



Query Builder and External Data Analysis Exercises

In these exercises you will:

Part 1 – Query Builder: Filtering Data and adding fields

- 1) Use Query Builder to view data for the Surface Fuels – Fine method.
- 2) Use Query Builder to view data for the Trees - Individuals method.
- 3) Use Query Builder to view data for the Cover – Species Composition method.
Add fields from the macroplot table and master species list to the query.

Part 2 – Query Builder: Calculations

- 4) Use Query Builder to calculate seedling density by status (live / dead) using the Trees – Seedlings (Height Class) method. Export the query results as a CSV file.
- 5) Use Query Builder to calculate basal area by dbh classes using the Trees – Individuals method.
- 6) Use Query Builder to calculate cover by life form using the Cover – Line Intercept protocol.
- 7) Use Query Builder to calculate cover by life form for the Cover – Points protocol.
- 8) Use Query Builder to calculate frequency by species using the Cover/Frequency protocol.

Part 3 – External Data Analysis

- 9) Import the Query Builder results for seedling density by status (live / dead) and view an analysis report and graph.

The first two tabs on the Query Builder allow users to filter data for the selected sampling method and to add fields from other FFI data tables. Data can be filtered by Macroplot, Monitoring Status, Sample Event, and Species attributes. Fields may be added to the query from the Macroplot, Sample Event, Monitoring Status, and Master Species List tables.

Data for the selected method is displayed in the Query Builder data grid. For each Macroplot and Sample Event, the sample attribute data are displayed in the first row followed by one or more rows of method attribute data.

Query Builder and External Data Analysis Exercises

Part 1 - Query Builder: Filtering Data and adding fields

Exercise 1: Use Query Builder to view data for the Surface Fuels – Fine method.

1.1 Select the *Surface Fuels Protocol* and the *Surface Fuels - Fine* method on the **Filter** tab.

Next, select plots *TestForest1* and *TestForest3*.

Select monitoring statuses *PreTreatment* and *ReMeasurementYear1*.

The screenshot shows the FFI Query Builder interface. The 'Filter' tab is active, showing the following configuration:

- Method:** Surface Fuels
- Macroplot:** M
- Sample Event:** 2/19/2008
- Species:** Biological not filtered, Nativity not filtered, Concern not filtered. Exclusion options: Exclude non-vascular, Exclude trees dead/down, Live perennials and all annuals.

The data table below shows the results of the query:

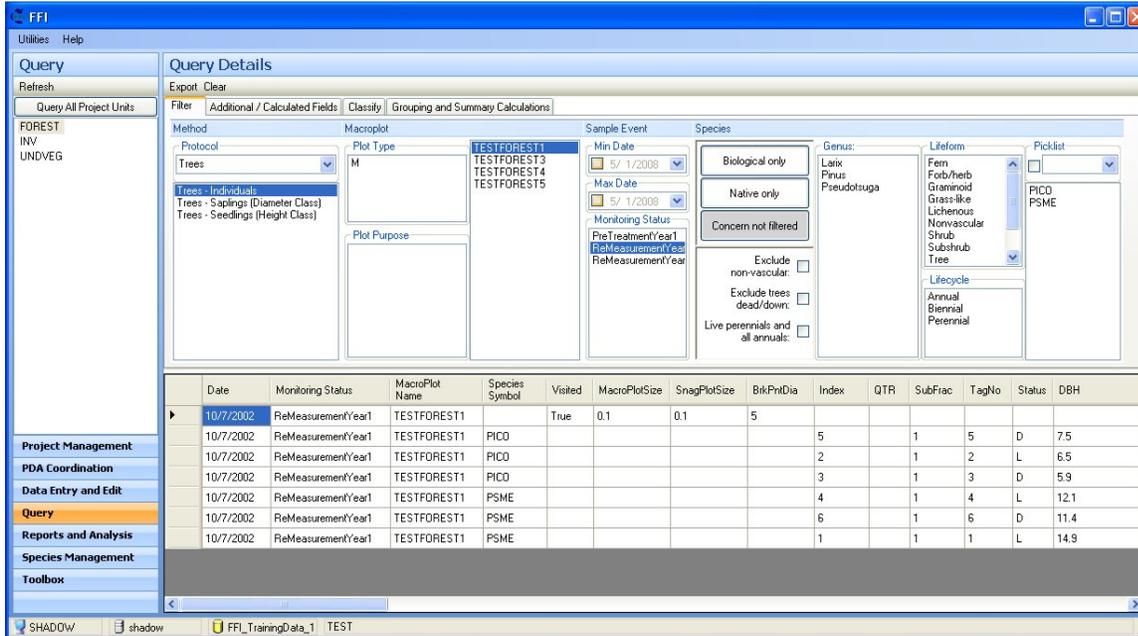
Monitoring Status	MacroPlot Name	Visited	NumTran	OneHrTranLen	TenHrTranLen	HunHrTranLen	Index	Transect	Azimuth	Slope	OneHr	TenHr	HunHr
PreTreatmentYear1	TESTFOREST1	True	2	6	6	15	1	1		26	38	20	3
PreTreatmentYear1	TESTFOREST1						2	2		6	51	27	4
PreTreatmentYear1	TESTFOREST3	True	2	6	6	15							
PreTreatmentYear1	TESTFOREST3						2	2		13	3	3	2
PreTreatmentYear1	TESTFOREST3						1	1		36	7	2	1
ReMeasurementYear1	TESTFOREST1	True	2	6	6	15							
ReMeasurementYear1	TESTFOREST1						1	1		26	17	10	2
ReMeasurementYear1	TESTFOREST1						2	2		6	28	14	2

