

CruiseComp Forest Inventory Module User Manual

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FOREST INVENTORY MODULE

1.1. INTRODUCTION

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The **Industrial Forestry Service Forest Inventory Module**, greatly increases the value and versatility of **CruiseComp** software. This module allows the user to select trees for calculating site index, summarizing cruise data and a variety of calculated fields into customizable stand layers by plot and timber type.

The main objective is to display the characteristics for each timber type or stratum.

1.2. SITE PRODUCTIVITY

Site Productivity is summarized by **timber type** and plot with the following attributes:

Basal area Basal area species composition Gross merch volume Gross merch volume species composition Primary and Secondary leading species: Site tree average height Site tree average counted age Site tree average total age Site Index

The program will also summarize the **Site trees** with the average, minimum, and maximum ranges for **Height, Counted Age, Total Age** and **Site Index**.

1.3. STAND STRUCTURE

There are times when it may be important to summarize timber types into different layers. For instance, a forester may want to know if a particular forest stand has enough timber volume to warrant a selective cut, while still leaving enough understory trees. Inventory Foresters can now generate summaries that indicate which **timber types** have multi-aged layers and which ones are even aged stands. The **Forest Inventory Module** permits the user to break the stand down into different age groups, dbh classes, height classes and species.

1.4. FOREST INVENTORY MAIN SCREEN

There are two main sections to the Forest Inventory Module:

- 1. Site Index calculations
- 2. Customizable timber layers

lock Ar	eas	Harve	st Metho	ds	Harvest	Areas	Hei	ght Curve	Heig	ht Equations	Grades	Percer	t Reductio
Cruise I	dentity		Compilati	on Stand	dard	Тур	es 🛛	Treatm	ent Units	Non-r	nerchantable	Areas 🛛	Blocks
Log A	Analysis		Spec	cies Grou	ips) E	nd Use	Sort	Blo	ick Area EUS I	Мар	Forest I	nventory
						Site Inde	x Spec	ies Curves					
	Compile F	Forest In	ventory			Spcs		Descripti	on		Cur	ve	
	lse Sam	nle Tree	es Onlu			Acb	Balsa	am Popla	r	0 - Huang,	Titus, and	Lakusta	(1994)
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					Act	Black	k Cottonv	/ood	0 - Throwe	r (1992)		· · ·]
						At	Trem	bling Asp	en	0 - Alberta	Forest Ser	vice (198	5)
V V	/alidate 1	Trees	De	tails	7	Ва	Amal	bilis Fir		0 - Kurucz	(1982)		
						BI	Suba	Ipine Fir		0 - uses B	a Kurucz (1	1982)	
			<u>D</u> efau	It Curve:	s	Вр	Noble	e Fir		0 - Curtis (1990)		
					-	Cwc	Coas	tal West	ern Red	d - Kurucz	(1985)		
Forest	Invento	ry File-				Cwi	Interi	or Weste	rn Redo	0 - Nigh (2	000)		
					- 11	Dr	Red /	Alder		0 - Nigh an	d Courtin (1998)	
_	Load			jave		Fdc	Coas	tal Dougl	as-fir	0 - Bruce (1981)		
Lauer	Load Bules			jave		Fdc	Coas	tal Dougl	as-fir	0 - Bruce (1981)		
Layer	Load Rules -		Min	<u>i</u> ave Max		Fdc	Coas	ital Dougl	as-fir	0 - Bruce (1981)		
Layer Seq	Load Rules – Type	Spcs	Min Age	iave Max Age	Min Heigt	Fdc Ma nt Heig	Coas	tal Dougl Min Ma DBH DB	as-fir IX IH	0 - Bruce (Layer	1981) Lay	ver Descri	ption
Layer Seq	Load Rules – Type	Spcs	Min Age	jave Max Age	 Min Heigt	Fdc Ma nt Hei 40	Coas ax I ght I 999	Min Ma DBH DB	as-fir IX IH 40 r	0 - Bruce (Layer n +	1981) Lay	ver Descri	ption
Layer Seq 1 2	Load Rules – Type	Spcs	Min Age	Max Age	Min Heigt	Fdc Ma Heig 40 30	Coas ax I ght I 999 40	Min Ma DBH DB	as-fir # 40 r 30-4	0 - Bruce (Layer n + 10 m	1981) Lay	ver Descri	ption
Layer Seq 1 2 3	Load Rules –	Spcs	Min Age	jave Max Age	Min Heigt	Fdc 140 140 130 120	Coas ax ght 999 40 30	Min Ma DBH DB	as-fir # 40 r 30-4 20-3	0 - Bruce (Layer n + 40 m 30 m	1981)	ver Descri	ption
Layer Seq 1 2 3 4	Load	Spcs	Min Age	jave Max Age	Min Heigt	Fdc Ma Heig 40 30 20 10	Coas ax 1 ght 1 999 40 30 20	Min Ma DBH DB	as-fir 40 r 30-4 20-3 10-2	0 - Bruce (Layer n + 40 m 30 m 20 m	1981) Lay	ver Descri	ption
Layer Seq 1 2 3 4 5	Load	Spcs	Min Age	Max Age	Min Heigt	Fdc 10 10 10 10 10 10 10 10 10 10	Coas ax ght 999 40 30 20 10	Min Ma DBH DB	as-fir 40 r 30-4 20-3 10-2 < 10	0 - Bruce (Layer n + 40 m 30 m 20 m 20 m	1981) Lay	ver Descri	ption
Layer Seq 1 2 3 4 5	Load	Spcs	Min Age	Max Age	Min Heigt	Fdc Ma Heig 40 30 20 10 0	Coas ght 1 999 40 30 20 10	Min Ma DBH DB	as-fir H 40 r 30-4 20-3 10-2 < 10	0 - Bruce (Layer n + 10 m 30 m 20 m 20 m	1981) Lay	rer Descri	ption
Layer Seq 1 2 3 4 5	Load	Spcs	Min Age	Max Age	Min Heigt	Fdc Ma Heiu 40 30 20 10 0	Coas ax 1 ght 1 999 40 30 20 10	Min Ma DBH DB	as-fir xx 40 r 30-4 20-3 10-2 < 10	0 - Bruce (Layer n + 40 m 30 m 20 m 20 m 3 m	1981) Lay	ver Descri	ption
Layer Seq 1 2 3 4 5	Load	Spcs	Min Age	Max Age	Min Heigt	Fdc Ma Heig 40 30 20 10 0	Coas ax 1 ght 1 999 40 30 20 10	Min Ma DBH DE	as-fir 40 r 30-4 20-3 10-2 < 10	0 - Bruce (Layer n + 40 m 30 m 20 m 30 m 30 m	1981) Lay	ver Descri	ption
Layer 5eq 1 2 3 4 5	Load	Spcs	Min Age	Max Age		Fdc Ma Heig 40 30 20 10 0 	Coas 999 40 30 20 10	Min Ma DBH DE	as-fir 40 r 30-4 20-3 10-2 < 10	0 - Bruce (Layer n + 10 m 30 m 20 m 30 m	1981) Lay	ver Descri	ption
Layer Seq 1 2 3 4 5	Load	Spcs	Min Age	Max Age		Fdc 14 40 30 20 10 0 	Coas ax 1 ght 1 999 40 30 20 10 10	Min Ma DBH DE	as-fir 40 r 30-4 20-3 10-2 < 10	0 - Bruce (Layer n + 40 m 30 m 20 m 30 m 30 m	1981) Lay	ver Descri	ption
Layer 5eq 1 2 3 4 5	Load	Spcs	Min Age	Max Age	Min Heigt	Fdc 14 40 30 20 10 0 	Coas ax ght 999 40 30 20 10 	Min Ma DBH DE	as-fir 40 r 30-4 20-3 10-2 < 10	0 - Bruce (Layer n + 40 m 30 m 20 m 3 m	1981) Lay	ver Descri	ption
Layer 5eq 1 2 3 4 5	Load	Spcs	Min Age	Max Age	Min Heigt	Fdc 14 40 30 20 10 0 	Coas ax ght 999 40 30 20 10 10	Min Ma DBH DE	as-fir 40 r 30-4 20-3 10-2 < 10	0 - Bruce (Layer n + 40 m 20 m 20 m 3 m	1981)	ver Descri	ption

