.40	0.40	0.40
21	30	0.50	0.50	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
31	40	0.50	0.50	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
41	50	0.50	0.50	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
51	60	0.50	0.50	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
61	70	0.50	0.50	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
71	80	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
81	90	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
91	100	0.40	0.40	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00
101	110	0.40	0.40	0.30	0.20	0.10	0.10	0.00	0.00	0.00	0.00
111	120	0.40	0.40	0.30	0.20	0.10	0.10	0.10	0.10	0.10	0.10
121	130	0.50	0.50	0.30	0.20	0.10	0.10	0.10	0.10	0.10	0.10
131	140	0.50	0.50	0.30	0.20	0.10	0.10	0.10	0.10	0.10	0.10
141	150	0.50	0.50	0.40	0.20	0.10	0.10	0.10	0.10	0.10	0.10
151	999	0.60	0.60	0.40	0.20	0.10	0.10	0.10	0.10	0.10	0.10

(To Be Completed)

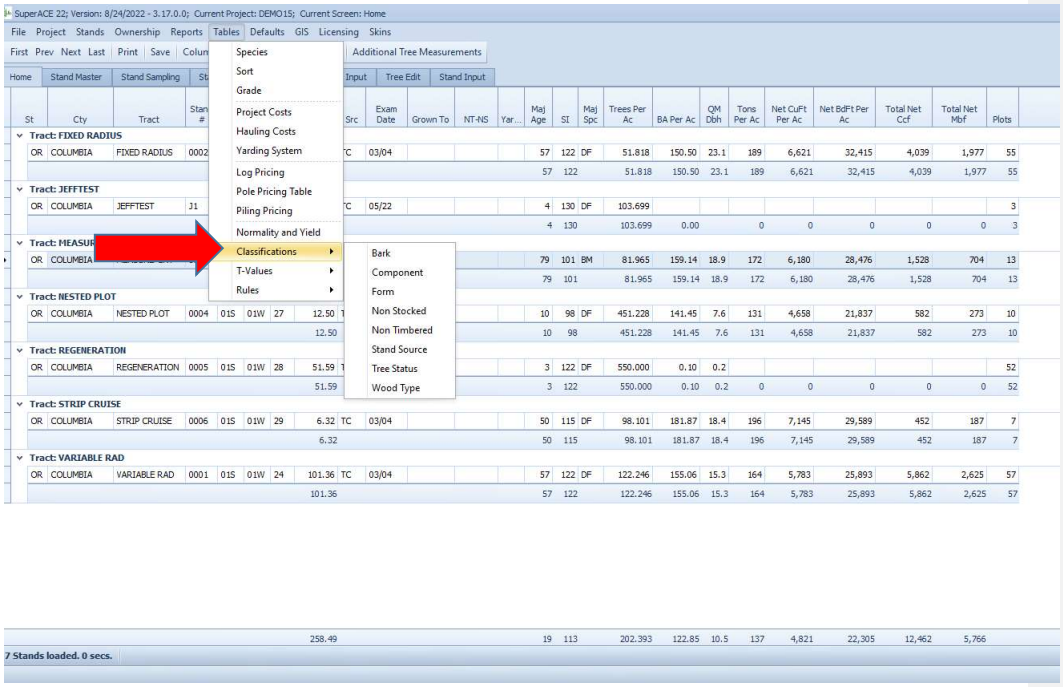
Yield Tables



Site Index	Total Age	BH Age	Height	Dbh	Basal Area	Trees Per Acre	Cubic Gross	Cubic Net	Scribner Gross	Scribner Net
120	26	19	56	8.69999980...	140.199996...	341	3572	2824	8949	6969
120	27	20	59	8.89999961...	145.399993...	338	3853	3110	10120	7957
120	28	21	61	9.10000038...	149.399993...	335	4092	3371	11224	8963
120	29	22	64	9.19999980...	153.5	332	4334	3645	12371	9997
120	30	23	67	9.39999961...	157	329	4564	3892	13519	11058
120	31	24	69	9.5	160.399993...	326	4795	4137	14698	12137
120	32	25	72	9.69999980...	163.899993...	323	5017	4385	15877	13234
120	33	26	74	9.80000019...	166.699996...	320	5236	4617	17073	14359
120	34	27	76	9.89999961...	169.800003...	317	5452	4842	18276	15491
120	35	28	79	10.1000003...	172.600006...	314	5674	5074	19527	16661
120	36	29	81	10.1999998...	175.399993...	312	5889	5296	20769	17828
120	37	30	83	10.3000001...	177.699996...	309	6086	5514	21965	19003
120	38	31	85	10.3999996...	180	306	6287	5723	23191	20196
120	39	32	88	10.6000003...	182.800003...	303	6507	5949	24503	21397
120	40	33	90	10.6999998...	185.300003...	301	6719	6166	25800	22605
120	41	34	92	10.8000001...	187.800003...	298	6932	6384	27112	23821
120	42	35	94	10.8999996...	190.199996...	296	7145	6602	28441	25055
120	43	36	96	11	192.699996...	293	7355	6827	29768	26256
120	44	37	98	11.1000003...	195	290	7566	7042	31113	27505
120	45	38	100	11.3000001...	197.199996...	288	7768	7248	32431	28712

(To Be Completed)

Classifications Tables

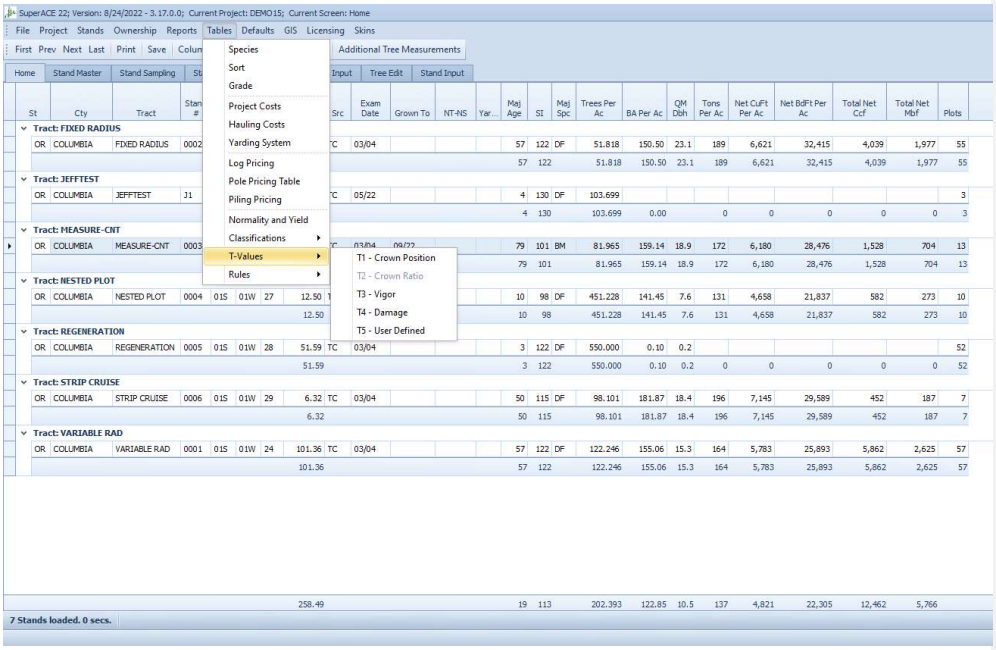


Classifications:

- **Bark**
- **Component**
- **Form**
- **Non-stocked**
- **Non-timbered**
- **Stand Source**
- **Tree Status**
- **Wood Type**

(To Be Completed)

T-Values



T-Values:

- **T1 – Crown Position**
  - **Dominant**
  - **Codominant**
  - **Intermediate**
  - **Suppressed**
  - **Residual**

- **T2 – Crown Ratio**
  - **A calculated value**

- **T3 – Vigor**

- **T4 – Damage**

- **T5 – User Defined**

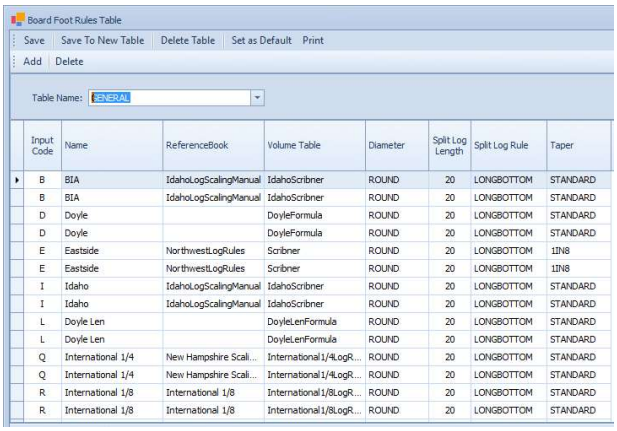
Rules – (Tree Form & Volume)

Rules:

- **AsubO (Ao)** This is the slope of the hyperbola line used in the tree form equation, Behre's hyperbola.

- **Board Feet**

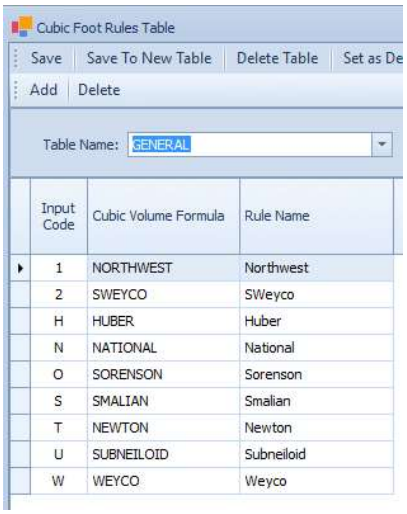
  This table shows the log scaling rules available in SuperACE. Scaling rules applied are selected in the species table made default.