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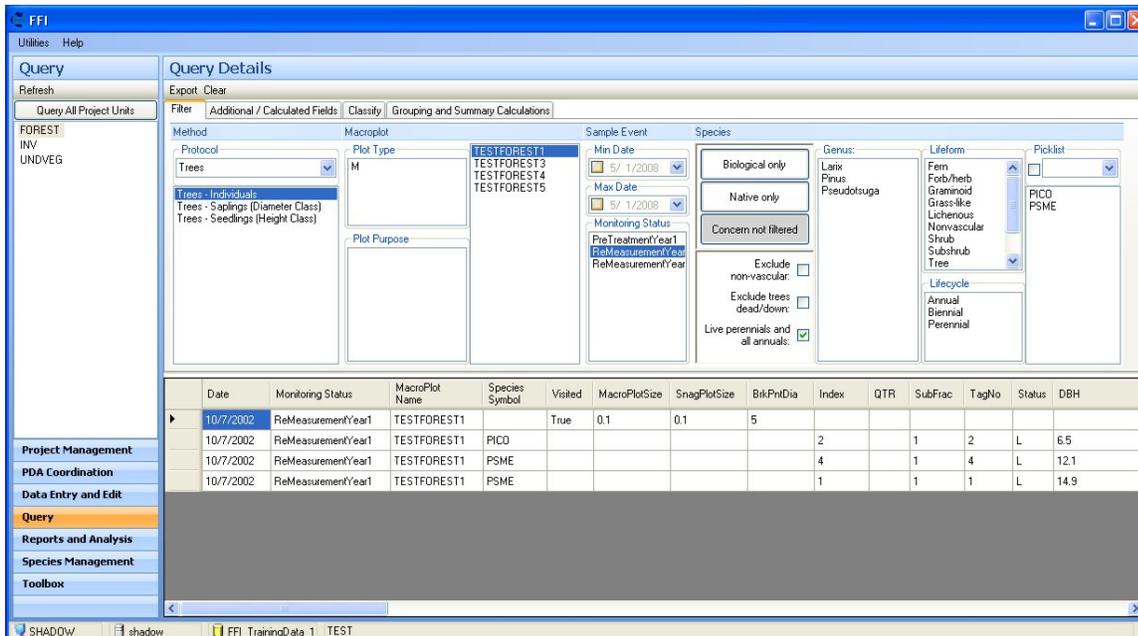
Exercise 2: Use Query Builder to view data for the Trees - Individuals method.

2.1 Select the *Trees* protocol and the *Trees - Individuals* method on the **Filter** tab.

Next, select plot *TestForest1* and monitoring status *ReMeasurementYear1*.



2.2 Check the **Live perennials and all annuals** checkbox. This filters the tree data to display only live trees.



Query Builder and External Data Analysis Exercises

Exercise 3: Use Query Builder to view data for the Cover – Species Composition method. Add fields from the macroplot table and master species list to the query.

3.1 Select the *Cover – Species Composition* protocol and method on the **Filter** tab.

Next, select plots *TestForest1* and *TestForest3* and monitoring statuses *PreTreatment* and *ReMeasurementYear1*.

Date	Monitoring Status	MacroPlot Name	Species Symbol	Visited	MinCovLevel	Index	Status	SizeCl	AgeCl
10/15/2001	PreTreatmentYear1	TESTFOREST1		True	10				
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5			2	L	TO	
10/15/2001	PreTreatmentYear1	TESTFOREST1	ARUV			1	L	TO	
10/15/2001	PreTreatmentYear1	TESTFOREST1	PSME			4	L	TO	
10/15/2001	PreTreatmentYear1	TESTFOREST1	SYAL			5	L	TO	
10/15/2001	PreTreatmentYear1	TESTFOREST1	PICD			3	L	TO	
10/15/2001	PreTreatmentYear1	TESTFOREST3		True	10				
10/15/2001	PreTreatmentYear1	TESTFOREST3	PHMA5			3	L	TO	
10/15/2001	PreTreatmentYear1	TESTFOREST3	PIPD			4	L	TO	

3.2 Select “Graminoid” in the **Lifeform** list box. This will filter the data to display only graminoids.

Date	Monitoring Status	MacroPlot Name	Species Symbol	Visited	MinCovLevel	Index	Status	SizeCl	AgeCl	Cover
10/15/2001	PreTreatmentYear1	TESTFOREST1		True	10					
10/15/2001	PreTreatmentYear1	TESTFOREST3		True	10					
10/15/2001	PreTreatmentYear1	TESTFOREST3	AGSP			1	L	TO		20
10/15/2001	PreTreatmentYear1	TESTFOREST3	FEID			2	L	TO		10
10/7/2002	ReMeasurementYear1	TESTFOREST1		True	10					
10/7/2002	ReMeasurementYear1	TESTFOREST3		True	10					
10/7/2002	ReMeasurementYear1	TESTFOREST3	AGSP			1	D	TO		10
10/7/2002	ReMeasurementYear1	TESTFOREST3	AGSP			2	L	TO		10
10/7/2002	ReMeasurementYear1	TESTFOREST3	FEID			3	L	TO		10

Query Builder and External Data Analysis Exercises

- 3.3 Select “Festuca” in the **Genus** list box. This will filter the data to display only grasses in the genus Festuca; in this case only *Festuca idahoensis* (Idaho fescue).

The screenshot shows the FFI Query Builder interface. The 'Species' filter is set to 'Festuca'. The data table below shows the results of the query.

Date	Monitoring Status	MacroPlot Name	Species Symbol	Visited	MinCovLevel	Index	Status	SizeCl	AgeCl	Cover
10/15/2001	PreTreatmentYear1	TESTFOREST1		True	10					
10/15/2001	PreTreatmentYear1	TESTFOREST3		True	10					
10/15/2001	PreTreatmentYear1	TESTFOREST3	FEID			2	L	T0		10
10/7/2002	ReMeasurement...	TESTFOREST1		True	10					
10/7/2002	ReMeasurement...	TESTFOREST3		True	10					
10/7/2002	ReMeasurement...	TESTFOREST3	FEID			3	L	T0		10

Query Builder and External Data Analysis Exercises

- 3.4** Unselect “Festuca” and “Graminoid”.
Click on the **Additional/Calculated Fields** tab. Add *Elevation* and *Aspect* from the **Macroplot Fields**.

Add *Scientific Name* and *Common Name* from the **Species Fields**.

