

FOREST GROWTH ORGANIZATION OF WESTERN CANADA

Forestry Toolbox Excel Add-in User's Guide

September 2021

Prepared By:
THEXLWIZ CONSULTING LTD.

Acknowledgements

I would like to express my sincere gratitude to the members of the Forest Growth Organization of Western Canada for the financial support of this project. I would like to offer my special thanks to Yanguo Qin, Senior Analyst at FORCORP for the thorough, independent numerical testing of the embedded forestry functions.

Table of Contents

1.	INTRODUCTION.....	1
2.	INSTALLATION	3
2.1	SAVE THE FILE	3
2.2	UNBLOCK THE FILE	3
2.3	OPTION 1: MANUALLY OPENING THE ADD-IN FOR SINGLE USE	4
2.4	OPTION 2: INSTALLING THE ADD-IN IN EXCEL (ALWAYS ACTIVE WHEN EXCEL IS OPEN).....	4
3.	ADD-IN FUNCTIONALITY.....	8
4.	FULL LIST OF FTBX FUNCTIONS	11
	APPENDIX I – EXAMPLE OF A CRUISE COMPILER.....	20
	APPENDIX II – EXAMPLE OF A SITE INDEX LOOKUP TABLE.....	23

List of Tables

Table 4-1. AVI Base 10 Stratum.....	11
Table 4-2. AVI Timber Productivity Rating.....	11
Table 4-3. Above-Ground Biomass	12
Table 4-4. Conifer or Deciduous Species	12
Table 4-5. Calculate Tree DBH from Tree Height.....	12
Table 4-6. Calculate Diameter Inside Bark at a Specified Height.....	13
Table 4-7. Calculate Tree Age from GYPSY	13
Table 4-8. Calculate Site Index from GYPSY	13
Table 4-9. Calculate Top Height from GYPSY	14
Table 4-10. Calculate Tree Height from Tree DBH.....	14
Table 4-11. Calculate Height from Site Index based on LFS 1997 models.....	15
Table 4-12. Calculate Site Index from Height based on LFS 1997 models.....	15
Table 4-13. Calculate Merchantable Tree Height	16
Table 4-14. Calculate Merchantable Tree Volume to a Specified Utilization	16
Table 4-15. Lookup Natural Subregion Code from ATS Township (Provincial 1994).....	17
Table 4-16. Lookup Numeric Natural Subregion Code	17
Table 4-17. Calculate Tree Expansion Factor for Fixed Area Plots	17
Table 4-18. Calculate Tree Expansion Factor for Prism (Variable Radius) Plots.....	17
Table 4-19. Calculate Quadratic Mean DBH	18
Table 4-20. Calculate Site Index from Growth Intercept	18
Table 4-21. Calculate Stump Diameter Over Bark	18
Table 4-22. Calculate Total Tree Volume	19
Table 4-23. Calculate Tree Basal Area.....	19

List of Figures

Figure 2-1. File Right-Click Menu	3
Figure 2-2. File Properties Window	4
Figure 2-3. Add-in Installation in Excel.....	5
Figure 2-4. Excel Options Add-Ins Window.....	5
Figure 2-5. Browse for the FTBX Add-in.....	6
Figure 2-6. FTBX Add-in Installation.....	6
Figure 2-7. FTBX Ribbon Menu	7
Figure 3-8. FTBX About Action Button	8
Figure 3-9. FTBX Worksheet Functions.....	9
Figure 3-10. Example Use of an FTBX Worksheet Function.....	10

1. Introduction

The Forestry Toolbox (FTBX) is a Microsoft Excel [™] add-in that works on Excel 2010 and newer versions including both the 32-bit and 64-bit installations of Office. This document provides a summary of the installation steps and general usage of the FTBX add-in.

2. Installation

Excel add-ins are “mini-applications” that provide Excel with enhanced functionality and automation features¹. Excel add-ins are typically Excel files saved with an .xlam or .xla file extension. They can be opened for single use or installed to ensure the features and functionality are always available.

2.1 Save the File

Save the FTBX add-in file in a location on your computer that is always accessible. There is an official add-in folder (C:\Users\[user_name]\AppData\Roaming\Microsoft\AddIns), however there is no need to use this folder; any folder will do. Some users may just want to add a folder called FTBX to their Desktop and save the add-in file in that folder.

2.2 Unblock the File

If the add-in file was saved from the internet/email, there is an extra step to permit access to the file. Right-click on the FTBX add-in file and select Properties from the menu as shown in Figure 2-1.