Input Code	Name	ReferenceBook	Volume Table	Diameter	Split Log Length	Split Log Rule	Taper
B	BIA	IdahoLogScalingManual	IdahoScribner	ROUND	20	LONGBOTTOM	STANDARD
B	BIA	IdahoLogScalingManual	IdahoScribner	ROUND	20	LONGBOTTOM	STANDARD
D	Doyle		DoyleFormula	ROUND	20	LONGBOTTOM	STANDARD
D	Doyle		DoyleFormula	ROUND	20	LONGBOTTOM	STANDARD
E	Eastside	NorthwestLogRules	Scribner	ROUND	20	LONGBOTTOM	1IN8
E	Eastside	NorthwestLogRules	Scribner	ROUND	20	LONGBOTTOM	1IN8
I	Idaho	IdahoLogScalingManual	IdahoScribner	ROUND	20	LONGBOTTOM	STANDARD
I	Idaho	IdahoLogScalingManual	IdahoScribner	ROUND	20	LONGBOTTOM	STANDARD
L	Doyle Len		DoyleLenFormula	ROUND	20	LONGBOTTOM	STANDARD
L	Doyle Len		DoyleLenFormula	ROUND	20	LONGBOTTOM	STANDARD
Q	International 1/4	New Hampshire Scali...	International1/4LogR...	ROUND	20	LONGBOTTOM	STANDARD
Q	International 1/4	New Hampshire Scali...	International1/4LogR...	ROUND	20	LONGBOTTOM	STANDARD
R	International 1/8	International 1/8	International1/8LogR...	ROUND	20	LONGBOTTOM	STANDARD
R	International 1/8	International 1/8	International1/8LogR...	ROUND	20	LONGBOTTOM	STANDARD

- **Cubic Foot**

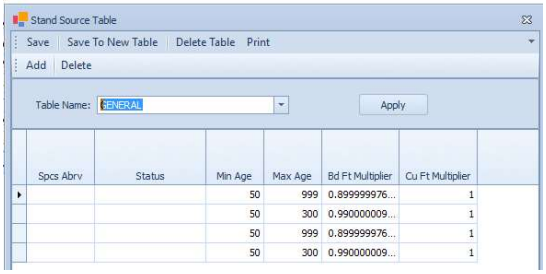
  This table shows the cubic foot formulas available in SuperACE. Cubic Volume Formula applied is selected in the species table made default.



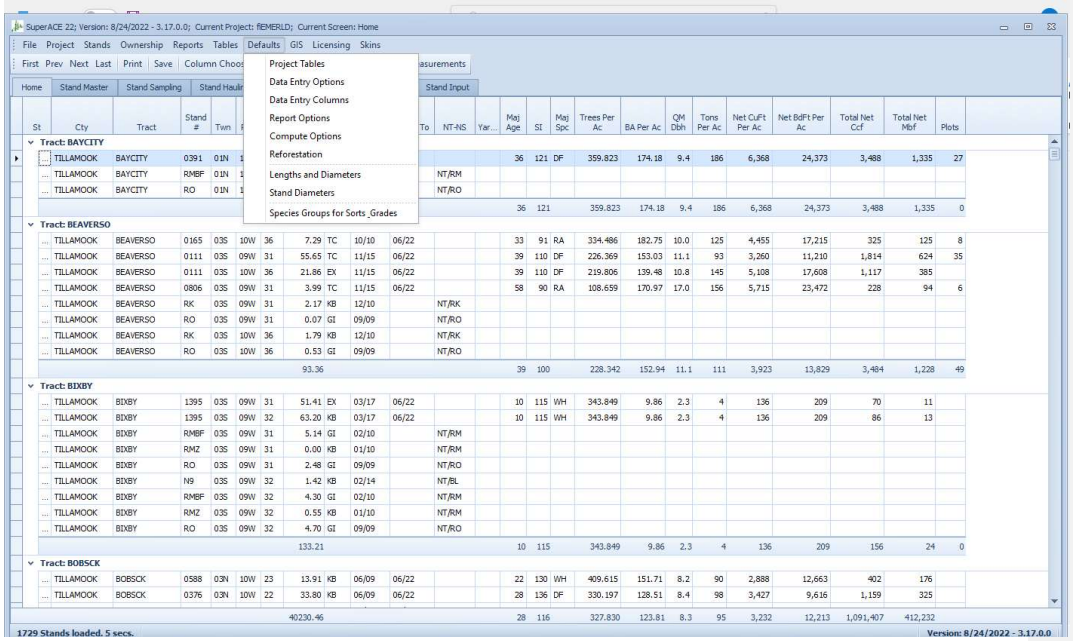
Adjustments Table:

This function is provided, but not recommended. It adjusts all volume according to the multipliers used in this table. When applied, volume of all logs is decreased or increased by the multiplier factor. It adjusts the high value butt logs as well as low value top logs at the same rate. It is most appropriate to adjust an inventory that has been check-cruised and found low or high. Forest inventories showing substantially more volume than a check cruise are likely due to 32 foot log volumes rather than 40 foot and variable log lengths cruises. For Westside forest management a 40 foot log has the highest value. Cruising should reflect log values. Forest inventory needs to support marketing and the actual

In collecting cruise and inventory tree data, a cruiser should make appropriate effort to represent butt rot or stem defects and breakage. The so-called “hidden defects” can be estimated by observing down trees, cut stumps in adjacent harvest areas and by checking with an increment borer. Knowledge of tree diseases and indicators is critical to appropriate defect in cruising logs. Butt/root rot/cat face/in-grown bark seams/checks occur in butt logs and are best represented by appropriate inch and feet scaling deductions in the butt log. Breakage usually occurs in tree tops. Breakage is dependent on tree height, defects, topography, hand falling or mechanized harvest and best lay. Breakage should be per tree and represented in a cruise with cull or zero segments in the upper bole where breakage is most likely to occur or by not running out the maximum possible logs.

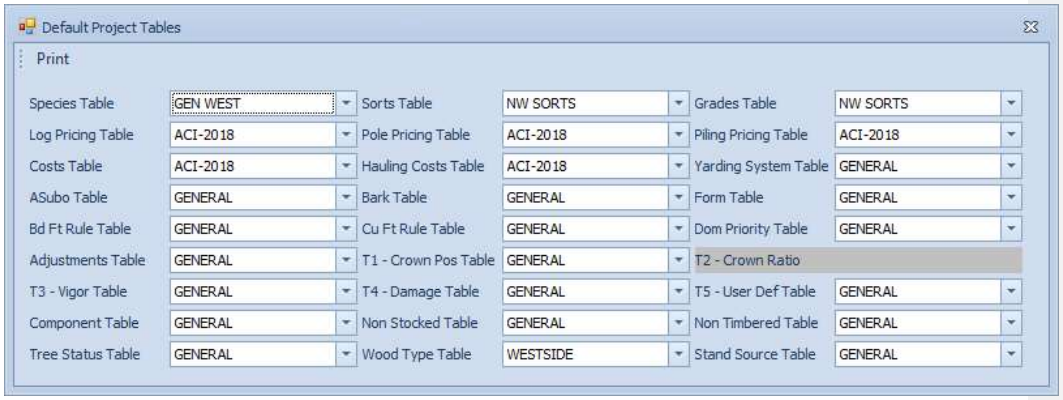


17. **Defaults**

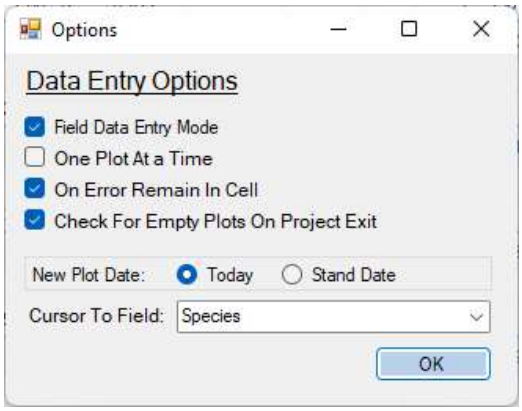


Defaults:

Project Tables



Data Entry Options



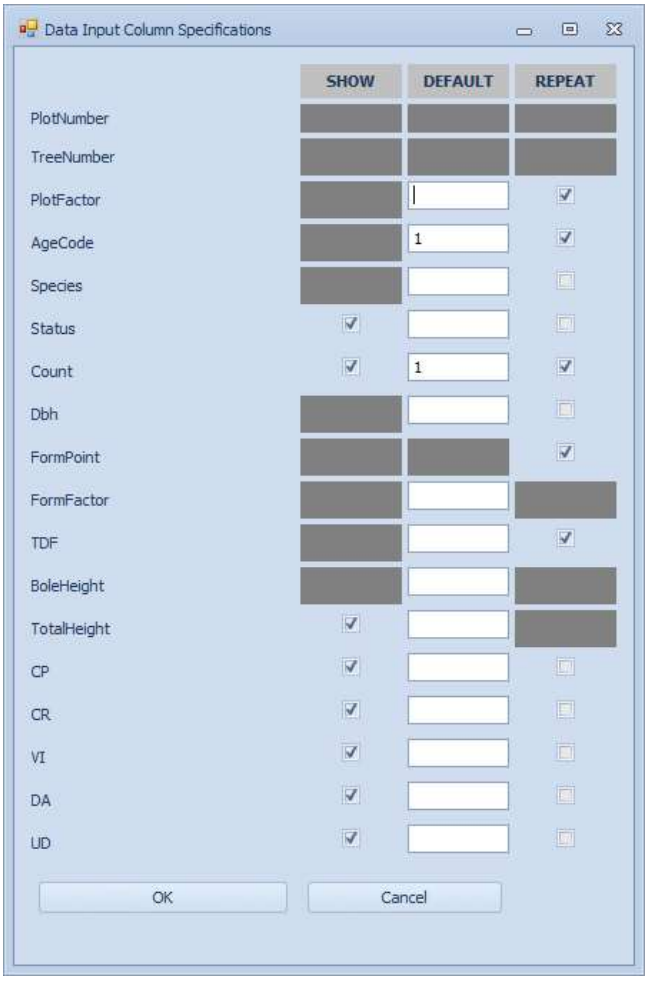
Field Data Entry Mode – This reduces the lines of menu visible allowing more room on a tablet screen for plot view.