Monitoring Status	MacroPlot Name	MacroPlot Elevation	MacroPlot Aspect	Species Symbol	Scientific Name	Common Name	Visited	MinCov	Index	Status	SizeC	AgeC	Cover
PreTreatmentYear1	TESTFOREST1	1219					True	10					
PreTreatmentYear1	TESTFOREST1	1219		PHMA5	Physocarpus malvaceus	mallow ninebark			2	L	TO		10
PreTreatmentYear1	TESTFOREST1	1219		ARUV	Arctostaphylos uva-ursi	kinnikinnick			1	L	TO		0.5
PreTreatmentYear1	TESTFOREST1	1219		PSME	Pseudotsuga menziesii	Douglas-fir			4	L	TO		20
PreTreatmentYear1	TESTFOREST1	1219		SYAL	Symphoricarpos albus	common snowberry			5	L	TO		10
PreTreatmentYear1	TESTFOREST1	1219		PICO	Pinus contorta	lodgepole pine			3	L	TO		50
PreTreatmentYear1	TESTFOREST3	1219	180				True	10					
PreTreatmentYear1	TESTFOREST3	1219	180	PHMA5	Physocarpus malvaceus	mallow ninebark			3	L	TO		80
PreTreatmentYear1	TESTFOREST3	1219	180	PIPO	Pinus ponderosa	ponderosa pine			4	L	TO		30

Part 2: Query Builder: Calculations

Query Builder provides calculations for density, cover, frequency, and basal area. These calculations work for all the sampling methods provided with the FFI software. They will also work with any new sampling methods created by FFI users provided the new methods contain the appropriate sample and method attributes. Because they offer the flexibility to work with existing and new sampling methods, the query builder calculations require users to input the appropriate fields for each calculation. Users must have some familiarity with how the appropriate sample attributes and method attributes are used to summarize the data.

The following exercises provide examples of how to use the calculations for cover, density, frequency, and basal area with various FFI sampling methods. They also emphasize the classification and grouping options in query builder, which offer additional data summary capabilities than are available using the standard data summary reports. Finally, these exercises demonstrate how to export Query Builder data for input into the FFI External Data Analysis Tool. Using Query Builder results with the External Data Analysis Tool allows users to analyze data summarized differently than in the standard data summary reports.

Query Builder and External Data Analysis Exercises

Exercise 4: Use Query Builder to calculate seedling density by status (live / dead) using the Trees – Seedlings (Height Class) method. Export the query results as a CSV file.

In order to calculate density by status, we first need to group the seedlings by status (live or dead). Next, we must sum the number of seedlings in each status. Then we can calculate density by dividing the number of seedlings in each status by the area sampled. The area sampled is the macroplot area if grouping data by macroplot and sample event or the sum of macroplot areas if grouping data for multiple macroplots and/or sample events. Finally, we need to provide a conversion factor to display the data in the desired units (per acre or per hectare).

4.1 Select the *Trees* protocol and the *Trees - Seedlings (Height Class)* method on the **Filter** tab.

The screenshot shows the FFI Query Builder interface. The 'Filter' tab is active, showing the following configuration:

- Method:** Trees - Seedlings (Height Class)
- Macroplot:** M
- Sample Event:** 4/29/2008
- Species:** Biological not filtered, Nativity not filtered, Concern not filtered.
- Genus:** Laix, Pinus, Pseudotsuga
- Lifeform:** Fern, Forb/herb, Graminoid, Grass-like, Lichenous, Nonvascular, Shrub, Subshrub, Tree
- Lifecycle:** Annual, Biennial, Perennial

The data table below shows the results of the query:

Date	Monitoring Status	MacroPlot Name	Species Symbol	Visited	MicroPlotSize	Index	SizeCIHt	Status	AgeCI	Count
10/15/2001	PreTreatment/Year1	TESTFOREST1		True	0.01					
10/15/2001	PreTreatment/Year1	TESTFOREST1	PSME			4	2	L		2
10/15/2001	PreTreatment/Year1	TESTFOREST1	PSME			1	0.2	L		1
10/15/2001	PreTreatment/Year1	TESTFOREST1	PSME			2	1	L		2
10/15/2001	PreTreatment/Year1	TESTFOREST1	PSME			3	2	D		1
10/15/2001	PreTreatment/Year1	TESTFOREST3		True	0.01					
10/15/2001	PreTreatment/Year1	TESTFOREST3	PSME			1	2	D		1
10/15/2001	PreTreatment/Year1	TESTFOREST3	PSME			2	2	L		2

Query Builder and External Data Analysis Exercises

- 4.2 Select *monitoring status order* on the **Additional/Calculated Fields** tab. Monitoring status is necessary when exporting data for input into the FFI External Data Analysis Tool.

The screenshot shows the FFI Query Builder interface. The 'Additional / Calculated Fields' tab is active, and the 'Order' checkbox under 'Monitoring Status Fields' is checked. The data table below shows the following records:

Date	Monitoring Status	Status Order	MacroPlot Name	Species Symbol	Visited	MicroPlotSize	Index	SizeDHT	Status	AgeCl
10/15/2001	PreTreatment/Year1	0	TESTFOREST1		True	0.01				
10/15/2001	PreTreatment/Year1	0	TESTFOREST1	PSME			4	2	L	
10/15/2001	PreTreatment/Year1	0	TESTFOREST1	PSME			1	0.2	L	
10/15/2001	PreTreatment/Year1	0	TESTFOREST1	PSME			2	1	L	
10/15/2001	PreTreatment/Year1	0	TESTFOREST1	PSME			3	2	D	
10/15/2001	PreTreatment/Year1	0	TESTFOREST3		True	0.01				
10/15/2001	PreTreatment/Year1	0	TESTFOREST3	PSME			1	2	D	
10/15/2001	PreTreatment/Year1	0	TESTFOREST3	PSME			2	2	L	

Query Builder and External Data Analysis Exercises

4.3 Calculate density by tree status on the **Grouping and Summary Calculations** tab. First, group the data by *Macroplot* and *Monitoring Status*.

Next, group the data by *Status (tree status)* under **Method Attributes**.

Then select *Plot Size* and *Count* under **Method Fields to Sum**. These fields are required to perform the density calculation.

Now fill in the appropriate fields for the **Density** calculation text boxes. Select the field “sum_MicroPlotSize” in the **Area** textbox. *MicroPlotSize* is the sampled area for seedlings for each macroplot and sample event.

The **Method Attribute (Subplot Fraction)** is optional here. It is only required when some seedlings are sampled within a fraction of the sampling area.

Select “sum_Count” in the **Count Field** text box. This field sums the number of seedlings in each status (live or dead).

Finally, select “Acres – Area (acres)” in the **Unit Conversions** text box. This conversion factor will calculate density as the number of seedlings per acre given that the sampling area was recorded in acres.

Check the **Calculate Density** checkbox and the density values are added to the data grid.