Figure 1 - Forest Inventory Main Screen

1.5. DATA ENTRY

The cruise data must include as a minimum, **height**, **species**, **dbh**, and either **counted age** and/or **total age**, for each sample tree entered into the **Sample Trees Card** (card 3).

Header	(Caro	19) 1	frees (C	ard 2	2) Gra	des (C	Card 2a) S	ample Tr	ees (Caro	d 3) Growth Rates (Card 5
Tree No	Ht (m)	Spc	DBH	сс	Total Age	SE	Counted Age	Corr. Years	Bored Height	
3	29.9	Н	25.6				42			

Figure 2 - Sample trees (Card 3)

The CC (Crown Class), Corr. Years and Bored height fields are optional.

1.1.1 Validations

CruiseComp runs a set of validation checks on the forest inventory data to help ensure the integrity of the results.

- Total AgeIf the Total Age does not equal the sum of the Counted Age plus the Corr.Years, a validation error will occur.
- Counted Age CruiseComp first looks to use the Counted Age to calculate Site Index. If the data only has the Total Age, the program will take it and convert it to a Counted Age.
- CC If the crown class is provided and the value is 1 (dominant) or 2 (codominant), the program will treat the sample tree as a site tree. If the crown class is a 3 (intermediate) or 4 (suppressed), the program will remove those trees as site trees because they are generally considered to be not suitable.
- **Bored Height** The site index program uses a bored height of 1.3m plus/minus 0.3 m. It is not necessary to enter a bored height. However, if the entered bored height is not between 1.0m and 1.6m, the sample tree will be removed from the calculations.

Header (C	ard 9)	Tree	s (Card)	2)	G	rad	es	(Ca	ird (2a)	j)	Use	er G	àra	des		Sai	mpl	le 1	free	es (Car	rd 3	3)	Growth	Rat	es (Card 5)]
Tree No	Ht (m)	Spc	DBH	T C	C K	B C	s c	F O	F R	M T	R B	D B	S G	s w	L N	L L	S T	1 K	2 K	S E	R R	I N	F	B D	Total Age	сс	LIVE CROWN	C T
1	15.8	В	24.8	1												1	1	4	4									
2	36.0	Н	85.2	2			1					3				2	1	4	4									
3	26.0	Н	96.0	4																								
4	23.1	В	31.0	1												2	1	4	4									
5	26.3	В	34.8	1												2	2	4	4									
6	50.6	F	134.5	5												3	1	4	4						176			

1.5.1. Additional Field in the 2 card (trees card)

Figure 3 - Total age field on the 2Card (Trees Card)

In order to break a timber type into more than one age layer, it will be necessary to have an age for every tree. This can be done in a field called **Total Age** on the **Trees Card** (Card2). If the total age is not entered for a tree, the program assigns each tree an age based on the midpoint of the **Age in Tens** for the plot. For instance, if there were no tree ages for a plot with the **Age in Tens** of 07, then each tree would be assigned an age of 65 (midpoint between 60-69 yrs).

Two validations are performed on the **Total Age** column in the **Trees Card** (2 card), one for mature tree class 5 or 7 trees and one for immature tree class 8 & 9 trees.

If the total age has not been entered in the **Trees Card** (card 2) for any of these trees, a validation warning will be displayed, stating that there is no total age. Tree class does not specify an age but only that the tree is mature or immature. If you are summarizing layers based on age, estimate any missing ages. If the total age is missing for these trees, they will be assigned the average age of the plot, which defeats the whole purpose of summarizing the timber type by age groups.

1.6. SITE INDEX SPECIES CURVES

The **Forest Inventory Module** allows the user to quickly calculate the **site index** for all site trees. This eliminates the need to spend valuable time manually calculating the site index for individual trees in the field or office. Keypunch your compilation as you normally would, while ensuring that the sample tree data has been entered. The program calculates the site indexes as a part of your normal compilation.