One Plot At a Time - This allows the ordered entry of trees into only the current plot regardless of plot number sequence.

Otherwise, SA will sort plots into numerical order and *insert tree* must be used to add tree data. *One Plot At a Time* allows 2x enter or down arrow to advance to the next tree to measure.

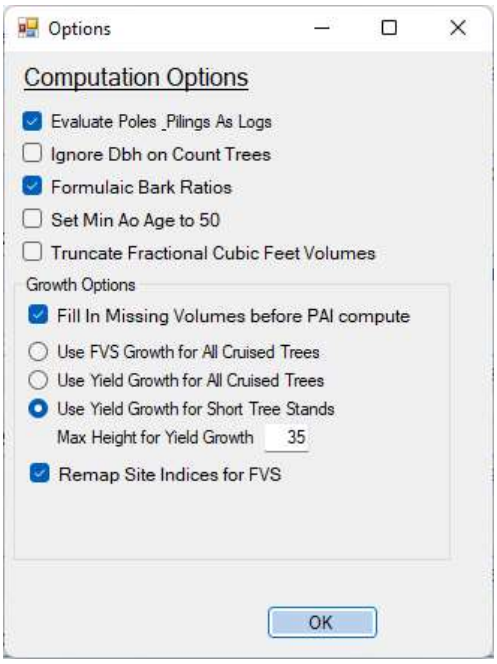
Cursor to Field is handy for efficient data entry. In stands with a dominant tree component, the next tree is likely to be the same species as the previous tree. Setting Cursor to Field DBH will be more efficient.

Data Entry Columns

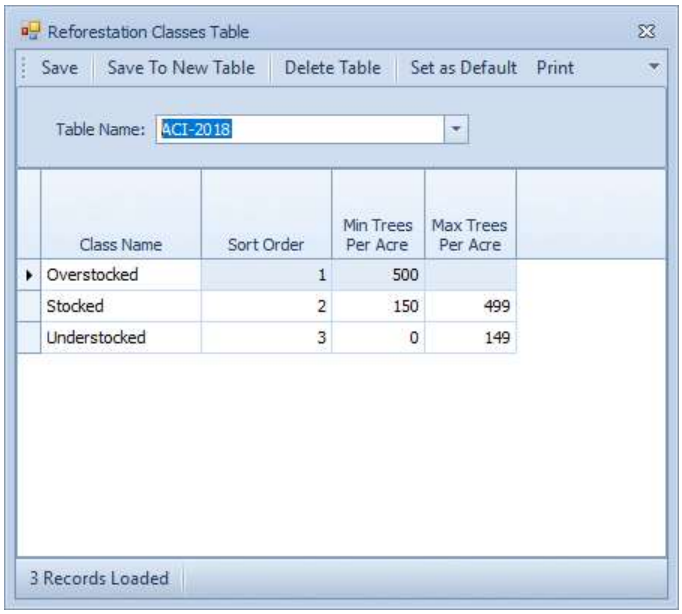


Check items to create the data entry flow you like. In stands with dominant species, checking species so that it carries down in Tree Input is handy. With this checked cursor will go to Dbh cell for data entry.

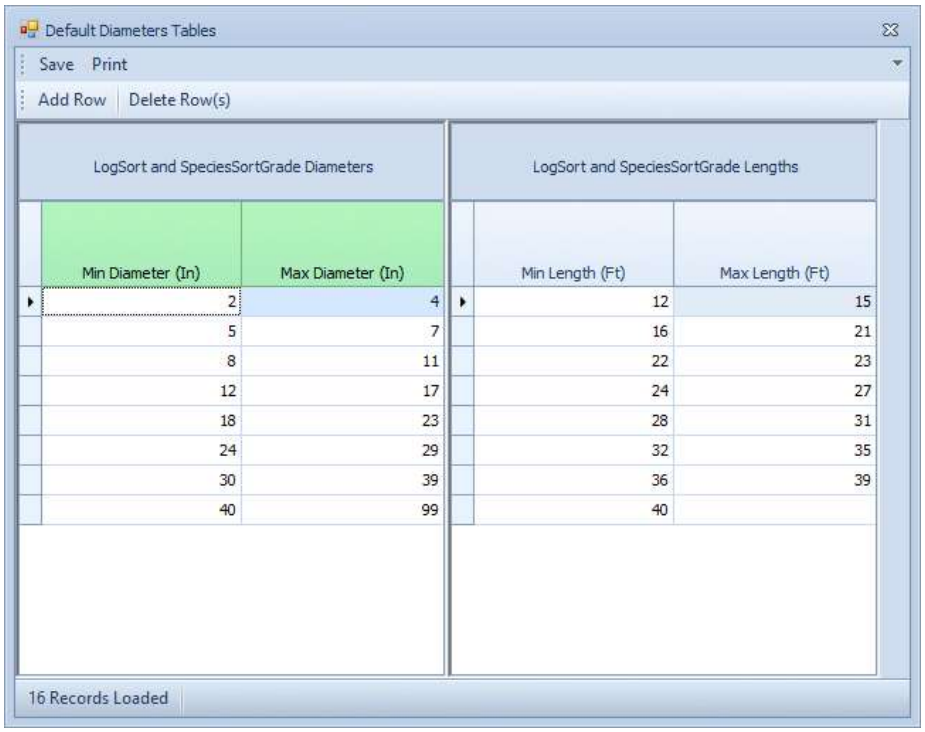
Compute Options



Reforestation

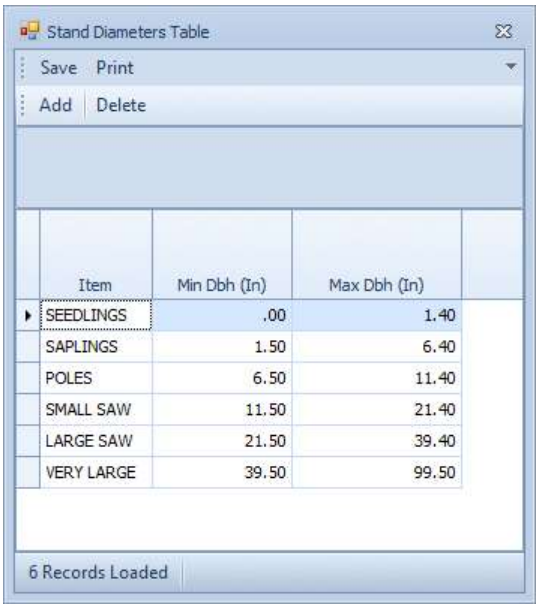


Lengths & Diameters



Found under Defaults, this table allows a user to set report and price table log diameters and lengths. Species, Sort & Grade, Log Stock reports and Log Price Table will display based on settings in this table.

Stand Diameters



This sets the items for the report “Stand by size classes”

Species Groups for Sorts & Grades

On the Sort and Grade tables there is a help button “other species” that shows which species scaling rules apply to.

18. GIS, GPS, Maps, Stratification

To take advantage of this program, the user should be familiar with data in FLIPS that corresponds to data in the GIS. The steps in this guide outline the procedures necessary to link data from a GIS to FLIPS or FLIPS to a GIS. It is assumed that the polygon shapefile being used for the linkage was created by following the steps in this guide. This is important to ensure accuracy in the acreage values that will be imported into FLIPS from the shapefile through the linkage process.

It is highly recommended that you backup/copy both the GIS and SuperACE files before starting this process. While it is relatively easy to undo changes made in a GIS, once data in SuperACE has been altered, the only way to go back to the original data is through a backup copy.

Organizing Shapefiles

Four base layer shapefiles that correspond with the FLIPS inventory data are used to create the final shapefile to utilize all ACI Linkage tool functions. At a minimum, a Stand and PLS layer should be used for creating the final shapefile. Additional layers can be included for special buffer situations.

1. Stand or Type polygon layer (delineating timber types on a timberland ownership).

2. PLS (public land survey) polygon layer.

3. Roads layer (Utilized for buffering).

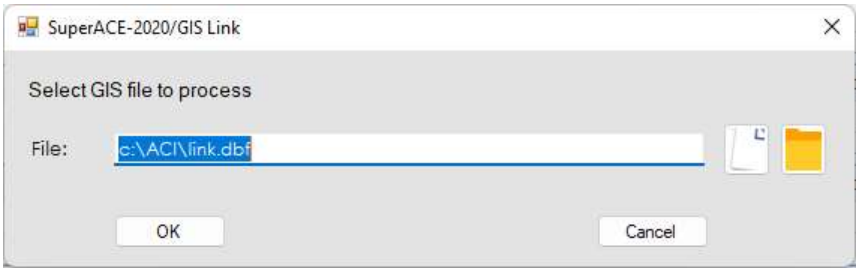
4. Hydro layer (Utilized for buffering).

These buffer layers will be overlayed with the stand and pls layers to create the final shapefile for linking to SuperACE.

Before processing can begin, the stand and PLS layer attribute tables need to have the following attribute fields in their attribute tables.