Export the Query Builder results as a CSV file.

Monitoring Status	Status Order	MacroPlot Name	RowCount	sum_MicroPlotSize	Status	sum_Count	Density_acres
PreTreatmentYear1	0	TESTFOREST1	1		D	1	100
PreTreatmentYear1	0	TESTFOREST1	3		L	5	500
ReMeasurement...	3	TESTFOREST1	2		D	4	400
ReMeasurement...	3	TESTFOREST1	1		L	2	200
ReMeasurement...	4	TESTFOREST1	3		D	5	500
ReMeasurement...	4	TESTFOREST1	1		L	1	100
PreTreatmentYear1	0	TESTFOREST5	1		D	1	100
PreTreatmentYear1	0	TESTFOREST5	3		L	6	600
ReMeasurement...	3	TESTFOREST5	3		D	6	600

Query Builder and External Data Analysis Exercises

Exercise 5: Use Query Builder to calculate basal area by dbh classes using the Trees – Individuals method.

In order to calculate basal area by dbh classes we need to know the dbh^2 value of each tree so we can calculate the basal area of each tree as a constant * dbh^2 . The constant is derived from the equation $area = \pi * (dbh/2)^2$. The constant differs depending on basal area units (sq. ft. / acre or sq. m / ha) and whether you recorded dbh in inches or cm.

Next we must classify the actual dbh values into our desired classes. Then we can sum the basal area by dbh classes. Now, we can calculate basal area by our dbh classes by dividing the sum of basal area for each dbh class by the area sampled. The area sampled is the macroplot area if grouping the data by macroplot and sample event or the sum of macroplot areas if grouping data for multiple macroplots and/or sample events. Finally, we need to provide a conversion factor to display the data in the desired units (sq. ft. / acre or sq. m. per ha).

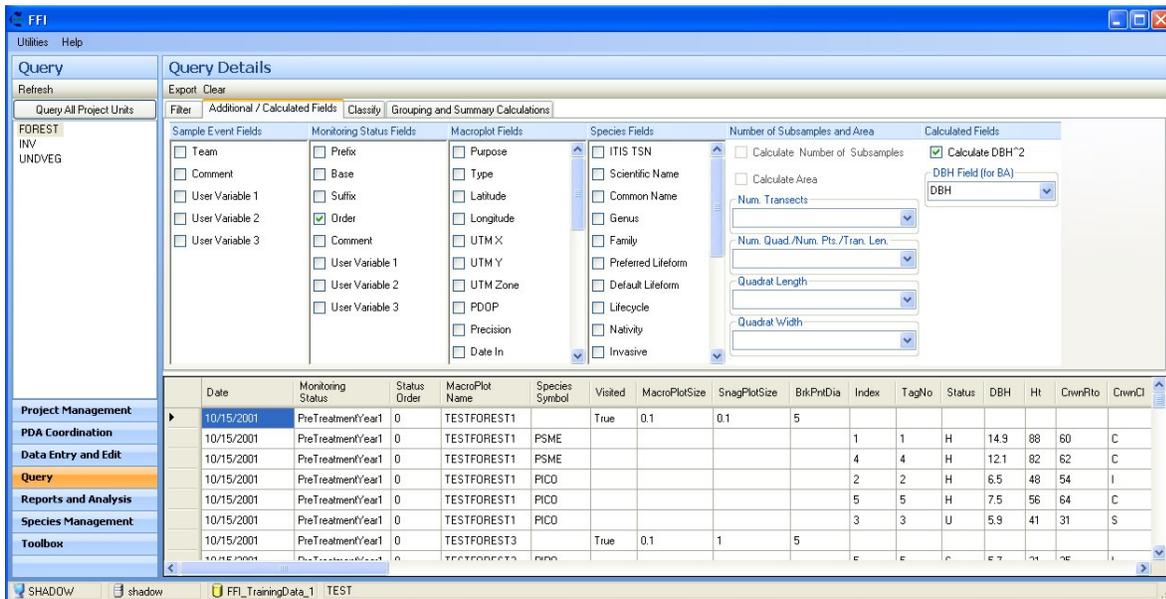
5.1 Select the *Trees* protocol and *Trees-Individuals* method on the **Filter** tab.

Date	Monitoring Status	MacroPlot Name	Species Symbol	Visited	MacroPlotSize	SnagPlotSize	BkPrnDia	Index	TagNo	Status	DBH	Ht	CrwnRto	CrwnCI	LCBHt
10/15/2001	PreTreatmentYear1	TESTFOREST1		True	0.1	0.1	5								
10/15/2001	PreTreatmentYear1	TESTFOREST1	PSME					1	1	H	14.9	88	60	C	35
10/15/2001	PreTreatmentYear1	TESTFOREST1	PSME					4	4	H	12.1	82	62	C	31
10/15/2001	PreTreatmentYear1	TESTFOREST1	PICO					2	2	H	6.5	48	54	I	22
10/15/2001	PreTreatmentYear1	TESTFOREST1	PICO					5	5	H	7.5	56	64	C	20
10/15/2001	PreTreatmentYear1	TESTFOREST1	PICO					3	3	U	5.9	41	31	S	28
10/15/2001	PreTreatmentYear1	TESTFOREST3		True	0.1	1	5								