Check the **Compile Forest Inventory** check box to calculate the site index.

Each tree species in British Columbia has at least one site index curve to choose from. Many species have several different site index equations to choose from.

If you would like to change the site curve for a species, click on the **Site Index Species Curves** box to make it active. Then click on the curve showing for that species and a list of available curves will drop down. Click on the desired curve to select it.



Figure 4 - Site Index Species Curves

To return to the **B.C. Ministry of Forests'** recommended curves for all the species, click the **Default Curves** button.

1.7. SITE INDEX TREE SELECTION

There are several ways that cruise data can be used to calculate site index.

1.1.2 Site Index Calculation without Site Tree Validation

Checking the **Use Sample Trees Only** box, means only trees from the **Sample Trees (card 3)** of all plots will be used to calculate the age of the stand and the site index.

To use trees from the main cruise plot, leave the **Use Sample Trees Only** box unchecked. The largest diameter tree of each tree species will be selected from each layer in each plot and will be used to calculate the site index. If the tree does not have a total age, **CruiseComp** will use the mid point of the **Age in Tens** for that layer in that plot as the age for that tree.

1.1.3 Site Index Calculation with Site Tree Validation

There is much debate on what constitutes an acceptable site index tree. The **Site Index Tree Selection Interface** allows the user to set the criteria for selecting suitable site index trees.

Click on the **Details** button to open up the **Site Index Tree Selection Interface**. Here the user can decide whether or not to use Crown Class 3 and 4 trees, damage trees or lean trees.

Under normal circumstances it is not recommended that these trees be used as site trees. Check or leave these boxes unchecked as appropriate.

	Site Index Tree Selection
Compile Forest Inventory	 Include Crown Class 3 and 4 Include damage trees Include lean trees
Validate Trees Details Default Curves Forest Inventory File	Include trees with these pathologies: Conk Frost Crack Blind Conk KINStletoe Scar Rotten Branch
Load Save	Fork/Crook Dead/Broken Top

Figure 5 - Site Index Tree Selection

If there are not enough ideal site trees, some trees with certain pathological remarks may have to be included. Tree growth is adversely impacted by fork/crooks, mistletoe or dead/broken tops and therefore will not give a true representation of site index. However, if a significant number of trees in a timber type have these conditions it may be necessary to include them to get an idea of the site index for that stand.

Click on the checkbox called **Include trees with these pathologies** (see figure 5) and then check any pathological remarks that are considered to be acceptable for site trees.

When the pathology checkboxes are grayed out, any trees with those path remarks will be excluded even if one or more of the boxes are checked off. To enable the validation of pathological remarks, the **Include trees with these pathologies** checkbox must be checked.

Once the **Site Index Tree Selection** criteria section is complete, click **OK**. When the **Validate Trees** box is checked, and the data is compiled, the program compares any potential site trees against the validation criteria, rejecting any that are not acceptable.

Validate Trees can be used on Use Sample Trees Only or on all trees.

When the **Use Sample Trees Only** box is unchecked, and the largest diameter tree of a given species in the main plot is rejected, the program will look at the next largest tree of that species in that plot. If all trees of a given species in a plot are not acceptable, the program will not use any trees of that species in that plot.

1.8. LAYER RULES

The Layer Rules interface, located at the bottom of the Forest Inventory module interface, allows the user to customize how the timber types will get broken down into layers. Layers can be created using the following attributes: Type, Species, Age, Height, and DBH.

Seq	Туре	Spcs	Min Age	Max Age	Min Height	Max Height	Min DBH	Max DBH	Layer	Layer Description
10			121	999					121 yrs +	
20			80	121					80 - 121 yrs	
30			60	80					60 - 80 yrs	
40			40	60					40 - 60 yrs	
50			1	40					1 - 40 yrs	

Figure 6 - Layer Rules

1.1.4 Description of Field Names:

- Seq The sequence is a number given to the layer and sorts the layers in numerical order from 1 to 9999. This number organizes how the layers will be displayed in the reports. (Sequence number 1 starts at the top and 9999 will be at the bottom)
- Type The type number is entered if the user would like to specify layers for a specific timber type. For instance, you could set up specific layers for a timber type and then completely different layers for all other timber types.
- Spcs Create layers by Species. For instance, instead of having age classes for all species combined, you could break it down by age class and grouped by species.
- Min Age Enter the minimum age for a given age class layer.
- Max Age Enter the maximum age for a given age class layer.
- Min Height Enter the minimum height for a given height class layer.
- Max Height Enter the maximum height for a given height class layer.
- Min DBH Enter the minimum dbh for a given dbh class layer.
- Max DBH Enter the maximum dbh for a given dbh class layer.
- Layer Enter in the name of the layer that you want to describe the layer. Each layer must have a layer name.

Layer

Description (Optional) A field that can be used to more completely describe the layer. This field is not necessary to fill in.

1.1.5 Examples of how the Layer Rules work:

1.1.5.1 One type with its own layers and all other types with a different set of layers

It may be necessary to create a different set of age class layers for one type and another set of age class layers for the rest of the types. For example:

Layer	r Rules									
Seq	Туре	Spcs	Min Age	Max Age	Min Height	Max Height	Min DBH	Max DBH	Layer	Layer Description
10	1		121	999					121 yrs +	
11	1		80	121					80-120 yrs	
12	1		1	80	1				1-80 yrs	
20			60	999					60 yrs +	
21			1	60					1-60 yrs	
31									**Unspecified**	Holds all trees not handled by ot
•	1									•

Figure 7 - Layer Rules Screen

The report below gives an example of the **Forest Inventory by Type report** using figure 7 as the setup.