Stand layer table attributes: All the fields require a value, except the FIFVkey which is left empty. The value for this field will be automatically created by the GIS Link tool and used as the key field for the linkage process.

Initiating the Link to Flips
1. Open SuperACE.
2. Click either on the on the button on the toolbar or the **GIS Link** on the menu bar.
3. The following dialog appears:



4. Select the Shapefile DBF file to be linked to a SuperACE project. Remember that this should be a GIS shapefile that has tabular fields that match the tabular fields in a SuperACE project.
These fields will not necessarily have the same name, but they must represent the same data.

5. Click Open. The Linking interface screen appears.
Note: You can only select one shapefile to link at a time; however, you can open a new session to link additional GIS files as many times as you wish.
You can click on the Exit Program button at any time to exit the program.

Selecting the FLIPS Project
1. In the Select Project area of the interface screen, select the FLIPS project to which the GIS data is to be linked. A question appears asking if you wish to start processing.

2. Answer yes to the question that appears.

3. Note that after the processing is finished, the Match Fields of the interface screen are populated with data. If the shapefile contains "**^Y**" buffer attributes then the buffer attribute data will be listed in the Buffers area of the interface screen.

Filling in the Match Fields Area
Now the user must choose which fields of the GIS shapefile to match with fields in SuperACE. Depending on your project needs, you can match on any combination of the match fields.

1. In the Match Fields area of the interface screen, identify a field to use to search for matches with SuperACE. Note that a matching field may have a different name in GIS compared to the corresponding field in FLIPS.

2. Click in the cell in the Inventory column adjacent to the GIS field to select a field to match. A dropdown list box appears from which you may choose a corresponding match field from SuperACE.

Filling in the Buffers Area
When the shapefile was initially selected, the linkage routine automatically identified any records that contained a "**^Y**" attribute. If any "**^Y**" attributes occur in the data they will be listed in the Buffers area of the interface screen. In this portion of the screen, the user may name the buffer fields with an alphanumeric name up to four characters long (basically giving these areas a Type designation). Also, the Priority column is filled in. Priority assignments tell the software which field name is assigned to an area that two or more fields share in common. For instance, perhaps a light duty road crosses over a secondary highway. Rather that have two records for the area contained in the intersection of their buffers, the higher priority field contains the record.
1. Click the cursor in a cell of the Inventory field next to the first GIS cell entry.
2. Enter a name up to 4 alphanumeric characters long to identify the GIS buffer.
3. Set the priority for each buffer area by clicking in the cell and edit the desired priority assignment.

Matching the Data
Once the fields have been picked to match on and the buffer names and priorities have been assigned, if buffers exist in the shapefile, it is time to let FLIPS and GIS search for data matches.
1. Click on the Match Data button at the bottom of the interface screen. Click Yes or No to the window that pops up. This window appears if the user did not enter any names for the Buffers area Inventory fields.
2. After processing is finished, three tabs appear on the lower left portion of the screen.
3. Resize the tab area to see **all three tabs**. These are the FI/GIS-Matched, GIS-UnMatched and FI-Unmatched tabs.
4. Click on these tabs from left to right to view the data matches and non-matches that occurred between FLIPS and the GIS, those records that did not match from the GIS data, and those that did not match from the FLIPS data. The GIS-UnMatched and FI-Unmatched tabs are useful in determining if you need to enter or remove a stand master in FLIPS or edit the GIS
shapefile. If you need to do an edit before continuing, just click on the Exit Program button to end the linkage routine. Once you have completed your edits simply restart the linkage routine again and repeat the previous steps to see if your edits were successful. If you click on the Reports button you can choose to generate and print reports for each of the three tab screens.

Making Choices for the FI/GIS-Matched Area
Now it is necessary to choose whether to either create an inventory from the GIS data, update the FLIPS data with the GIS data, or update the GIS data with the inventory data.
Check any or all of the four checkboxes to choose how you want to use the matched and un-matched data. The two Update options are the most commonly used linkage options. Each option is explained below.

Create INV From Matched GIS: This function will automatically create stand masters in a new FLIPS project. When you check this box and click
the Process button the following window comes up. Fill in the New Project name, Location and use the dropdown window in each of the cells to select which shapefile attributes are to be used to create the stand masters. This is useful if your shapefile contains other attributes that you want to use to create a new FLIPS project.

Create INV From Un-Matched GIS: This function is useful in automatically creating stand masters in FLIPS for stands that occur in the GIS but not in FLIPS. When you check this box and click Process the same window as above opens. Fill in the New Project name, Location and use the dropdown window in each of the cells to select which shapefile attributes are to be used to create the stand masters. This process forces the user to create the stand masters in a new FLIPS project to safeguard the existing FLIPS data. You can then use Stand Maintenance in FLIPS to copy the new masters from one SuperACE project to another.

Update INV From Matched GIS: This selection is the most used process of the linkage program. It will use the matched data between the GIS and FLIPS to automatically load acres from the GIS into FLIPS and, if the shapefile contains buffer attributes, will create buffer stand masters in FLIPS. This is the most time saving feature of the linkage program.

Update GIS From Matched INV: This function will create a data base file (dbf) in a directory named FIdata. The data base will contain one record of stand inventory data for every matched shapefile record. This table can be used in a GIS to link, using the FIFVkey field, to the shapefile for querying and symbolizing inventory data in the GIS. For this option it is best to use a shapefile that does not contain road or hydro buffer attributes.

1. Fill in the number of species to be used in the project. Up to seven species can be included. If there are more species available than the number entered into this box, the main species will be chosen. For example, if the user has 4 species in a timber type and chooses 2 as the #
of Species, the information associated with the main two species will be used.
2. Either enter a new name in the Summary File box or accept the default name of the original shapefile name.
3. Click the Process button.

(To Be Completed)

19. Growth

SuperACE Inventory Data Types/Sources:

- Tree Data from Cruises (source code = TC) For these stands that have an average tree height of 35'(set in the defaut table) or greater the program uses the US Forest Service's Forest Vegetation Simulator (FVS) to grow the individual trees. For TC stands that have an average tree height of less than 35-feet the program uses Yield Tables to grow the stand attributes.
- Stand Data from Keyboard Input on the Stand Input Screen (source codes Keyboard [KB], Exploded [EX]) are grown using built-in Yield Tables.

Other source codes exist for non-forest types: (KB for NT/NS; 'blank' for ZP/ZM types; GI for GIS generated non-forest types including RM, RO). We do not grow these types.Forest Vegetation Simulator (FVS)

The Forest Vegetation Simulator (FVS) is a model used for predicting forest stand dynamics that is used extensively in the United States. FVS is the standard model used by various government agencies including the USDA Forest Service, USDI Bureau of Land Management, and USDI Bureau of Indian Affairs. It is also used by state agencies such as the Washington Department of Natural Resources and Custer State Park, industry, educational institutions, and private landowners.

Uses of FVS are not restricted to timber management applications. Other uses of FVS include considering how management practices affect stand structure and composition, determining suitability of stands for wildlife habitat, estimating hazard ratings for insect outbreaks or wildfires, and predicting losses from fire and insect outbreaks.
The SuperACE program seamlessly incorporates the FVS software to automatically grow individual cruise tree Dbh's, total heights, and trees/acre with mortality built in. The "grown" trees are displayed on the Tree Edit screen in blue text.

Variants

Variant – When equations, such as those for tree growth, mortality, and volume, are developed for a specific geographic area and imbedded in the FVS framework, the resulting model is called a geographic variant of FVS.
Individual variants have been calibrated for many geographic areas across the United States. SuperACE has been programed to automatically input the Variant number to FVS based on the State and County input for the stand. Where there are multiple Variants per County, a drop-down menu provides the option for Variant selection on the Stand Master screen under the **FvsVar** (2-digit character code) **and FvsLoc** (3-digit numeric code) input positions on the top line.
The Variants provided are listed by State and County as follows:

OR County	1st Loc	2nd Loc	3rd Loc
BAKER	619	602	604
BENTON	709	708	
CLACKAM,	708	606	
CLATSOP	708		
COLUMBIA	708		
COOS	712	611	708
CROOK	607	601	602
CURRY	611		
DESCHUTI	601	602	
DOUGLAS	712	615	611
GILLIAM	606		
GRANT	604	614	607
HARNEY	602	604	607
HOOD RIV	606	603	
JACKSON	711	610	611
JEFFERSC	601	606	607
JOSEPHIN	611	610	
KLAMATH	701	602	601
LAKE	602	601	701
LANE	618	712	709, 710, 615
LINCOLN	708		
LINN	708	618	
MALHEUR	602		
MARION	708	618	606
MORROW	606	614	
MULTNOM	708	606	
POLK	708		
SHERMAN	606		
TILLAMOO	708		
UMATILLA	606	614	619
UNION	619	614	
WALLOWA	616	614	619
WASCO	606		
WASHING	708		
WHEELER	607	606	614
YAMHILL	708		

WA County	1st Loc	2nd Loc	3rd Loc
Adams	617		
Asotin	113	614	510
Benton	613	617	
Chelan	601	608	
Clallam	609	701	
Clark	609	603	
Columbia	617	614	
Cowlitz	609	603	
Douglas	617		
Ferry	621	608	
Franklin	617		
Garfield	113	614	617
Grant	614	617	
Grays Hart	609	800	
Island	609		
Jefferson	609	701	800
King	613	609	
Kitsap	609		
Kittitas	617	613	
Klickitat	613	603	
Lewis	603	609	613
Lincoln	617	113	621
Mason	609		
Okanogan	608	699	
Pacific	609		
Pend Oreill	113	621	
Pierce	609	613	
San Juan	609		
Skagit	605	609	
Skamania	603		
Snohomish	605	609	613
Spokane	113		
Stevens	621	113	
Thurston	609	603	
Wahkiakun	609		
Walla Wall	617	614	
Whatcom	605	609	
Whitman	113	617	
Yakima	613	617	603

20. Definitions

1. Timberland appraisal and investments use numerous terms which are peculiar to the forest products industry and may not be fully understood by investors. Following is a summary of commonly used terms to assist the reader in understanding the specific terminology (Avery 1994, Helms 1998, Akerson 1984, Appraisal Institute 1993, Wenger 1984)[1].