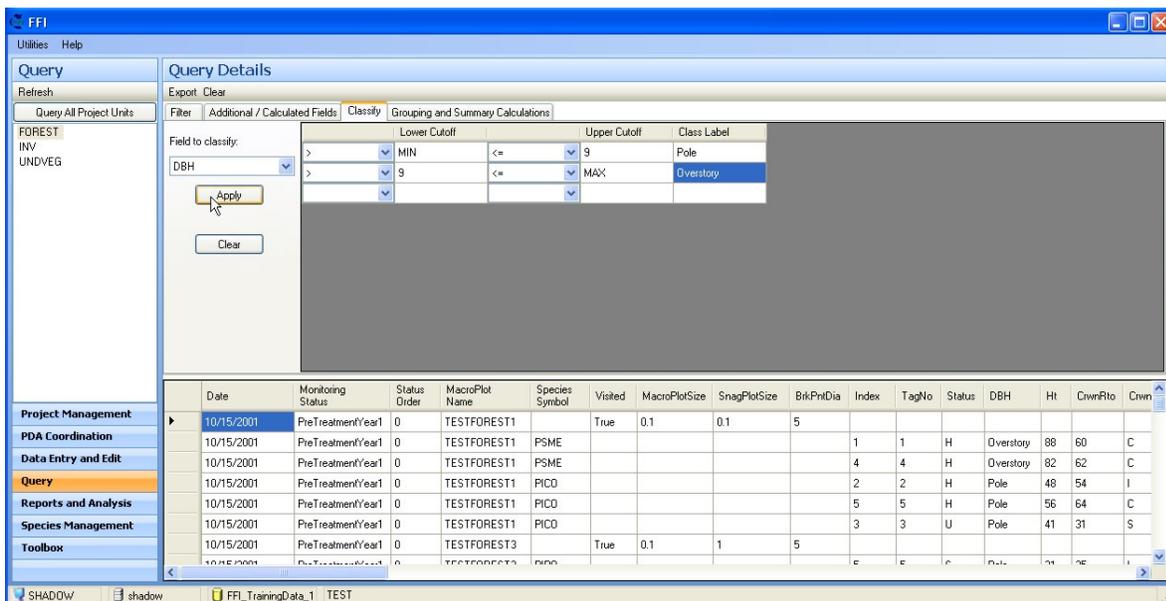
Query Builder and External Data Analysis Exercises

5.2 Select **Monitoring Status Order** on the **Additional/Calculated Fields** tab. We need the Monitoring Status Order if we are going to import the data into the External Data Analysis Tool.

Select **DBH** in the DBH field and check **Calculate DBH²**. We need to calculate dbh² for calculating basal area.



5.3 Using the **Classify** tab, classify the dbh field into pole (> breakpoint dbh and <=9 inches) and overstory (>9 inches) classes. When you apply the classification, the numeric dbh values will be replaced with their classified value. This classified value will be carried over to the **Grouping and Summary Calculations** tab.



Query Builder and External Data Analysis Exercises

- 5.4 Calculate basal area by dbh classes using the **Grouping and Summary Calculations** tab. We will calculate basal area by dbh class for each Macroplot and Monitoring Status.

First, group the data by Macroplot, Monitoring Status, and DBH class.

Next, select Plot Size under **Method Fields to Sum**. These fields are required to perform the basal area calculation.

Now fill in the appropriate fields for the **Basal Area** calculation text boxes. Select the field “sum_MacroplotSize” in the *Area* textbox. This will give us the total plot area sampled.

The **Method Attribute (Subplot Fraction)** is optional here. It is only required when some trees are sampled on a fraction of the macroplot area.

Select “sum_DBH²” in the **DBH Squared** text box. This field will provide the sum of dbh² for calculating basal area.

Finally, Select “*Sq. Ft. / Acre – DBH (in), Area (acres)*” for the **Unit Conversion**. This will apply the appropriate unit conversion to calculate basal area in Sq. Ft. / Acre given that dbh was recorded in inches and macroplot area was recorded in acres.

Check the **Calculate Basal Area** checkbox and the basal area values are added to the data grid.

Monitoring Status	Status Order	MacroPlot Name	sum_DBH ²	RowCount	sum_MacroPlotSize	DBH	BasalArea_sq ft./acre
PreTreatment\Year1	0	TESTFOREST3	1090.73	2		Overstory	59.49
PreTreatment\Year1	0	TESTFOREST3	177.49	3		Pole	9.68
ReMeasurement...	3	TESTFOREST3	1090.73	2		Overstory	59.49
ReMeasurement...	3	TESTFOREST3	177.49	3		Pole	9.68
ReMeasurement...	4	TESTFOREST3	1090.73	2		Overstory	59.49
ReMeasurement...	4	TESTFOREST3	177.49	3		Pole	9.68
PreTreatment\Year1	0	TESTFOREST1	368.4199999999...	2		Overstory	20.09
PreTreatment\Year1	0	TESTFOREST1	133.31	3		Pole	7.27

Query Builder and External Data Analysis Exercises

Exercise 6: Use Query Builder to calculate cover by life form using the Cover – Line Intercept protocol.

In order to calculate cover using the Cover – Line Intercept protocol, we must know how many inches (cm) of transect were sampled for each macroplot. We can calculate the total length of line sampled per macroplot by multiplying the number of transects by the length of each transect. Next we can sum the total intercept for each species on a plot. We can calculate cover by dividing the sum of intercepts for each species by the total length of transects sampled and multiply by 100. If we are interested in calculating cover by life form, we can group species into life forms before we perform the cover calculation.

6.1 Select the *Cover – Line Intercept* protocol and method on **Filter** tab.

Date	Monitoring Status	MacroPlot Name	Species Symbol	Visited	NumTran	TranLen	Index	Transect	Status	SizeCl	AgeCl	TypeCov	Start	Stop	Int	Height
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5	True	3	66	13	2	L	TO			47.3	58.8	11.5	
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5				7	1	L	TO			1	2	1	4
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5				2	1	L	TO			10.83	16.67	5.84	
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5				3	1	L	TO			20.83	26.67	5.84	6
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5				5	1	L	TO			53.33	59.67	6.33	3
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5				15	3	L	TO			45.7	52.9	7.2	4

Query Builder and External Data Analysis Exercises

6.2 Select **Monitoring Status Order** and **Calculate Number of Subsamples** on the **Additional/Calculated Fields** tab. The number of subsamples is the total number of inches (cm) of tape sampled for each macroplot and sample event.

Select the field “*Num. Transects*” in the **Num. Transects** text box and the field “*Tran. Length*” in the **Num. Quad./Num. Pts./Tran. Len.** textbox. When you calculate the number of subsamples the total number of inches (cm) sampled is calculated by multiplying the number of transects by the transect length.

Date	Monitoring Status	Status Order	MacroPlot Name	Species Symbol	Visited	NumTran	TranLen	Index	Transect	Status	SizeCl	AgeCl	TypeCov	Start	Stop	Int
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5	True	3	66									
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5				13	2	L	TO			47.3	58.8	11.5
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5				7	1	L	TO			1	2	1
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5				2	1	L	TO			10.83	16.67	5.84
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5				3	1	L	TO			20.83	26.67	5.84
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5				5	1	L	TO			53.33	59.67	6.33
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5				15	3	L	TO			45.7	52.9	7.2

Query Builder and External Data Analysis Exercises

- 6.3** Calculate cover by life form on the **Grouping and Summary Calculations** tab. First, group by Macroplot, Monitoring Status, Subplot Fraction, and Lifeform.