Type	Layer	Basal m2/ha	Area Species%	Gross m3/ha	Merch Species*	Pri Sp	mary sp Hght (ecies .Age 1	.Age	SI	Sec Sp	ondary Hght C	specie Age 1	s .Age	SI
	-		-		-		-	_	_		_	-	-	_	
1	121 yrs + 80-120 yrs	1.9 67.9	F100 F74 H22 C4	26.4 912.4	F100 F82 H16 C2	F	52.2	107	114	36					
2	60 yrs +	50.1	F78 H18 C4	720.9	F81 H16 C3	F	53.1	99	106	37	н	48.0	98	103	33
з	60 yrs +	66.0	F77 H23	914.7	F80 H20	F	48.5	89	97	36	н	47.1	89	94	34
4	60 yrs +	59.0	F88 H10 C2	836.5	F89 H10 C1	F	46.5	90	98	34	н	40.9	91	96	29
5	60 yrs +	61.3	F74 H17 D9	830.4	F76 H17 D7										
6	60 yrs +	59.8	F83 H10 D6	778.2	F86 H8 D5	F	45.8	73	80	37					
7	60 yrs +	59.8	F81 H7 C6	773.2	F85 H6 C5	F	47.2	71	78	39					
8	60 yrs +	61.2	F76 H14 D8	819.7	F79 H13 D7	F	42.2	72	80	34					
9	60 yrs +	55.5	F71 H18 C8	758.8	F73 H20 C5	F	47.3	75	82	38					
10	60 yrs + 1-60 yrs	17.5 21.0	C70 F30 D67 H33	175.5 201.8	C56 F44 D75 H25										
11	60 yrs +	72.5	F91 H6 C3	1043.4	F92 H6 C2	F	44.7	98	106	32					

The program first looks to the smallest sequence number and starts sorting the trees that are contained there first. Once these trees have been assigned a layer, they are no longer available for another layer. The program goes through each layer in sequential numeric order until all trees in the compilation have been sorted into a layer.

Sequence number assignment must be considered very carefully. Always give the more specific layers, a sequence number that is smaller than a less specific layer. For example, while referring to figure 7, if the layers in type 1 were given sequence numbers of 50, 51 and 52, all trees greater than 60 years old would be assigned to sequence 20 leaving no trees for number 50 & 51, and only some trees for number 52.

Any trees are not assigned to a layer, are placed into an unspecified layer. The user can compile the data, review the layer results and then make adjustments to the layer rules if some trees were mis-placed.

1.1.5.2 Using layers to summarize height layers

Another way to get an idea of a timber stand's structure is to break it down into height classes. The example below examines this option:

Seq	Туре	Spcs	Min Age	Max Age	Min Height	Max Height	Min DBH	Max DBH	Layer	Layer Description
1					50.0	999.0			> 50 m	
2					40.0	50.0			40 - 50 m	
3					30.0	40.0			30 - 40 m	
4					20.0	30.0			20 - 30 m	
5					10.0	20.0			10 - 20 m	
6					1.0	10.0			< 10 m	

Figure 8 - Example forest inventory by height classes

Type	Layer	Basal m2/ha	Area Species%	Gross m3/ha	Merch Species*	Pri Sp	mary Hght	species C.Age 1	[.Age	SI	Secondary Sp Hght	/ speci C.Age	es T.Age	SI
1	<pre>> 50 m 40 - 50 m 30 - 40 m 20 - 30 m 10 - 20 m < 10 m</pre>	33.9 16.3 5.6 9.2 3.7 1.2	F100 F92 C8 H66 F34 H80 F20 H100 C100	523.0 227.7 73.9 94.4 15.7 4.2	F100 F94 C6 H68 F32 H81 F19 H100 C100	F	52.2	107	114	36				
2	> 50 m 40 - 50 m 30 - 40 m 20 - 30 m	23.8 17.4 2.2 6.7	F100 F74 H26 F100 H67 C33	376.1 265.0 26.2 53.5	F100 F69 H31 F100 H68 C32	F	53.1	99	106	37	H 48.0	98 .	103 3	13
3	> 50 m 40 - 50 m 30 - 40 m 20 - 30 m 10 - 20 m	20.0 26.3 12.1 4.5 3.0	F100 F83 H17 F75 H25 H100 H100	309.1 397.2 155.0 38.1 15.3	F100 F79 H21 F71 H29 H100 H100	F F	51.2 47.2	88 90	95 98	38 35	H 47.1	89	94	34
4	> 50 m 40 - 50 m 30 - 40 m 20 - 30 m 10 - 20 m	27.8 19.4 8.9 1.0	F96 H4 F89 H11 F89 H11 H100 H57 C43	431.8 279.6 104.2 9.5 11.2	F95 H5 F88 H12 F88 H12 H100 H58 C42	F	46.5	90	98	34	Н 40.9	91	96	29

1.1.5.3 Using layers to summarize height and dbh classes

This example shows an example for of uneven age management of drybelt Douglas-Fir stands.

Layer 1 - > 12.5cm

Layer 2 - 7.5 - 12.5 cm

Layer 3 - > 1.3m and < 7.5cm

Layer 4 - < 1.3m

- Layer	Rules –									
Seq	Туре	Spcs	Min Age	Max Age	Min Height	Max Height	Min DBH	Max DBH	Layer	Layer Description
10	1						12.5	999	>12.5cm	
20	1						7.5	12.5	7.5-12.5cm	
30	1				1.3	999	0.1	7.5	>1.3m - <7.5cm	
40	1				0.1	1.3			<1.3m	
•	1			1	1					<u>+</u>

Figure 9 - Layers for height & DBH

			Net M	erch	Merch St	ems/ha	Merch	BA/ha	All Ste	ems/ha	All H	BA/ha	Avg	Avg	Volume
Туре	Layer	Species	m3/ha	÷	LiveDP	Snags	LiveDP	Snags	LiveDP	Snags	LiveDP	Snags	Height	DBH	/Tree
ı	>12.5cm	Doug-Fir	106	71	233.4	10.3	16.3	2.3	349.0	20.6	18.2	2.4	22.1	29.8	0.45
		Spruce L. P. Pine	30 10	20 7	43.3 95.9	1.0 10.1	3.1	0.1	55.7 106.0	7.3	3.3	0.3	27.5 14.3	30.1 16.5	0.69
		Aspen Cottonwood	2	i	11.1	5.0	0.4	0.1	24.2 1.3	11.7	0.6	0.3	16.7 15.5	21.0 34.9	0.20
		Total	148	100	385.0	26.5	21.9	2.7	536.3	39.5	24.5	2.9	22.4	26.9	0.39
	7.5-12.5cm	Aspen							32.6		0.3				
		Doug-Fir L.P.Pine							340.9 111.9	52.5	2.4 0.8	0.4			
		Spruce Total							13.0 498.5	52.5	0.1 3.6	0.4			
	>1.3m - <7.5cm	Doug-Fir L D Dine							676.6	174.4	1.8	0.4			
		Total							715.2	174.4	1.9	0.4			
	<1.3m	Doug-Fir							5.1		0.0				
		L. P. Pine Spruce							5.1		0.0				
		Total							15.4		0.0				