2. **Accretion:** An increment, usually of trees rather than stands, generally applied to the more rapid growth, in diameter or volume, of trees given more growing space during the latter part of the rotation.

3. **Acre:** The basic unit of land measurement used in the Public Land Survey System (PLSS) here in the United States. An acre contains 43,560 square feet, or an area 66 feet x 660 feet. Note that 66 feet is one chain.

4. **All-aged stand:** A stand with trees of all or almost all age classes, including those of exploitable age.

5. **Appraisal:** An analysis, opinion, or conclusion relating to the nature, quality, value, or utility of specified interests in, or aspects of, identified real estate. In this usage, appraisal covers a variety of assignments, including valuation, consulting, and review.

6. **Basal area:** 1) The cross-sectional area of a single stem, including the bark, measured at breast height (4.5 feet or 1.37 meters above the ground). 2) The cross-sectional area of all stems of a species or all stems in a stand measured at breast height and expressed per unit of land area, such as basal area per acre.

7. **Board foot:** The amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide. In trees or logs, board foot volume is a measure of merchantability, and therefore the number of board feet in a cubic foot depends on tree diameter, amount of slab, and saw kerf.

8. **Board foot rules:** There are three primary rules for estimating the amount of board feet in standing trees or cut logs.

[1] Akerson, C. B. 1984. Capitalization theory and techniques. The Appraisal Institute, Chicago, Illinois.
Appraisal Institute. 1993. The dictionary of real estate appraisal. The Appraisal Institute, Chicago, Illinois.
Avery, T. E. and H. E. Burkhart. 1994. Forest measurements. McGraw-Hill, New York, New York.
Helms, J. A. 1998. The dictionary of forestry. Society of American Foresters, Bethesda, MD.
Wenger, K. F. 1984. Forestry handbook. Society of American Foresters, Bethesda, MD.

9. **Doyle rule:** A log rule used in the East and South, particularly for hardwoods. The formula is V = [(D-4)/4]2*L, where V = board foot volume, D = diameter inside bark at the small end in inches, and L = length in feet. The Doyle rule underestimates board foot volume in small logs and overestimates in large logs.

10. **International rule:** A formula log rule derived from the mathematical equation used to calculate the volume of a cylinder. The rule assumes 1/16-inch shrinkage for each inch (2.54 cm) of board thickness and taper of 0.5-inch (1.27 cm) for each 4-feet (1.2 meters) log section. This is one of the official rules used by the USDA Forest Service.

11. **Scribner rule:** A diagram log rule that assumes 1-inch (2.54 cm) boards and 0.25-inch (0.64 cm) kerf, is based on diameter at the small end of the log, disregards taper, and does not provide for overrun. The Scribner rule underestimates lumber yield on small logs and on long logs with taper. This log rule is used in the Pacific Northwest.

12. **Breast height:** A standard height from ground level, generally 4.5 feet (1.37 meters) for recording diameter, circumference, or basal area of a tree.

13. **Breast-high age:** The number of rings from the pith to the cambium counted at breast height.

14. **Bucking:** To saw felled trees into shorter lengths.

15. **Butt log:** The first log cut above the stump.

16. **Butt rigging:** A system of swivels, shackles, and hooks that permits both the hookup between the main and haulback lines and the attachment of chokers.

17. **Cable log:** To take logs from the stump to a landing and stationary yarder using winch-driven cables that pull butt rigging, a block, or a carriage to which logs are attached with chokers.

18. **Cable yarding:** Taking logs from the stump area to a landing using an overhead system of winch-driven cables to which logs are attached with chokers.

19. **Camp Run:** Average value of logs without any differentiation attributed to grades, sizes, or export potential. It is an average price which incorporates all of these factors into a single price.

20. **Capital gains:** When capital assets are held longer than a designated period prior to disposal, federal tax laws classify any gain or loss from such an “occasional sale” compared to the original purchase price as a capital gain or loss.

21. **Capital investments:** An investment of funds in assets with a useful life greater than one year. This includes the acquisition of real property, property rights, or permanent improvements

that increase the value of property already owned. Capital expenditures may not be deducted from gross income in the year paid or incurred, but must be "capitalized," which means that expenses are charged in increments over the economic life of the asset.

22. **Choker:** A short length of wire rope or chain that forms a noose around the end of a log to be skidded or yarded.

23. **Consulting:** The act or process of providing information, performing analyses of forestry and/or real estate data, and making recommendations or conclusions on diversified problems.

24. **Cruise, cruising:** 1) A forest survey to locate and estimate the quantity of timber on a given area according to species, size, quality, possibly products, or other characteristics. 2) The estimate obtained from such a cruise.

25. **Cubic log rules:** These log rules measure the total volume of wood in a log, without consideration for saw kerf. Measurement units can be in cubic feet (United States) or cubic meters (other countries). There are three common rules (Hubers, Smalian, and Newton). These rules provide identical results when measuring perfect cylinders.

26. **Hubers rule:** This formula assumes that the average cross-sectional area is found at the midpoint of the log. The formula has limited use due to 1) bark measurements or empirical bark deductions are required to obtain mid-diameters inside bark and 2) the midpoints of logs in piles or ricks are often inaccessible and cannot be measured.

27. **Smalian rule:** This formula required measurement at both ends of the log and is the easiest and least expensive to apply. It is also the least accurate of the three methods, especially for butt logs having flared ends.

28. **Newton rule:** This formula requires measurement of both ends and the middle of the log. Although it is more accurate than the other two methods, the expense incurred in application limits its use to research, experimental techniques, and checks against other cubic volume determinations.

29. **NW Rule:** This formula is a variation of the Smalian formula, and is used in the Pacific Northwest.

30. **Cunit:** A unit of volume consisting of 100 cubic feet of solid wood (not including bark or air volume).

31. **Current annual increment (CAI):** The growth observed in a tree or stand in a specific one-year period. Although the current annual increment is strictly that of the year just passing, it is

generally taken as the mean of a few preceding years, i.e., a short-term mean annual increment termed a periodic (mean) annual increment.

32. **DBH:** Diameter breast height. Also dbh.

33. **Depreciation:** The decline in value of a fixed asset due to wear and tear from use, passage of time, or obsolescence.

34. **Diameter (at) Breast Height (DBH, dbh):** The diameter of the stem of a tree measured at breast height (4.5 feet or 1.37 meters) from the ground. On sloping ground the measure is taken from the uphill side. DBH usually implies diameter outside bark (DOB) but can be measured as inside bark (DIB).

35. **Diameter inside bark (DIB):** The diameter of the wood portion of a stem or log cross section. DIB is usually measured on logs or estimated on trees as diameter outside bark minus twice the bark thickness.

36. **Diameter outside bark (DOB):** The diameter of a stem or log cross section that includes both the wood and the bark.

37. **Discount rate:** 1) In appraising, the rate of return on investment in the physical components of land and buildings. It may also be applied to the rate of return on the legal components of leased fee and leasehold interests: sometimes referred to as risk rate or interest rate. 2) The annual percentage rate that reflects the competitive rate of return on an investment. The term is used to distinguish a rate of return on an investment from the rate of interest (interest rate) on borrowed funds, and they are not interchangeable. 3) The charge member banks must pay to the Federal Reserve on their borrowings.

38. **Discounted cash flow (DCF) analysis:** The analysis of cash flow projections, period by period, over a presumed term of ownership, to compute the present value for a given rate of return, or to compute the internal rate of return indicated by a series of cash flows.

39. **Doyle rule:** See **Board foot rules**.

40. **Ecoregion:** A contiguous geographic area having a relatively uniform macroclimate, possibly with several vegetation types, and used as an ecological basis for management or planning.

41. **Ecosystem:** A spatially explicit, relatively homogeneous unit of the earth that includes all interacting organisms and components of the abiotic environment within its boundaries. An ecosystem can be of any size, e.g., a log, pond, field, forest, or the earth's biosphere.

42. **Empirical yield table:** A yield table, usually based on inventory data, showing average volumes and other statistics in relation to age and (sometimes) site index classes as they are

found in the existing forest. Empirical yield tables are of limited usefulness today because existing older stands do not reflect the effects of changing management practices applied to younger stands.

43. **Even-aged stand:** A stand of trees composed of a single age class in which the range of tree ages is usually ± 20 percent of rotation.

44. **Fee simple estate:** Absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat.

45. **Fee simple title:** A title that signifies ownership of all the rights in a parcel of real property, subject only to the limitations of the four powers of government.

46. **Feller-buncher:** A harvesting machine that cuts a tree with a shear or saw and carries one or more cut trees in its hydraulically operated arms as it moves to cut the next tree. A feller-buncher deposits small piles of cut trees on the ground to be picked up and transported by a grapple skidder, clam-bunk skidder, tree-length forwarder, or cable yarder, but not by a regular forwarder.

47. **Forest Practice Regulations:** A series of regulations imposed by some states concerning the management of private forestlands.