Subplot fraction is optional here since it is always equal to 1, meaning that all species on a macroplot were sampled along the same length of transect.

Next, select Intercept under **Method Fields to Sum**. These fields are required to perform the cover calculation.

Now fill in the appropriate fields for the **Cover** calculation text boxes. Select the field “*sum_NumSubsamples*” in the **Number of Subsamples** textbox. This will give us the total length (in. or cm) of line transects sampled.

The **Method Attribute (Subplot Fraction)** is optional here, but we will use it just as an example. Select the field “*SubFrac*” for this textbox.

Select “*sum_Int*” in the **Cover Field** textbox. This field will provide the sum of intercept sampled by life form.

Check the **Calculate Cover** checkbox and the cover values are added to the data grid.

Monitoring Status	Status Order	MacroPlot Name	Preferred Lifeform	sum_NumSubsamp	RowCount	SubFrac	sum_Int	Cover
PreTreatmentYear1	0	TESTFOREST1	Shrub		13	1	70.34	35.53
PreTreatmentYear1	0	TESTFOREST1	Tree		5	1	46.5899999999999...	23.53
ReMeasurement...	3	TESTFOREST1	Shrub		4	1	8	4.04
ReMeasurement...	3	TESTFOREST1	Tree		2	1	9	4.55
ReMeasurement...	4	TESTFOREST1	Shrub		7	1	26.3699999999999...	13.32
ReMeasurement...	4	TESTFOREST1	Tree		4	1	19.88	10.04
PreTreatmentYear1	0	TESTFOREST5	Shrub		6	1	30.14	15.22
PreTreatmentYear1	0	TESTFOREST5	Subshrub		6	1	26.4599999999999...	13.36
PreTreatmentYear1	0	TESTFOREST5	Tree		3	1	23.72	11.98

Query Builder and External Data Analysis Exercises

Exercise 7: Use Query Builder to calculate cover by life form for the Cover – Points protocol.

In order to calculate cover using the Cover – Points protocol, we must know how many points were sampled for each macroplot. We can calculate the total number of points sampled per macroplot by multiplying the number of transects by the number of points sampled along each transect. Next we can sum the total number of unique “hits” at each point for each species. Unique hits are recorded once per species at a point, thus multiple hits at a point for a species are only counted as one. We can calculate cover by dividing the number of unique hits for each species by the total number of points sampled and multiply by 100. If we are interested in calculating cover by life form, we can group species into life forms before we perform the cover calculation.

7.1 Select the *Cover – Points (metric)* protocol and method on **Filter** tab.

The screenshot shows the FFI Query Builder interface. The 'Filter' tab is active, showing the following configuration:

- Method:** Cover - Points (metric)
- Macroplot:** TESTFOREST8
- Sample Event:** 12/17/2007
- Species:** Biological not filtered, Nativity not filtered, Concern not filtered.
- Genus:** Agropyron, Arabis, Arcrostaphylos, Festuca
- Lifeform:** Fern, Forb/herb, Graminoid, Grass-like, Licheneous, Nonvascular, Shrub, Subshrub, Tree
- Exclude non-vascular:**
- Exclude trees dead/down:**
- Live perennials and all annuals:**

The data table below shows the results of the query:

Date	Monitoring Status	MacroPlot Name	Species Symbol	Visited	NumTran	TranLen	NumPlsTran	Index	Transect	Point	Tape	Order	Height	Status	Comment	UV
10/15/2001	PreTreatmentYear1	TESTFOREST8		True	2	50	200									
10/15/2001	PreTreatmentYear1	TESTFOREST8	FEID					25	1	153	38.25	1	0.02	L		
10/15/2001	PreTreatmentYear1	TESTFOREST8	FEID					27	1	155	38.75	1	0.1	L		
10/15/2001	PreTreatmentYear1	TESTFOREST8	FEID					29	1	165	41.25	1	0.19	L		
10/15/2001	PreTreatmentYear1	TESTFOREST8	FEID					28	1	159	39.75	1	0.12	L		
10/15/2001	PreTreatmentYear1	TESTFOREST8	FEID					26	1	154	38.5	1	0.26	L		
10/15/2001	PreTreatmentYear1	TESTFOREST8	FEID					24	1	152	38	1	0.13	L		

Query Builder and External Data Analysis Exercises

- 7.2 Select **Monitoring Status Order** and calculate **Number of Subsamples** on the **Additional/Calculated Fields** tab. The number of subsamples is the total number of points sampled for each macroplot and sample event.

Select the field “*Num. Transects*” in the **Num. Transects** text box and the field “*Num. Pts./Tran.*” in the **Num. Quad./Num. Pts./Tran. Len.** textbox. When you calculate the number of subsamples the total number of points sampled is calculated by multiplying the number of transects by the number of points per transect.

Date	Monitoring Status	Status Order	MacroPlot Name	Species Symbol	Visited	NumTran	TranLen	NumPtsTran	Index	Transect	Point	Tape	Order	Height	Status	Co
10/15/2001	PreTreatmentYear1	0	TESTFOREST8	FEID	True	2	50	200								
10/15/2001	PreTreatmentYear1	0	TESTFOREST8	FEID					25	1	153	38.25	1	0.02	L	
10/15/2001	PreTreatmentYear1	0	TESTFOREST8	FEID					27	1	155	38.75	1	0.1	L	
10/15/2001	PreTreatmentYear1	0	TESTFOREST8	FEID					29	1	165	41.25	1	0.19	L	
10/15/2001	PreTreatmentYear1	0	TESTFOREST8	FEID					28	1	159	39.75	1	0.12	L	
10/15/2001	PreTreatmentYear1	0	TESTFOREST8	FEID					26	1	154	38.5	1	0.26	L	
10/15/2001	PreTreatmentYear1	0	TESTFOREST8	FEID					24	1	152	38	1	0.13	L	
10/15/2001	PreTreatmentYear1	0	TESTFOREST8	FEID					40	2	154	37.5	1	0.04	L	

Query Builder and External Data Analysis Exercises

- 7.3** Calculate cover by life form on the **Grouping and Summary Calculations** tab. First, group by Macroplot, Status, Transect, Point, and Lifeform. Grouping by Transect and Point is necessary for this method in order to determine which points have multiple hits per species. Cover is calculated using only unique hits at each point. These fields are required to perform the cover calculation.