1.1.5.4 Example of height and diameter classes.

Layer	Rules -									
Seq	Туре	Spcs	Min Age	Max Age	Min Height	Max Height	Min DBH	Max DBH	Layer	Layer Description
10	1				30.0	999.0	50.0	999.0	>30m - >50cm	
11	1				30.0	999.0	30.0	50.0	>30m - 30-50cm	
12	1				30.0	999.0	1.0	30.0	>30m - <30cm	
20	1				20.0	30.0	50.0	999.0	20-30m - >50cm	
21	1				20.0	30.0	30.0	50.0	20-30m - 30-50cm	
22	1				20.0	30.0	1.0	30.0	20-30m - <30cm	
30	1				10.0	20.0	50.0	999.0	10-20m - >50cm	
₹	1				40.0	~~~	20.0		40.00 00.00	Þ

Figure 10 - Height and DBH classes used together.

Trmo	Louion	Basal	Area Spoziosi	Gross	Merch	Pri	mary sp	ecies) and	ст	Sec	ondary s Hott C	pecie	s Noro	ет
туре	bayer	ш2/ПА	Species.	ш3) па	opecies.	ър	ngno o	. Age I	.nge	51	эр	ngno c.	Age I	.nge	51
1	>30m - >50cm >30m - 30-50cm 20-30m - 30-50cm	40.7 15.0 3 7	F97 C3 F75 H25 H100	614.8 209.8 32.8	F98 C2 F76 H24 H100	F	52.2	107	114	36					
	20-30m - <30cm 10-20m - <30cm <10m	5.6 3.7 1.2	H66 F34 H100 C100	61.6 15.7 4.2	H71 F29 H100 C100	н	29.9	42	47	34					
2	Unspecified	50.1	F78 H18 C4	720.9	F81 H16 C3	F	53.1	99	106	37	н	48.0	98	103	33
з	Unspecified	66.0	F77 H23	914.7	F80 H20	F	48.5	89	97	36	н	47.1	89	94	34
4	Unspecified	59.0	F88 H10 C2	836.5	F89 H10 C1	F	46.5	90	98	34	н	40.9	91	96	29
5	Unspecified	61.3	F74 H17 D9	830.4	F76 H17 D7										
6	Unspecified	59.8	F83 H10 D6	778.2	F86 H8 D5	F	45.8	73	80	37					
7	Unspecified	59.8	F81 H7 C6	773.2	F85 H6 C5	F	47.2	71	78	39					
8	Unspecified	61.2	F76 H14 D8	819.7	F79 H13 D7	F	42.2	72	80	34					
9	Unspecified	55.5	F71 H18 C8	758.8	F73 H20 C5	F	47.3	75	82	38					
10	Unspecified	38.5	D36 C32 F14	377.4	D40 C26 F21										
11	Unspecified	72.5	F91 H6 C3	1043.4	F92 H6 C2	F	44.7	98	106	32					

As you can see in the report above, only type 1 had the dbh and height classes specified. The trees without a layer assigned have been deemed unspecified.

1.9. SAVING FOREST INVENTORY SETTINGS

As stated earlier, it may be of value to create and save one or more versions of forest inventory settings rather than manually re-entering them with each new dataset. The **Forest Inventory Module** allows the user to create as many forest inventory files (*.fiv) as required. When the settings have been finalized, click the **Save** button located at the mid left of the forest inventory screen.

Export Forest I	ventory Settings				?×
Save jr	: 🗀 Forest Invent	огу	•	- 🗈 💣 🖩	∎-
Pecent	iv files 🔁 fiv files				
Desktop					
My Documents					
My Computer					
	File <u>n</u> ame: Save as tupe:	Coast-Num-1	(* 60)	- -	<u>S</u> ave Cancel
My Network Places	Jave as type.	The Forest invention settings ((.IIV)		

Figure 11 - Saving an fiv file

A dialog box will open up, prompting you to name the saved file and copy the file to a folder. It is recommended that you store all your forest inventory files in one folder to keep your files better organized.

1.10. LOADING A FOREST INVENTORY FILE:

Click on the **Load** button on the **Forest Inventory** interface, and choose the folder where your *.fiv files are located. Select the required file and open it.

Import Forest In	ventory Settings		? ×
Look jn:	C Forest Inventory	- 🕂 🖆 📰 -	
Content Recent	iv files finages etc Coast-2-layer.fiv		
Desktop	Int-dry-belt-layers.fiv		
My Documents			
My Computer			
My Network Places	File name:		<u>O</u> pen
	Files of type: CC Forest Inventory Settings ((*.fiv)	Cancel

Figure 12 - Opening the .fiv file

After clicking the **Open** button, the program imports the ".fiv" file into the new **CruiseComp** file. The following message box appears.

CruiseCo	mp	×
⚠	The current setting Do you wish to co	gs will be overwritten. ntinue?
	Yes	No

Figure 13 - Prompt when importing an fiv file

If you'd like to override the old settings with the new file, click Yes. If you want to keep the old settings click No.

If you need to create a new Forest Inventory file that is similar to an existing one, open the existing one edit it, then save it with a new name.

1.11. REPORTS

There are seven reports available in the **Forest Inventory Module**.