48. **Geographic Information System (GIS):** An organized collection of computer hardware, software, geographic and descriptive data, personnel, knowledge, and procedures designed to efficiently capture, store, update, manipulate, analyze, report, and display the forms of geographically referenced information and descriptive information. A central component of information storage is the necessity for topology to be maintained and coordinated by the software; otherwise, certain complex spatial operations are not possible or would be very difficult, time-consuming, or impractical. The major components of a GIS are the user interface, database management, data entry, product generation, and spatial data manipulation and analysis, which may be centralized or distributed across a network.

49. **Global Positioning System (GPS):** A commonly handheld, satellite-based navigational device that records x, y, z coordinates and other data allowing users to determine their location on the surface of the earth (usually within meters). Signals are obtained from satellites orbiting the earth such as NAVSTAR (NAVigation System with Time And Ranging), a network of 24 radio transmitting satellites and ground stations developed by the US Department of Defense.

50. **Grading:** The classification of logs, stems, lumber, or seedlings according to quality, value, potential use, or function.

51. **Grading rules:** Descriptions of various grades of timber or logs and how these grades are to be determined. Grading rules for logs, cants, and other sawn timber have been drawn up for many of the world's timber-exporting centers, and for internal trade, in order to establish assortments that best meet buyers' needs.

52. **Growing stock:** All the trees growing in a forest or in a specified part of it, usually commercial species, meeting specified standards of size, quality, and vigor, and generally expressed in terms of number or volume.

53. **Growth:** Stand growth is the net volume gained since the last measurement, and encompassing accretion, mortality, and ingrowth. Tree growth is an intermittent process characterized by changes in stem form and dimension over a period of time (Avery and Burkhart 1994). Growth can be measured as mean annual increment, or periodic annual increment.

54. **Head spar:** A spar tree or portable spar (tower) at the landing of a skyline logging operation.

55. **Hectare:** The metric unit of land measurement, equivalent to 10,000 square meters. One hectare equals 2.47 acres.

56. **Helicopter Logging:** Type of logging operation normally performed on hillsides which are too steep for cable yarding (high lead) and on soils which are highly erodable. A helicopter hovers above the felled tree while the logger attaches a choker cable. The helicopter then flies the log, hanging from a steel cable to a landing nearby where it can be loaded onto a log truck.

57. **Highlead logging:** A cable logging system in which logs or trees are yarded by means of a wire rope passing through a block at the top of the head spar or tower.

58. **Huber rule:** See **Cubic log rules**.

59. **Image:** A graphic representation or description of an object, typically produced by an optical or electronic device. An image consists of remotely sensed data such as satellite data, scanned data, and photographs. An image is stored as a raster data set of binary or integer values that represent the intensity of reflected light, heat, or another range of values on the electromagnetic spectrum. Remotely sensed images are photographic or digital representation of the earth.

60. **Income capitalization approach:** A set of procedures through which an appraiser derives a value indication for an income-producing property by converting its anticipated benefits (cash flows and reversion) into property value. This conversion can be accomplished in two ways. One year's income expectancy can be capitalized at a market-derived capitalization rate or at a capitalization rate that reflects a specified income pattern, return on investment,

and change in the value of the investment. Alternatively, the annual cash flows for the holding period and the reversion can be discounted at a specified yield rate.

61. **Ingrowth:** The volume, basal area, or number of those trees in a stand that were smaller than a prescribed minimum diameter or height limit at the beginning of any growth-determining period and that, during that period, attained the prescribed size.

62. **International rule:** See **Board foot rules**.

63. **Inventory:** 1) A set of objective sampling methods designed to quantify the spatial distribution, composition, and rates of change of forest parameters within specified levels of precision for the purposes of management. 2) The listing (enumeration) of data from such a survey. Note: Inventories may be made of all forest resources including trees and other vegetation, fish, insects, and wildlife, as well ass street trees and urban forest trees.

64. **Kerf:** The width of the cut made by a saw blade.

65. **Kiln:** A chamber for drying sawn lumber having controlled temperature and humidity, forced air circulation and ventilation.

66. **Landing:** A cleared area in the forest to which logs are yarded or skidded for loading onto trucks for transport.

67. **Loader:** A self-propelled machine with a grapple or tongs and a supporting structure designed to pick up and discharge trees or logs for the purpose of piling or loading.

68. **Log rule:** A formula to estimate the volume (usually in board feet) of lumber that may be sawed from logs of different sizes under various assumed conditions given their length and scaling (small end) diameter. Log rules are commonly divided into four groups on the basis of derivation: (a) diagram rules, (b) formula rules, (c) rules based on actual output, and (d) hybrid rules.

69. **Log scale:** 1) The volume of a log as determined by a log rule. 2) Any system of measuring round timber.

70. **Long Log Scale:** Unit of measurement which measures logs according to length, usually using the Scribner log rule. It is used in western Washington and Oregon and other areas of the Northwest. The scaling cylinder on a long log scale is from 12 feet to 40 feet in length.

71. **Market data approach:** See **Sales Comparison Approach**.

72. **MBF:** Refers to the volume of timber. It is interpreted to mean per "thousand board feet". Thus, 800 MBF equates to 800,000 board feet of timber.

73. **Mean Annual Increment (MAI):** The total increment of a tree or stand (standing crop plus thinnings) up to a given age divided by that age.

74. **MMBF:** Similar to MBF, except this refers to a million board feet. Thus, 800 MMBF equates to 800,000,000 board feet of timber.

75. **Mortality:** Trees dying from natural causes, usually by size class in relation to sequential inventories or subsequent to incidents such as storms, wildfire, or insect and disease epidemics.

76. **Newton rule:** See **Cubic log rules**.

77. **Periodic Annual Increment (PAI):** The growth of a tree or stand observed over a specific time period divided by the length of the period.

78. **Pole:** A tree of a size between a sapling and a mature tree.

79. **Pulpwood:** Roundwood, whole-tree chips, or wood residues that are used for the production of wood pulp.

80. **Real price increase (RPI):** The nominal price increase (without inflation), expressed as a percentage, that has been adjusted for changes in the price level over time.

81. **Reforestation:** The reestablishment of forest cover either naturally (by natural seeding, coppice, or root suckers) or artificially (by direct seeding or planting). Reforestation usually maintains the same forest type and is done promptly after the previous stand or forest is removed.

82. **Regeneration:** The act of renewing tree cover by establishing young trees naturally or artificially.

83. **Reversion:** A lump-sum benefit that an investor receives or expects to receive at the termination of an investment. Also called reversionary benefit.

84. **Review:** The act or process of critically studying a report prepared by another.

85. **Riparian Management Zone (RMZ):** A terrestrial area, other than a coastal area, of variable width adjacent to and influenced by a perennial or intermittent body of water. The riparian zone contributes organic matter to the river or stream and may be influenced by periodic surface or subsurface water. Riparian zones provide a functional linkage between terrestrial and aquatic ecosystems through coarse and fine organic matter input, bank stability, water temperature regulation, sediment and nutrient flow regulation, maintenance of unique wildlife habitat, and in limiting or mitigating nonpoint source pollution. The management of

a riparian zone is commonly constrained or modified to retain particular ecosystem values and functions. The term is used in management plans, legislation, regulation, and government policy in which riparian zone width is variably defined.

86. **Rotation:** In even-aged systems, the period between regeneration establishment and final cutting. Rotation may be based on many criteria including mean size, age, culmination of mean annual increment, attainment of particular minimum physical or value growth rate, and biological condition.

87. **Sales comparison approach:** A set of procedures in which a value indication is derived by comparing the property being appraised to similar properties that have been sold recently, applying appropriate units of comparison, and making adjustments to the sale prices of the comparables based on the elements of comparison. The sales comparison approach may be used to value improved properties, vacant land, or land being considered as through vacant. It is the most common and preferred method of land valuation when comparable sales data are available.

88. **Sapling:** A usually young tree larger than a seedling but smaller than a pole.

89. **Sawlog:** A log that meets minimum regional standards of diameter, length, and defect, intended for sawing.

90. **Section:** A unit of land measurement in the Public Land Survey System (PLSS), normally equivalent to one square mile or 640 acres. Due to discrepancies in the survey system, along with the curvature of the earth, not all sections are exactly 640 acres.

91. **Scaling:** the measurement or estimation of the quantity or quality of felled timber.

92. **Scaling diameter:** the inside-bark diameter at the small end of a log.

93. **Scribner rule:** A diagram log rule that assumes 1-inch (2.54 cm) boards and 0.25-inch (0.64 cm) kerf, is based on diameter at the small end of the log, disregards taper, and does not provide for overrun. The Scribner rule underestimates lumber yield on small logs and on long logs with taper.

94. **Seedling:** An immature tree small enough to be hand planted.

95. **Short Log Scale:** Unit of measurement which measures logs according to length, usually using the Scribner log rule. In eastern Washington and Oregon, the typical measurement system is the Short Log unit, in which the scaling cylinder occurs from 12 feet to 20 feet in length.

96. **Shovel Logging:** Skidding performed by swing machines successively moving trees or stems from one pile to another in the direction of the skid.

97. **Silvicultural system:** A planned series of treatments for tending, harvesting, and re-establishing a stand.

98. **Silviculture:** The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

99. **Site Index:** This is a species-specific measure of actual or potential forest productivity, expressed in terms of the average height of trees included in a specified stand component (defined as a certain number of dominants, codominants, or the largest and tallest trees per unit area) at a specified index or base age. Site index is used as an indicator of site quality and is usually applied to even-aged stands.

100. In the Pacific Northwest, site index has been traditionally measured using age 100 as the base or index. Most foresters today express site index using a 50 year base or index. In the South were rotations are short, the site index if often expressed on a 25 year base.

101. For coastal Douglas-fir, site indices are often grouped into five classes, ranging from Class I sites (very best) to Class V sites (poorest). Most timberland sites fall into the Class II-IV range. Class V sites generally occur on mountain ridgetops or steep hillsides.