Now fill in the appropriate fields for the **Cover** calculation text boxes. Select the field “*sum_NumSubsamples*” in the **Number of Subsamples** textbox. This will give us the total number of points sampled.

The **Method Attribute (Subplot Fraction)** is optional here. It is only required if some species on a macroplot were sampled with fewer points.

Select “*RowCount*” in the **Cover Field** textbox. This field will provide the number of unique hits for a species along each transect.

Check the **Calculate Cover** checkbox and the total hits, unique hits, and cover values are added to the data grid below.

Monitoring Status	Status Order	MacroPlot Name	Preferred Lifeform	sum_NumSubsamp	RowCount	Transect	Point	Total_Hits	Unique_Hits	Cover
PreTreatment/Year1	0	TESTFOREST8	Subshrub					6	6	1.5
PreTreatment/Year1	0	TESTFOREST8	Forb/herb					18	17	4.25
PreTreatment/Year1	0	TESTFOREST8	Graminoid					25	24	6
ReMeasurement...	3	TESTFOREST8	Subshrub					24	21	5.25
ReMeasurement...	3	TESTFOREST8	Forb/herb					43	33	8.25
ReMeasurement...	3	TESTFOREST8	Graminoid					48	35	8.75
ReMeasurement...	4	TESTFOREST8	Subshrub					28	25	6.25
ReMeasurement...	4	TESTFOREST8	Forb/herb					36	32	8
ReMeasurement...	4	TESTFOREST8	Graminoid					55	44	11

Query Builder and External Data Analysis Exercises

Exercise 8: Use Query Builder to calculate frequency by species using the Cover/Frequency protocol.

In order to calculate frequency using the Cover – Frequency protocol, we must know how many quadrats were sampled for each macroplot. We can calculate the total number of quadrats sampled per macroplot by multiplying the number of transects by the number of quadrats sampled along each transect. Next we can sum the total number of quadrats in which a species occurs. We can calculate frequency by dividing the number of quadrats in which a species occurs by the total number of quadrats sampled and multiply by 100.

8.1 Select the *Cover/Frequency* protocol and method on the **Filter** tab.

The screenshot shows the FFI Query Builder interface. The 'Query' tab is active, and the 'Filter' sub-tab is selected. The 'Method' dropdown is set to 'Cover/Frequency'. The 'Macroplot' section lists 'TESTFOREST3', 'TESTFOREST11', 'TESTFOREST4', and 'TESTFOREST5'. The 'Sample Event' section has 'Min Date' and 'Max Date' set to '12/17/2007'. The 'Species' section has 'Biological not filtered', 'Nativity not filtered', and 'Concern not filtered' checked. The 'Genus' list includes Agropyron, Arclostaphylos, Festuca, Physocarpus, Symphoricarpos, Vaccinium, and Xerophyllum. The 'Lifeform' list includes Fern, Forb/herb, Graminoid, Grass-like, Lichenous, Nonvascular, Shrub, Subshrub, and Tree. The 'Lifecycle' list includes Annual, Biennial, and Perennial. The 'Picklist' is empty. The 'Project Management' sidebar is visible on the left.

Date	Monitoring Status	MacroPlot Name	Species Symbol	Visited	NumTran	TranLen	NumQuadTran	QuadLen	QuadWid	NFRatio	NFNum	Index	Transect	Quadrat	Status	NF
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5	True	5	66	5	20	20	1:25:50:100	1:2:3:4	16	2	3	L	3
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5									35	4	5	L	3
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5									33	4	4	L	4
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5									31	4	3	L	3
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5									12	2	1	L	3
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5									29	4	2	L	4
10/15/2001	PreTreatmentYear1	TESTFOREST1	PHMA5									14	5	5	L	3

Query Builder and External Data Analysis Exercises

- 8.2** Select **Monitoring Status Order** and calculate **Number of Subsamples** on the **Additional/Calculated Fields** tab. The number of subsamples is the total number of quadrats sampled for each macroplot and sample event.

Select the field “*Num. Transects*” in the **Num. Transects** text box and the field “*Num. Quad./Tran.*” in the **Num. Quad./Num. Pts./Tran. Len.** textbox. When you calculate the number of subsamples, the total number of quadrats sampled is calculated by multiplying the number of transects by the number of quadrats per transect.

Date	Monitoring Status	Status Order	MacroPlot Name	Species Symbol	Visited	NumTran	TranLen	NumQuad	QuadLen	QuadWid	NFRatio	NFNum	Index	Trans	Quad	Status
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5	True	5	66	5	20	20	1:25:50...	1:2:3:4	16	2	3	L
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5									35	4	5	L
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5									33	4	4	L
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5									31	4	3	L
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5									12	2	1	L
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5									29	4	2	L
10/15/2001	PreTreatmentYear1	0	TESTFOREST1	PHMA5									14	2	2	L

Query Builder and External Data Analysis Exercises

8.3 Calculate frequency by species on the **Grouping and Summary Calculations** tab. First, group by Macroplot, Status, and Species.

Now fill in the appropriate fields for the **Frequency** calculation text boxes. Select the field “*sum_NumSubsamples*” in the **Number of Subsamples** textbox. This will give us the total number of quadrats sampled.

Select “*RowCount*” in the **Frequency Field** textbox. This field will provide the number of quadrats in which a species occurs.

Check the **Calculate Frequency** checkbox and the frequency values are added to the data grid.