 Appraisal Summary Report Map Area Statement Report Percent Reductions Applied Double Sampling Factors Field Data & Slope Averages Height Curves Volume and Basal Area Summary Reports Statistics Statistics Statistics Stand Stock Basal Area Reports Harvest Methods Lumber Recovery Factor Plots Forest Inventory by Type General Ext Forest Inventory by Type General Statistics End Use Sort Forest Inventory by Type General Forest Inventory by Type General Statistics Ext Forest Inventory by Type General May Area Reports Market Methods <	Report Options Dialog			×
Percent Reductions Applied Percent Reductions Applied Double Sampling Factors Field Data & Slope Averages Height Curves Height Curves Summary Reports Statistics Statistics Statistics Harvest Methods Harvest Methods Height Correst Inventory by Plot General Ext Forest Inventory by Type General Ext Forest Inventory by Plot General Ext Forest Inventory by Plot General Ext Forest Inventory by Type Forest Inventory by Plot General More Up More Up More Up More Up More Down			Use Default Reports Order	,
Portech Remoted using Factors Powelk Sampling Factors Field Data & Slope Averages Height Curves Volume and Basal Area Summary Reports StandStock Basal Area Reports Harvest Methods Lumber Recovery Factor Plots Trees Dogs Forest Inventory by Type General Ext Forest Inventory by Tree General Ext Forest Inventory by Type Gost Forest Inventory by Type Gost Forest Inventory by Type General Ext Forest Inventory by Type Gost Forest Inventory Forest Inventory by Type Gost Forest Inventory by Type Forest Inventory by Type Ext Forest Inventory			Report Name	Category
Obdue 3 dx Slope Averages Image: Provide 1 Data & Slope Averages			Forest Inventory by Plot	General
Pield Data & Subjer Averages Pield Data & Subjer Averages <td< td=""><td>Eigld Data 9. Slapp Augrages</td><td></td><td>Forest Inventory by Type</td><td>General</td></td<>	Eigld Data 9. Slapp Augrages		Forest Inventory by Type	General
Image: Constant Porest Inventory Settings General Image: Constant Summary Reports Ext Forest Inventory by Tree General Image: Constant Statistics General Ext Forest Inventory by Plot General Image: Constant Statistics General Ext Forest Inventory by Plot General Image: Constant Statistics General Ext Forest Inventory by Type General Image: Constant Forest Inventory Forest Inventory by Type General Ext Forest Inventory by Type Image: Constant Forest Inventory by Plot Forest Inventory by Type General Image: Constant Forest Inventory by Plot Forest Inventory by Type General Image: Constant Forest Inventory by Plot Forest Inventory by Type General Image: Constant Forest Inventory by Type Forest Inventory by Type General Image: Constant Forest Inventory by Plot Forest Inventory by Plot General Image: Constant Forest Inventory by Plot Forest Inventory by Plot General Image: Constant Forest Inventory by Plot Forest Inventory by Plot General	Height Curves		Operational Forest Inventory by Type	General
Image: Summary Reports Image: Summary Repor	Imagine Corves		Forest Inventory Settings	General
Image: Statistics Ext Forest Inventory by Flot General Image: Statistics Image: Statistics Ext Forest Inventory by Type General Image: Statistics Image: Statistics Ext Forest Inventory by Type General Image: Statistics Image: Statistics Ext Forest Inventory by Type General Image: Statistics Image: Statistics General Ext Forest Inventory by Type Image: Statistics Image: Statistics General General Image: Statistics Image: Statistics General General <td>Volume and basar Area</td> <td></td> <td>Ext Forest Inventory by Tree</td> <td>General</td>	Volume and basar Area		Ext Forest Inventory by Tree	General
Image: Stand Stock Basal Area Reports Image: Stand Stock Basal Area Reports <td< td=""><td></td><td></td><td>Ext Forest Inventory by Type</td><td>General</td></td<>			Ext Forest Inventory by Type	General
Image: Status Subtrast Area Reports Image: Harvest Methods Image: Limber Recovery Factor Image: Limber Recovery Factor <td>🖽 🖂 🚰 Stand Stock Pacal Area Deports</td> <td></td> <td></td> <td>denor di</td>	🖽 🖂 🚰 Stand Stock Pacal Area Deports			denor di
Indivest Herious Indivest Herious Indivest Herious Indivest Herious Plots Indivest Herious Indivestion Inditin Indivestion				
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Operational Forest Inventory by Type Image: Operational Forest Inventory by Type Image: Operational Forest Inventory Settings Image: Operational Forest Inventory by Type Image: Operation Forest Inventory by Type	Forest Inventory by Type			
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Remove All Move Up Move Down	Ext Forest Inventory by Type		I	
		-	Remove All Move Up	Move Down
			01	1
Load Save OK Cancel	Load Save		ОК	Cancel

Figure 14 - Choosing forest inventory reports

The reports are:

1. Forest Inventory by Type

Tranc	Louion	Basal Area	G.	Fross B	Terch Sportoch	Pris	mary spe Wabt C	cies Ago T A	~	ст	Sec	ondary s Waht C	pecie	s Jan	ст
rype	bayer	шала эрест	.ез» ш	13/114	Species*	ър	ngno c	Nge I.A	ge	51	зp	ngno c.	Age I	.Age	51
1	80 - 121 yrs 40 - 60 yrs	66.1 Fd79 3.7 Hw100	Hw17 Cw4 8	98.1 43.7	Fd87 Hwll Cw2 Hwl00	Fd Hw	52.2 29.9	107 1 42	14 47	36 34					
2	80 - 121 yrs	50.1 Fd78	Hw18 Cw4 7	20.9	Fd81 Hwl6 Cw3	Fd	53.1	99 1	06	37	Ηw	48.0	98	103	33
з	80 - 121 yrs	66.0 Fd77	Hw23 9	914.7	Fd80 Hw20	Fd	48.5	89	97	36	Ηw	47.1	89	94	34
4	80 - 121 yrs	59.0 Fd88	Hw10 Cw2 8	36.5	Fd89 Hw10 Cw1	Fd	46.5	90	98	34	$H \boldsymbol{\omega}$	40.9	91	96	29
5	80 - 121 yrs	61.3 Fd74	Hw17 Dr9 8	30.4	Fd76 Hw17 Dr7										
6	80 - 121 yrs 60 - 80 yrs	1.1 Fd100 58.6 Fd82) Hwll Dr6 7	15.3 762.9	Fd100 Fd86 Hw8 Dr5	Fd Fd	45.2 46.9	74 72	81 79	36 38					
7	80 - 121 yrs 60 - 80 yrs	1.4 Cw100 58.4 Fd83) Hw7 Dr6 7	14.8 758.4	Cw100 Fd86 Hw6 Dr5	Fd	47.2	71	78	39					
8	80 - 121 yrs 60 - 80 yrs	59.2 Fd76 2.0 Fd100	Hwl4 Dr8 7	792.9 26.8	Fd78 Hw14 Dr7 Fd100	Fd	42.2	72	80	34					
9	80 - 121 yrs	55.5 Fd71	Hw18 Cw8 7	758.8	Fd73 Hw20 Cw5	Fd	47.3	75	82	38					
10	80 - 121 yrs 40 - 60 yrs	17.5 Cw70 21.0 Dr67	Fd30 1 Hw33 2	.75.5 201.8	Cw56 Fd44 Dr75 Hw25										
11	80 - 121 yrs	72.5 Fd91	Hw6 Cw3 10)43.4	Fd92 Hw6 Cw2	Fd	44.7	98 1	06	32					