102. **Skidder:** A self-propelled machine, often articulated (hinged) in the center, for dragging trees or logs. A skidder may be cable (using a main winch cable and cable chokers to assemble and hold a load), clam-bunk (using an integrally mounted loader to assemble the load and a clam or top-opening jaws to hold it), or grapple (using a grapple or bottom-opening jaws to assemble and hold la load).

103. **Skyline:** A cableway stretched tautly between two points, such as yarding tower and stump anchor, and used as a track for a block or skyline carriage.

104. **Skyline carriage:** A wheeled mechanical assembly that moves back and forth while suspended above the ground by the skyline. Logs are attached to the carriage by a skidding line for yarding.

105. **Smalian rule:** See **Cubic log rules**.

106. **Sorting:** See **Grading**.

107. **Stand:** A contiguous groups of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

108. **Stand table:** A listing of the number of trees by species and diameter classes, generally per unit area. Such data may be presented in the form of a frequency distribution of diameter classes.

109. **Stock table:** A listing showing the proportions of total volume within a stand by diameter class.

110. **Stumpage:** 1) Standing timber as viewed by a commercial cutter. 2) The value of timber as it stands uncut in terms of an amount per unit area. Felling, bucking, yarding, and hauling the log to market incurs additional costs, therefore, the delivered log price is higher to account for these additional activities. The stumpage price indicates the standing value of a tree before it is cut down.

111. **Stump-to-Truck:** The logging costs associated with felling a tree and placing it on a logging truck. Associated costs would include felling, bucking, skidding, and loading.

112. **Tower:** A steel, commonly telescoping, mast used instead of a spar tree at the landing for cable yarding.

113. **Township:** A unit of land measurement in the Public Land Survey System (PLSS), normally equivalent to 36 sections. Due to discrepancies in the survey system, along with the curvature of the earth, not all townships have exactly 36 sections.

114. **Tractor:** A powered vehicle mounted on crawler tracks or wheels used for skidding or hauling. Tracklaying or crawler tractors are often fitted with various devices on the front end, such as (a) a curved, straight-bottomed blade for pushing soil, e.g., in road making, (b) a raker blade with tines on the bottom for site preparation, or (c) a KG blade for stump removal.

115. **Valuation:** The process of estimating the market value, insurable value, investment value, or some other properly defined value of an identified interest or interests in a specific parcel or parcels of real estate as of a given date. Valuation is a term used interchangeably with appraisal.

116. **Whitewoods:** A term used in the Pacific Northwest to refer to a collection of species including the true firs (*Abies*), hemlock (*Tsuga*), spruce (*Picea*), and sometimes lodgepole pine.

117. **Yard:** 1) A place where logs are accumulated. 2) to convey logs or trees to a landing, particularly by cable, balloon, or helicopter logging systems. Also **Yarding**.

118. **Yield:** The amount of wood that may be harvested from a particular type of forest stand by species, site, stocking, and management regime at various ages. 2) the amount of product output recovered from a quantity of raw material input.

119. **Yield table:** A table showing the expected timber yields by age of an even-aged stand, usually by site index classes, and typically including quadratic mean diameter (DBH), height, number of stems, basal area, and standing volume per unit area. Yield tables may also include volume of thinnings, CAI, MAI, and other data.

21. Tree Form Calculations

22. Sampling Methods

Introduction

Forests are generally too large and have too many trees for a 100% inventory of every tree. Limited time and money for cruising usually dictates that the population be sampled. Samples are collected that hopefully will represent the entire population. Sampling has to be done in a way that the answers are still reliable. Reliability comes only when the stratification is done properly, the acres are calculated correctly, the right sampling method is used, the trees are measured or estimated correctly, and data are properly extended to useful information.

There is always some risk of not having the right answer when sampling. Bias can cause a systematic distortion. This can be caused by using the wrong sampling system, bad measurements, or poor estimates. This can only be avoided by cruiser training and continually measuring all of the parameters all day, every day.

Accuracy means the estimates are close to the true values. Often, cruisers will measure one parameter, such as DBH with great precision, and guess all of the heights and have very inaccurate cruise. The measurement effort must be balanced among all parameters in all species to avoid bias and error.

The populations in forests are often variable. Every tree can have a different volume and balance and every acre a different volume and value. This variation is measured by installing a series of samples spread over the entire population.

SuperACE calculates and reports a “Statistical Summary” for each timber type. Variation and Standard Error are calculated for basal area, net cubic feet per acre, and net board feet per acre. The confidence limits are printed for each parameter for a given standard deviation. Usually foresters use one standard deviation, or that the average will fall in the confidence limits 67% of the time.

The statistical calculations are done after the cruise is complete. Rarely is it feasible to go back to the forest and take more samples. The cruiser must decide before starting the cruise, what kind of sampling system to use, what kind of plots to take, and how many plots to establish. Stratifying the forest into homogeneous types usually brings the Coefficient of Variation in normal forests to around 50%. We have found that 30 to 40 proportional plots with an average of 4 to 6 trees per plot, or a total of around 150 sample trees will yield accurate answers that will cut-out around + or –10%, 67% of the time. Stands with more variation require more plots. Count plots should be used when the basal area per acre varies more than the volume per acre. Count plots only measure species and basal area per acre.

Common sense and a basic knowledge of the various sampling systems are more important than sampling theory.

Key to Timber Cruise Sampling Methods

To use this key, make estimates based on observation, aerial photographs, comparable data and personal knowledge of the timber stand. Record the following stand conditions:

1. total height
2. average diameter

3. acres
4. stand structure

Start at the top of the key and review each of the conditions about the stand. Select the sampling method to which the key leads.

REFORESTATION CRUISES: (Trees up to 20 feet tall)

Stocking variable ..... Variable Radius
Stocking even; density adequate ..... Fixed Area

TIMBER CRUISES: (Trees over 20 feet)

Small area up to 10 acres - Area known:
Small trees up to 8" ..... Fixed area
Few large trees ..... 100 %
Many large trees ..... Strip or fixed

Area unknown:
Few trees ..... 100 %
Many trees ..... Strip

Larger area over 10 acres - Area known:
Small trees up to 8" ..... Fixed area
Tree over 8" ..... Prism
Even aged stand with large tree overstory ..... Prism plots plus 100 %
Variable Stocking .... Prism plus count plots
Homogeneous stand (Spp and DBH) ..... Prism plus count trees

Area unknown: ..... Strip

Sampling Methods

Reforestation Cruise

Reforestation surveys are used in stands with heights of less than 20 feet. Timber stands taller than 20 feet have measurable volume and should be sampled with a timber cruise program. Reforestation surveys are entered in the TC-Tree Input screen of SuperACE by placing R1, R2, R3, R4 or R5 in the PF column to indicate a fixed radius reforestation plot. Values are assigned to the R1 thru R5 factors on the type master screen. For example, if you're running a stocking survey with 1/100th acre plots, R1 is entered in the PF column for each tree record. In the type master screen a value of 11.78 (plot radius, in feet, for a 1/00th acre plot) is entered in the cell next to R1. Values for R2 thru R5 are left blank since only one plot radius was used in the survey. All blank plots must be recorded in order to calculate stocking. All blank plots must be recorded in order to calculate stocking. Blank plots arerecorded by entering a plot number, species code and 0 in the Ct. column.

100 % Cruise

This is not a sampling method, but rather a complete or 100% cruise of the entire population. This is rarely feasible. Do not attempt a 100% cruise unless you are absolutely sure all trees can be identified and measured. A 100% cruise tree is entered in SuperACE by preceding the plot number with a dash (-). For example –001 (or use S1 in the PF column for the tree and assign a value of "1" in the Stand Master screen).

Situations for use:

1. A cruise of one tree.
2. Marked trees along a right-of-way.
3. A few (less than 100) large, scattered trees in a reproduction type which can be easily identified.
4. A few scattered, large trees of a merchantable type, which are usually a different species, age, and of high value (i.e., older).

Douglas-fir trees in a younger stand. The younger trees may be prism cruised while the more valuable Douglas-fir trees should be 100% cruised.

Advantages

1. No sampling.
2. Provides a record of every tree.

Disadvantages

1. 100% cruises are expensive. The higher costs must be justified by specific requirements which cannot be obtained otherwise.
2. Possibility of missing trees.
3. Possibility of cruising trees twice.

Strip Cruise

A strip cruise is a cruise of a percentage of the total type area or number of trees. Continuous strips are run through the tract at regular intervals. A strip cruise is entered in the tree input screen of SuperACE by entering S1, S2, S3, S4 or S5 in the PF column for each tree record. A strip cruise "blow-up" factor is entered as a whole number on the type master screen. For example, if each tree cruised represents 5 trees (a 20% cruise) then a "5" is entered SuperACE / FLIPS□ User's Manual Atterbury Consultants, Inc. 4 next to S1 on the type master screen. Values for S2 thru S5 are left blank since only one strip "blow-up" factor was used in the cruise.

Situations for use:

1. Areas of unknown size.
2. Irregular shaped areas.
3. Irregular area with field around it.
4. Road right-of-way laid out in timber.
5. Narrow strip where powerline right-of-way is widened.
6. Brushy areas or areas with broken topography where prism cruising would not work.

Acreage's by stand type must be calculated with a strip cruise; however, they are only used to calculate volume per acre. The total volumes are calculated by multiplying the volume of each tree times the strip area factor.

There is no balancing of diameter and trees per acre as in a prism cruise. If the diameters are estimated too small in a strip cruise, the volume will be low.

Advantages

1. Strip cruises can avoid critical acreage errors in small units.
2. Blow-up factors can be independent of acreage.
3. Brushy areas with scattered trees can be cruised accurately.