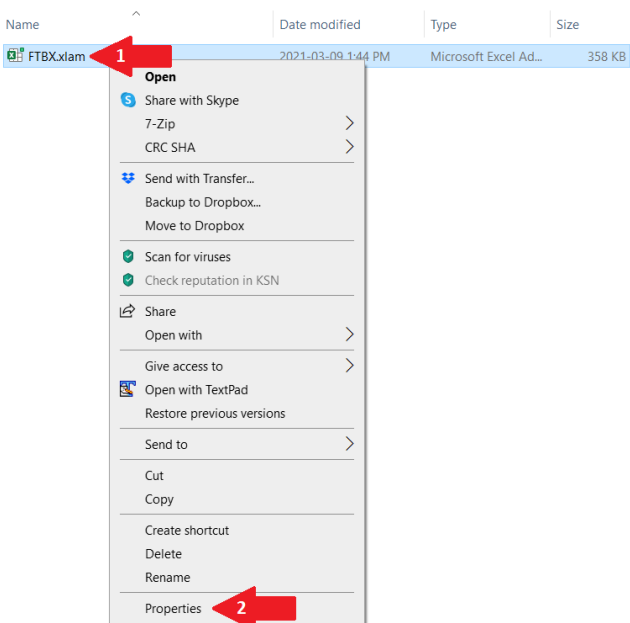


Figure 2-1. File Right-Click Menu

¹ Instructions for Excel add-in installation were tailored based on <https://exceloffthegrid.com/install-uninstall-excel-add/>. See link for further details.

From the File Properties window unblock the file and click OK as shown in Figure 2-2.

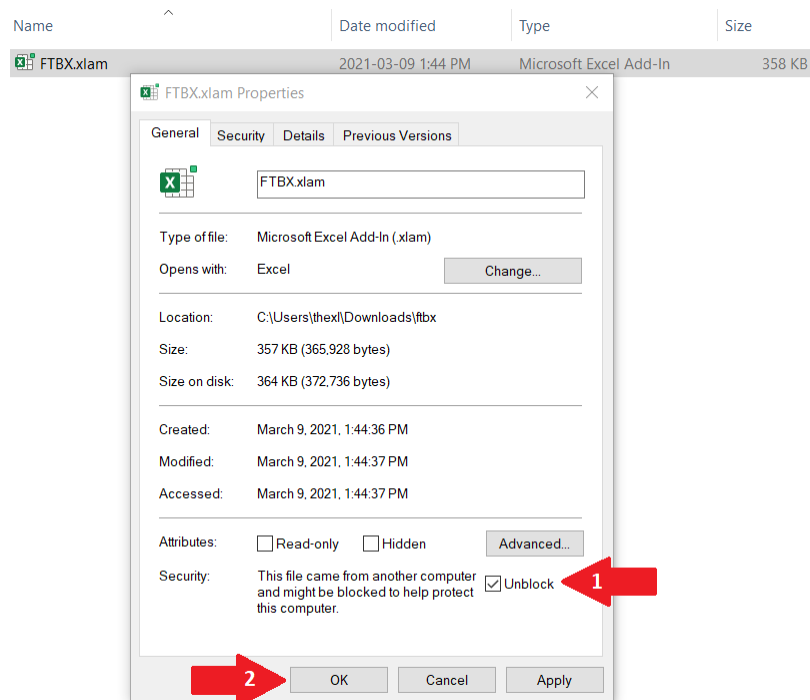


Figure 2-2. File Properties Window

2.3 Option 1: Manually opening the add-in for single use

In order to use an add-in, it is not essential to install it. Opening the file as a standard Excel file will enable the use of the add-in while that session of Excel remains open. The next time Excel opens, the add-in will not be available automatically, it will need to be manually opened again. No registration/installation is required, but other files that reference the FTBX add-in embedded worksheet functions will not work, unless the FTBX add-in is also open in the same Excel session.

2.4 Option 2: Installing the add-in in Excel (always active when Excel is open)

Open Excel. From the Excel Ribbon click *File* -> *Options* (Figure 2-3).