2. Forest Inventory by Plot

	D1-1	<i>a.</i>	D1 -+	•	Basal	Area	Gross	Merch	Pri	mary	species		AT	Seco	mdary	speci	.es	
Туре	BICK	scrp	PIOC	Layer	nz/na	Species*	ns/na	Species*	ър	Hght	t.Age	r.Age	51	ър	Hght	t.Age	1.Age	51
1	041		9	>30m - >50cm >30m - 30-50cm	47.0 18.8	F100 F100	734.7 280.6	F100 F100	F	52.8	99	106	37					
			10	>30m - >50cm 10-20m - <30cm	34.3 18.4	F82 C18 H100	502.1 78.4	F86 C14 H100	F	53.5	111	118	36					
			11	>30m - >50cm >30m - 30-50cm 20-30m - <30cm	37.6 28.2 18.4	F100 F100 H100	558.2 381.4 218.4	F100 F100 H100	н	29.9	42	47	34					
			12	>30m - >50cm >30m - 30-50cm	28.2 18.4	F100 H100	433.0 251.5	F100 H100	F	50.4	110	118	34					
			13	≻30m - ≻50cm ≻30m - 30-50cm 20-30m - 30-50cm 20-30m - ≼30cm ≼10m	56.4 9.4 18.4 9.4 6.1	F100 F100 H100 F100 C100	846.0 135.5 163.9 89.5 20.8	F100 F100 H100 F100 C100										
2	042		з	Unspecified	39.0	F100	560.5	F100	F	51.5	103	110	36					
			4	Unspecified	52.7	H51 F49	856.4	H57 F43	н	48.0	98	103	33					
			5	Unspecified	65.0	F100	1024.7	F100	F	57.0	96	103	40					
			6	Unspecified	26.4	F49 C51	269.9	F62 C38										
			7	Unspecified	91.7	F71 H29	1199.6	F82 H18										
			8	Unspecified	26.0	F100	414.4	F100	F	50.8	97	104	36					

3. Ext Forest Inventory by Type

Type	Samples	Species	Layer	Height	CountAge	TotalAge	SiteIndex
l	3 1	Doug-Fir Hemlock	>30m - ≻50cm 20-30m - <30cm	52.2 (50.4-53.5) 29.9	107 (99-111) 42	114 (106-118) 47	35.7 (34.1-37.1) 33.7
2	3 1	Doug-Fir Hemlock	Unspecified Unspecified	53.1 (50.8-57.0) 48.0	99 (96-103) 98	106 (103-110) 103	37.3 (35.7-40.3) 32.9
3	3 1	Doug-Fir Hemlock	Unspecified Unspecified	48.5 (46.5-51.2) 47.1	89 (86-94) 89	97 (94-102) 94	35.8 (34.6-37.8) 34.0
4	1 1	Doug-Fir Hemlock	Unspecified Unspecified	46.5 40.9	90 91	98 96	34.2 28.5
6	з	Doug-Fir	Unspecified	45.8 (44.8-46.9)	73 (72-74)	80 (79-81)	37.0 (36.3-38.2)
7	2	Doug-Fir	Unspecified	47.2 (46.2-48.2)	71 (70-72)	78 (77-79)	38.7 (37.6-39.8)
8	1	Doug-Fir	Unspecified	42.2	72	80	34.5
9	2	Doug-Fir	Unspecified	47.3 (45.8-48.7)	75 (74-75)	82 (81-82)	37.8 (36.8-38.8)
10	1	Hemlock	Unspecified	20.4	45	51	22.1
11	1	Doug-Fir	Unspecified	44.7	98	106	31.8

4. Ext Forest Inventory by Plot

Туре	Samples	Species	Layer	Height	CountAge	TotalAge	SiteIndex
1	3 1	Doug-Fir Hemlock	>30m - >50cm 20-30m - <30cm	52.2 (50.4-53.5) 29.9	107 (99-111) 42	114 (106-118) 47	35.7 (34.1-37.1) 33.7
2	3 1	Doug-Fir Hemlock	Unspecified Unspecified	53.1 (50.8-57.0) 48.0	99 (96-103) 98	106 (103-110) 103	37.3 (35.7-40.3) 32.9
3	3 1	Doug-Fir Hemlock	Unspecified Unspecified	48.5 (46.5-51.2) 47.1	89 (86-94) 89	97 (94-102) 94	35.8 (34.6-37.8) 34.0
4	1 1	Doug-Fir Hemlock	Unspecified Unspecified	46.5 40.9	90 91	98 96	34.2 28.5
6	з	Doug-Fir	Unspecified	45.8 (44.8-46.9)	73 (72-74)	80 (79-81)	37.0 (36.3-38.2)
7	2	Doug-Fir	Unspecified	47.2 (46.2-48.2)	71 (70-72)	78 (77-79)	38.7 (37.6-39.8)
8	1	Doug-Fir	Unspecified	42.2	72	80	34.5
9	2	Doug-Fir	Unspecified	47.3 (45.8-48.7)	75 (74-75)	82 (81-82)	37.8 (36.8-38.8)
10	1	Hemlock	Unspecified	20.4	45	51	22.1
11	1	Doug-Fir	Unspecified	44.7	98	106	31.8