Disadvantages

1. The entire tree distribution will be sampled, which may mean that many small trees will have to be recorded. These small trees
add greatly to the cost of cruising but may not add to the volume and value.
2. An accurate baseline must be run completely through the number of strips for cruise % control.
3. Accurate strip widths placed at right angles to the baseline must be constantly maintained with frequent checking of borderline trees. The strip center must be accurately marked in order to do this.

Fixed Area Plots

These are usually fixed circular plots of a certain size. These plots should be large enough to sample the population with an average of 5-10 trees per plot. The radius of the plot must be larger than the radius of the square of the actual stocking.

Plot Radius = sq.rt. (13,865.58*plot area)

Five fixed area plots can be nested in a plot. They are indicated on the plot card or data recorder with an F1, F2, F3, F4 or F5 in the PF column and the plot size defined on the Stand Master screen. A plot radius is entered on the Stand Master screen as decimal factor. For example, a ¼ acre plot is entered as 0.25.

Proportional Plots, Variable Radius Plots, Prism Plots

These are the most popular plots for cruising merchantable timber today. A BAF should be selected to yield an average of 5 trees per plot. Use the same BAF for the entire type or strata. SuperACE allows BAF of any number between 1 and 99.99. BAF that are whole numbers can be put directly in the PF column on the plot card or in the cruise input screen. BAF that have a decimal number are assigned in the Stand Master screen and coded on the plot card or data recorder as B1, B2, B3, B4, or B5.

More than one BAF can be used in a type to sample various species or size groups.

Combination Sampling Systems

Types that have mixed species of extreme value, or a wide diversity in age or size, may have to be sampled with more than one system or plot size at the same time.

Nested plots can be used for many situations. Merchantable stands, with a few scattered large trees, can be cruised with a BAF for the merchantable element and with a 100% or a strip used for the large trees.

Merchantable stands, containing a minor species of high value, can be cruised using a combination of prism for the major species and a strip cruise for the high value minor species.

Sampling Design and Intensity

1. Determine the accuracy needed for the project or each sampling unit (type). Prioritize the sampling intensity to the highest value, largest, nearest to operations or highest volume per acre.
2. Stratify the ownership into sampling units (types) or operational units that can be sampled. Each type may be sampled with a different method and intensity.
3. The number of plot and tree samples is a function of the needed accuracy and the variation with the sampling unit. Stratification can reduce the number of plots needed to satisfy accuracy.

Statistical calculations of the samples will determine the actual sampling error. Estimating the number of plots needed for the accuracy comes more from experience than from statistical calculations before the sampling is started.
Statistics from old cruises in an area can help in judging the number of plots that are required for a certain accuracy on types to be sampled.
Average PNW Westside timber types have coefficient of variation of around 40 – 50% and can be sampled to about +/-10% at 1 standard deviation with 30 to 40 plots. Proportional plots require about 4-6 trees average or 120 to 240 trees. Stands with more variation require more plots or trees. To reduce the error by half requires four times the number of sample plots.

Determine the number of sample trees per plot.

Proportional plots determine the BAF by estimating the basal area per acre and divide by 5 trees.

Example:

BAF = 100 sq. ft. per acre/5 trees = 20

Fixed area plots estimate the trees per acre and divide by 10

Example:

Plot Radius = 200 trees per acre / 10 = 20th acre = plot radius of 26.33 feet.

Determine plot spacing.

Square grid = sqrt ((43,560 x type acres) / (number of plots))

Example:

Total acres = 44 Plots = 44

Square grid = sqrt((43,560 x 44) / (44)) = 208.71 feet.

Acres per plot = (plot spacing)^2 / 43,560 = (208.71)^2 / 43,560 = 1.00

Rectangular grid = Spacing between lines = (Acres x 43,560) / (# plots x distance between plots)

Example:

Total acres = 44 Plots = 44 Distance between plots = 132’

Spacing between lines = (44 ac. X 43,560) / (44 plots x 132’) = 330’

Acres per plot = (distance between plots x spacing between lines) / 43,560 = (132’ x 330’) / 43,560 = 1.00.

Lay out the plot lines on the maps to cross drainages and other patterns that may cause the sample to be in error. The acres per plot should be multiplied by the number of plots in each type to check the acres calculations and the plot count.

Measure the results.

Statistical calculations should be computed for each type, the average for all types and possibly the standard error for the entire project. Cut-out records should be kept to check the actual volumes harvested against the cruise estimate. Measurement errors must be considered. Measure the right things for quality results.

23. Cruising Logs, Poles, and Piling

Logs should always be cruised for the highest value. This is usually a combination of higher value sort and length. For Westside (Oregon & Washington State) operations, 40-foot logs are usually the highest value. If export logs are going into containers (40 foot usually) then preferred lengths need to be 36 – 39 feet. While Westside scaling rules are in 1-foot multiples and Eastside scaling rules in 2-foot multiples, log buyers have preferred lengths and price accordingly.

The Official Rules for Log Scaling and supplement to ORLS describe how defects are deducted for. This is usually in feet and inches of log lengths and diameter. Percents may be taken by putting a 1 in the % column of a log. Deductions are in feet and inches Scribner and feet and inches cubic. Cubic deductions are taken for physically missing wood.

Some defects will be a required bucking break, some will go into a delivered log and be treated with a scaling deduction. This varies by buyer and location. If a log price table is filled out, the edit screen will display log values. You can use this feature to optimize tree value if you wish.

Poles or pilings will be the highest value wood products. In the field you can use the edit screen to check length and top diameter for meeting pole specifications. For poles over 100 feet, the last two digits can be entered and SuperACE will fill in the total length. For example, enter 05 and SuperACE will fill in 105 feet for the length.

Pole lengths or availability may be limited by curves or other features of the haul road, by yarding type and topography. For a tree to be considered a pole or piling means falling it in one piece, yarding to the landing and hauling to a pole yard.

If in defaults, the *report poles pilings as logs* option is checked, SuperACE will split scale the pole according to scaling rules. Trim will be added to the segments made. This results in an estimate of what that pole would contain if cut as logs. Poles or piling are the highest value products so this estimated log board feet is advisory. The split scaled segments made from a long pole or piling will also not reflect preferred log lengths that would be cut. If a closer estimate of log volume in poles is desired it is best to use + in the log % column to join segments of likely cutting lengths. Example - a 95-foot pole would, in Westside scaling rules, have board feet from logs (butt to top) of 31ft – 32ft – 32ft. For Eastside scaling rules the 95 foot pole would have board feet from logs (butt to top) of 32ft – 32ft – 31ft. Westside scaling rules put the longest segment to the top, Eastside scaling rules put the longest segment to the butt. Cutting to preferred log lengths could be (butt to top) 40ft + 40ft + 16ft. How many board feet are in a pole? It depends. If the log price table and pole price table are correctly filled out, the relative values of logs and poles can be looked at using the edit screen.

24. Volumes

Scribner board feet are based on diagrams of boards that would fit in different log diameters. It was an estimate of lumber recovery 150 years ago. There is little relation to modern mill lumber recovery from logs. Board feet come from tables with scaling diameter and log lengths. It is not measured volume. Logs less than 12 inches in diameter have Scribner board foot volume due to estimated allocations. Which volume tables are used depends on regional scaling rules.

SuperACE uses a cruisers measured tree parameters and applies equations (butt taper & Behre's hyperbola for tree form) to calculate scaling diameters at cruised log lengths. The scaling diameter, log length and deductions are then read from a table according to the scaling rule set in the species table.

Cubic formulas are also set in the species table. Cubic volumes are calculated volumes. Tons are calculated from the cubic volume and the pounds per cubic foot set in the species table. Pounds per cubic foot shown in the Atterbury Consultants provided species table are reasonable long-term averages from past Crown Zellerbach and other operations. Small diameter logs weigh more per cubic foot. The greater percentage of sapwood and thus water in small logs makes their weight per cubic foot higher than large logs with a higher percentage of relatively dry heart wood. Be aware some publications showing wood weights are based on old growth or large log studies. If weight numbers are available for your operations, copy to make a new species table and edit to appropriate weights. Wood weight will vary with the season and time since cutting. Carbon makes up half of dry wood weight. If carbon content calculations are desired, run the tons log stock table report, export to a spreadsheet and convert to dry tons per species.

25. Cruising Equipment

Tree counts and tree heights are the most important cruising measurements. Relaskops or Laser Technology's RD1000 (no longer manufactured) adjust the sample angle, BAF, for slope and thus are most useful in our Pacific Northwest topography. Relaskop calibration needs to be checked and confirmed for accuracy. Even brand new Relaskops may be off. The bars on Relaskops are easily used to measure form factor taper and top diameter fraction for inputting to SuperACE. The Measure at Distance function in the program allows use of either and will calculate measurements based on distance and bar or diameter and angle inputs. The calculated values can be inserted into the tree data line with the push of a button.

Heights are easiest to measure with lasers. Lasers that support a missing line function are more accurate for measuring leaning trees. Use a laser.

Field data recorders running Windows Mobile can download to SuperACE20-23 if Windows Mobile Device Center is installed along with the registry fix for Windows 10 and 11 OS. Waterproof, ruggedized Windows 10 and 11 OS tablets are available for field use as are waterproof cases for

tablets like the MS Surface. Use of an active stylist is recommended. Changing the display to 200% is a reasonable combination of view and screen coverage. More RAM is recommended. Use of a chest harness in the field to have hands free is recommended. Either a full version of SuperACE or the field license version can be used for data collection in the forest. Defaults/Data Entry Options/Field Data Entry Mode can be checked to reduce the program header lines and free up screen space. One Plot at a Time should be checked if plots will be entered out of numerical order.