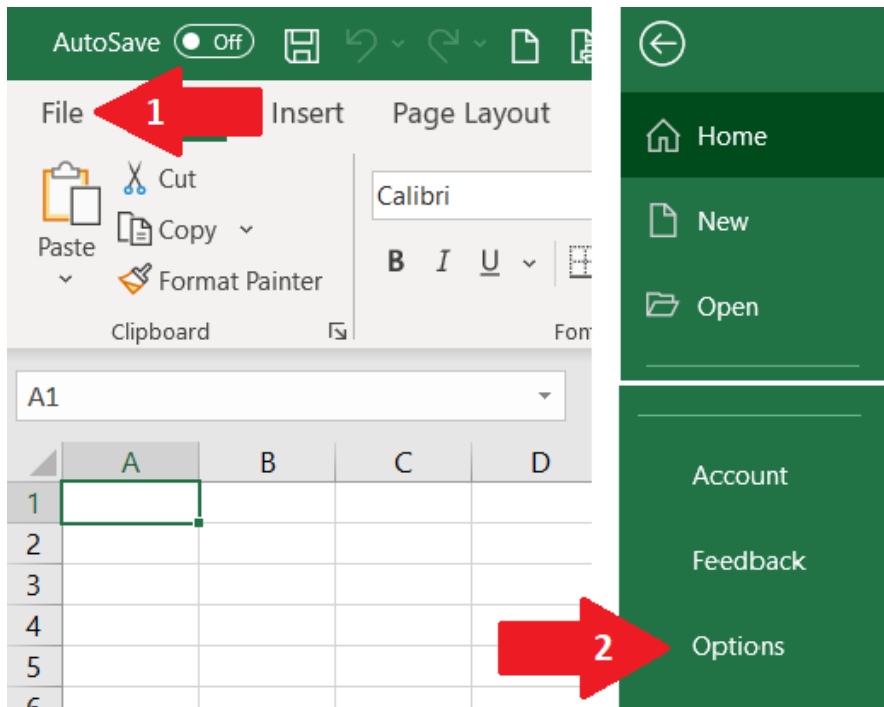


Figure 2-3. Add-in Installation in Excel

Select Add-ins from the Excel Options window. The main window will change to show a list of active and inactive add-ins. At the bottom of this window select Excel Add-ins and click Go... as shown in Figure 2-4.

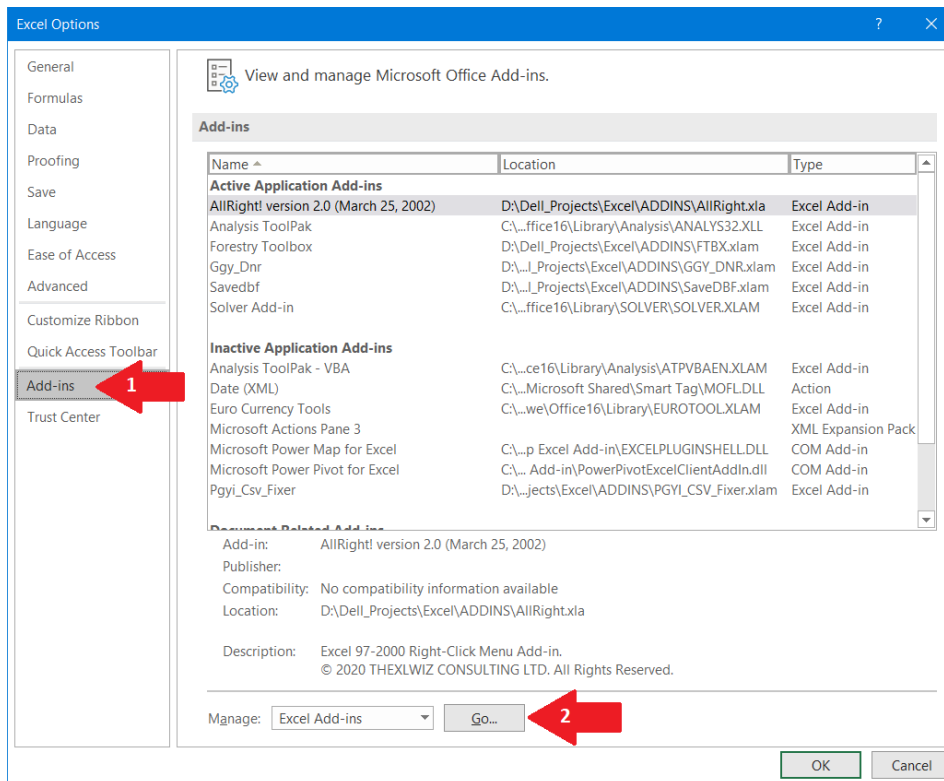


Figure 2-4. Excel Options Add-Ins Window

Click Browse... and select the FTBX.XLAM file from the folder where it was copied (Figure 2-5).

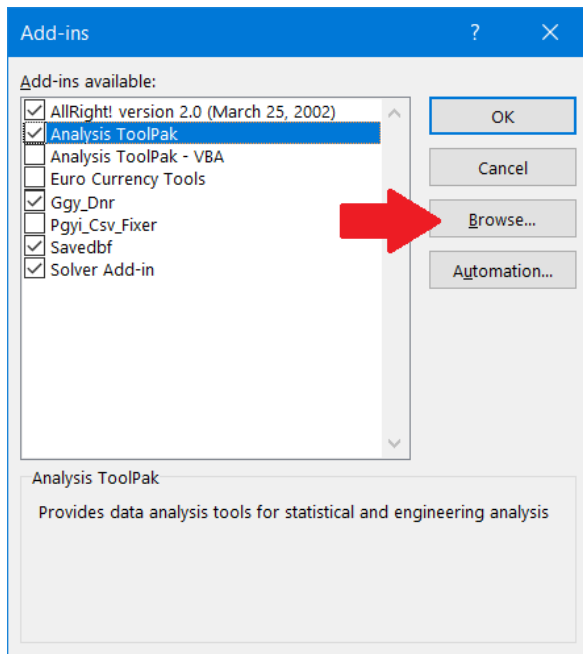


Figure 2-5. Browse for the FTBX Add-in

Once the add-in file is selected, it will show as “Forestry Toolbox” in the Add-in window with a checkbox next to it (Figure 2-6). Click OK. Now the add-in has been installed and is ready for use.