The screenshot shows the FFI Query Builder interface. The 'Grouping and Summary Calculations' tab is active. The configuration area shows the following settings:

- Macroplot Group By:** Macro Plot (checked)
- Method Fields to Group By:** Visited, Num. Transects, Tran. Length, Num. Quad./Tran., Quad. Length, Quad. Width, NRF Subplot Ratio, NRF Subplot Numbers
- Method Attributes:** Index, Transect, Quadrat, Item Code, Status, NRF, Type Cov., Cover, Height, Comment, UV1, UV2, UV3
- Species Attributes:** Nothing, Species (selected), Genus, Family, Lifecycle, Plant / Not Plant, Nativity, Lifeform+Nativity
- Method Fields to Sum:** Num. Transects, Tran. Length, Num. Quad./Tran., Quad. Length, Quad. Width
- Method Attributes:** Transect, Quadrat, NRF, Cover, Height
- Calculations:** Calculate Frequency (checked), Number of Subsamples (sum_NumSubsamples), Frequency Field (RowCount)

The data grid at the bottom shows the following data:

Monitoring Status	Status Order	MacroPlot Name	Species Symbol	sum_NumSubsamples	RowCount	Frequency
PreTreatmentYear1	0	TESTFOREST3	PHMA5		5	20
PreTreatmentYear1	0	TESTFOREST3	FEID		10	40
PreTreatmentYear1	0	TESTFOREST3	AGSP		15	60
PreTreatmentYear1	0	TESTFOREST3	XETE		20	80
ReMeasurement...	3	TESTFOREST3	PHMA5		5	20
ReMeasurement...	3	TESTFOREST3	FEID		10	40
ReMeasurement...	3	TESTFOREST3	AGSP		15	60
ReMeasurement...	3	TESTFOREST3	XETE		20	80

Query Builder and External Data Analysis Exercises

Part 3: External Data Analysis

Exercise 9: Import the Query Builder results for seedling density by status (live / dead) and view an analysis report and graph.

- 9.1** Open the CSV file from the Query Builder results in Excel and save it in an Excel spreadsheet format (.xls).
- 9.2** Import the Excel spreadsheet into the External Data Analysis tool. Open the spreadsheet and select the worksheet.
- 9.3** Select the Analysis Variables.
 - Strata = Status
 - Monitoring Status Order = Status Order
 - Monitoring Status = Monitoring Status
 - Macroplot = MacroPlot Name
 - Data Attribute = Density_acres
- 9.4** Type in the Report Headers.
 - Project Unit = Test
 - Summary Report = Trees - Seedlings
 - Report Attribute = Density
 - Units of Measure = Seedlings per acre
- 9.5** Select the Analysis Settings.
 - Statistical Analysis
 - Parametric
 - Alpha Value = 0.5
 - Precision = 1.0

Query Builder and External Data Analysis Exercises

External Data Analysis Settings

Toolbox Details

File: Analysis

File Name: Trees - Seedlings_Density.xls

Worksheet: Trees - Seedlings_Density\$

Analysis Variables

Strata (Optional): Status

Monitoring Status Order: Status Order

Monitoring Status: Monitoring Status

Macroplot: MacroPlot Name

Data Attribute: Density_acres

Report Headers

Project Unit: Test

Summary Report: Trees - Seedlings

Report Attribute: Density

Units of Measure: Seedlings per acre

Species (Optional):

Settings

Statistics Options

Descriptive Statistics

Statistical Analysis

Alpha Value

.05 .10 .20

Precision

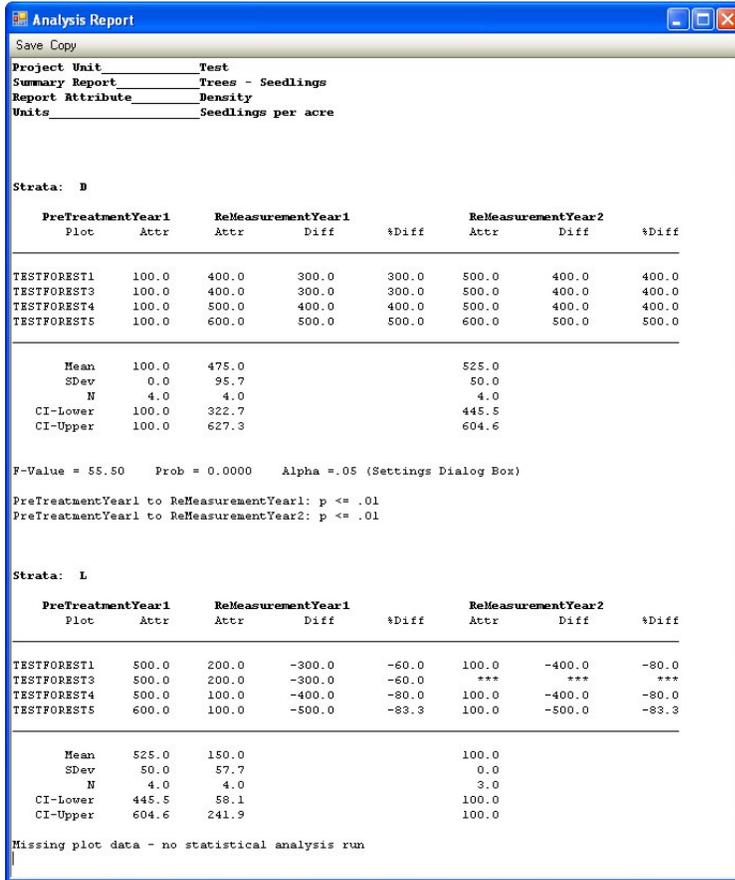
1 1.0 1.00

Excel Spreadsheet Data

MacroPlot Name	MacroPlot	Monitoring Status	Status Order	Status	sum_Count	RowCount	Density_acres
TESTFOREST1	03a514a...	PreTreatmentYear1	0	D	1	1	100
TESTFOREST1	03a514a...	PreTreatmentYear1	0	L	5	3	500
TESTFOREST1	03a514a...	ReMeasurement...	3	D	4	2	400
TESTFOREST1	03a514a...	ReMeasurement...	3	L	2	1	200
TESTFOREST1	03a514a...	ReMeasurement...	4	D	5	3	500
TESTFOREST1	03a514a...	ReMeasurement...	4	L	1	1	100
TESTFOREST5	21471a...	PreTreatmentYear1	0	D	1	1	100
TESTFOREST5	21471a...	PreTreatmentYear1	0	L	6	3	600
TESTFOREST5	21471a...	ReMeasurement...	3	D	6	3	600
TESTFOREST5	21471a...	ReMeasurement...	3	L	1	1	100
TESTFOREST5	21471a...	ReMeasurement...	4	D	6	3	600
TESTFOREST5	21471a...	ReMeasurement...	4	L	1	1	100
TESTFOREST4	65aaf5h	PreTreatmentYear1	0	D	1	1	100

Query Builder and External Data Analysis Exercises

9.6 View the Analysis Report.



9.7 View the Analysis Graph.