5. Ext Forest Inventory by Tree

Type	Block	Strip	Plot	Tree	Samples	Species	Layer	Height	CountAge	TotalAge	SiteIndex
1	041		9	8	1	Doug-Fir	>30m - >50cm	52.8	99	106	37.1
			10	5	1	Doug-Fir	>30m >50cm.	53.5	111	118	35.9
			11	з	1	Hemlock	20-30m - <30cm	29.9	42	47	33.7
			12	2	1	Doug-Fir	>30m >50cm.	50.4	110	118	34.1
2	042		з	з	1	Doug-Fir	Unspecified	51.5	103	110	35.7
			4	4	1	Hemlock	Unspecified	48.0	98	103	32.9
			5	5	1	Doug-Fir	Unspecified	57.0	96	103	40.3
			8	2	1	Doug-Fir	Unspecified	50.8	97	104	36.1
з	051		90	2	1	Doug-Fir	Unspecified	51.2	88	95	37.8
			94	2 8	1 1	Doug-Fir Hemlock	Unspecified Unspecified	46.5 47.1	86 89	94 94	34.9 34.0
			99	4	1	Doug-Fir	Unspecified	47.9	94	102	34.6
4	061		2	з	1	Hemlock	Unspecified	40.9	91	96	28.5
			92	2	1	Doug-Fir	Unspecified	46.5	90	98	34.2
6	072		34	4	1	Doug-Fir	Unspecified	46.9	72	79	38.2
			35	3	1	Doug-Fir	Unspecified	45.6	74	81	36.7
			41	4	1	Doug-Fir	Unspecified	44.8	73	80	36.3

6. Operational Forest Inventory

Туре	Layer	Species	Net M m3/ha	erch *	Merch Ste LiveDP	ems/ha Snags	Merch LiveDP	BA/ha Snags	All Ste LiveDP	ms/ha Snags	All H LiveDP	3A/ha Snags	Avg Height	Avg DBH	Volume /Tree
1	40 m +	Doug-Fir Total	83 83	100 100	20.6 20.6		7.1 7.1						41.5 41.5	66.4 66.4	4.04 4.04
	30-40 m	Hemlock Doug-Fir W.R.Cedar Total	283 99 52 434	65 23 12 100	158.3 46.4 17.6 222.2		22.2 8.9 5.4 36.5						34.2 38.2 34.0 35.1	42.3 49.5 62.8 45.8	1.79 2.13 2.98 1.95
	20-30 m	W.R.Cedar Hemlock Birch Cottonwood Total	75 43 24 8 150	49 29 16 6 100	128.0 133.7 75.0 8.8 345.5		8.2 4.9 2.3 0.9 16.3						26.3 24.9 29.8 29.5 26.6	28.5 21.7 19.9 35.6 24.5	0.59 0.32 0.32 0.94 0.44
	10-20 m	W. R. Cedar Total	12 12	100 100	95.0 95.0		2.7 2.7						12.8 12.8	19.1 19.1	0.13 0.13

7. Forest Inventory Settings

Input trees: Card 3 only.

```
Species
                     Curve Description
                 * Huang, Titus, and Lakusta (1994)
* Thrower (1992)
* Alberta Forest Service (1985)
* Viewer (1992)
Acb
Act
At.
                  * Kurucz (1982)
Ba
В1
                  * uses Ba Kurucz (1982)
                  * Curtis (1990)
Bр
Cwc
                  * Kurucz (1985)
                  * Nigh (2000)
Cwi
                  * Nigh and Courtin (1998)
Dr.
                  * Bruce (1981)
Fdc
Fdi
                  * Thrower and Goudie (1992)
                 * Means, Campbell, Johnson (1988)
* Wiley (1978)
* Nigh (1998)
Hhn
Hwc
Hwi
                 * Milner (1992)
Lω
Pli
                  * Nigh (1999)
                 * Curtis, Diaz, and Clendenen (1990)
* Hann and Scrivani (1986)
* Alberta Forest Service (1985)
Pω
Pv
sъ́
Se
                  * Chen and Klinka (2000)
                  * Nigh (1997)
Ss
                  * Nigh/Love (2000) + Goudie (1984) (pla)
Sw
Rules:
ELSE IF( (type = 1) AND (30.0 <= height < 999.0) AND (50.0 <= dbh < 999.0) ) ASSIGN TO: >30m - >50cm
ELSE IF( (type = 1) AND (30.0 <= height < 999.0) AND (30.0 <= dbh < 50.0) ) ASSIGN TO: >30m - 30-50cm
ELSE IF( (type = 1) AND (30.0 <= height < 999.0) AND (1.0 <= dbh < 30.0) ) ASSIGN TO: >30m - 30-50cm
ELSE IF( (type = 1) AND (20.0 <= height < 30.0) AND (50.0 <= dbh < 30.0) ) ASSIGN TO: >30m - <30cm
ELSE IF( (type = 1) AND (20.0 <= height < 30.0) AND (50.0 <= dbh < 999.0) ) ASSIGN TO: 20-30m - >50cm
ELSE IF( (type = 1) AND (20.0 <= height < 30.0) AND (30.0 <= dbh < 50.0) ) ASSIGN TO: 20-30m - >50cm
ELSE IF( (type = 1) AND (20.0 <= height < 30.0) AND (30.0 <= dbh < 50.0) ) ASSIGN TO: 20-30m - 30-50cm
                  (type = 1) AND (20.0 <= height < 30.0) AND (30.0 <= dbh < 50.0) ) ASSIGN T0: 20-30m - 30-50cm
(type = 1) AND (20.0 <= height < 30.0) AND (1.0 <= dbh < 30.0) ) ASSIGN T0: 20-30m - <30cm
ELSE IF (
ELSE ASSIGN TO: **Unspecified**
```