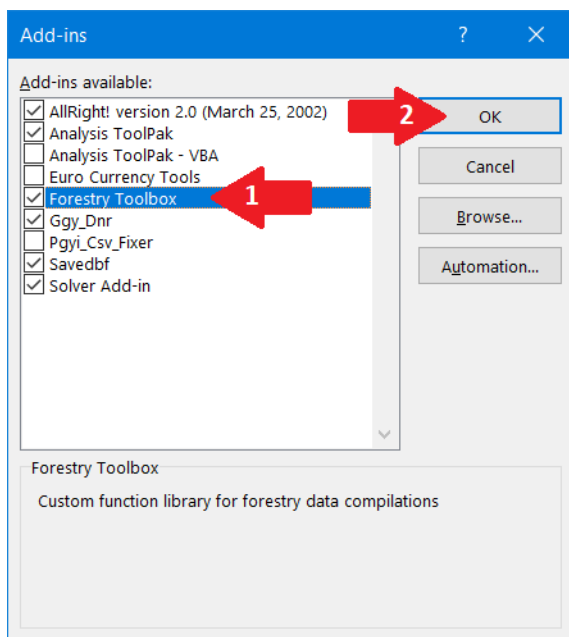


Figure 2-6. FTBX Add-in Installation

Note that if the user wishes to deactivate the add-in, they just need to follow the same steps and uncheck the box next to the Forestry Toolbox. This will keep the add-in in the system, but it will not be loaded.

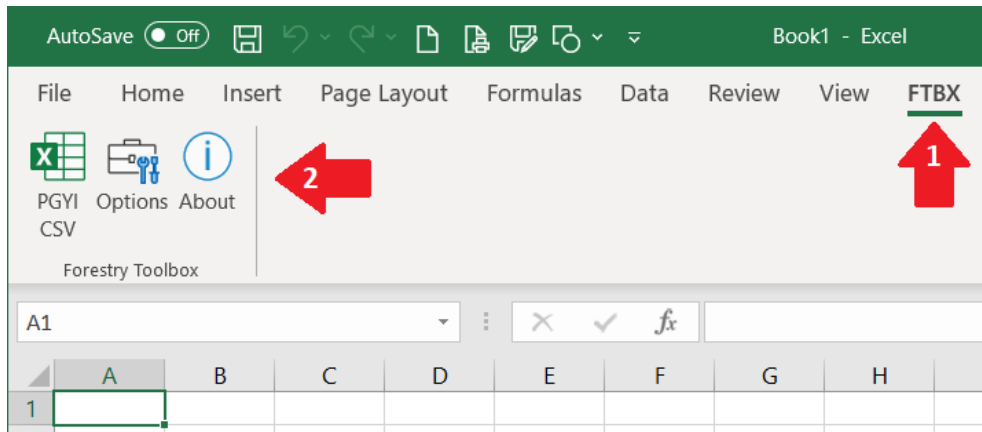


Figure 2-7. FTBX Ribbon Menu

If the Forestry Toolbox installed properly, the user will see a menu item in Excel called FTBX as shown in Figure 2-7.

3. Add-in Functionality

The Forestry Toolbox Excel add-in has two major components: Action Buttons on the Ribbon menu and an embedded library of useful forestry functions that work exactly like any other Excel worksheet function such as the SUM or VLOOKUP functions that are native to Excel.

The FTBX has its own registered menu and associated Ribbon with some Action Buttons. These buttons will carry out a set of actions to achieve a certain objective.

- PGYI CSV: will properly format a standard Provincial Growth & Yield Initiative (PGYI) CSV file. The formatting code will automatically identify the file type for the open CSV file (there are eight different formats) and let the user know if there are any column header naming issues. If no issues are found with the headers, the file will be formatted to PGYI standard.
- Options: This button is reserved for potential future implementation of user-specific profiles/setup so that individuals can define their preferences for the embedded forestry functions. For example, a user may prefer a certain default utilization limit or may want to use a custom set of FMU-specific taper coefficients).
- The About button will show information about the FTBX version and other information as shown in Figure 3-8.

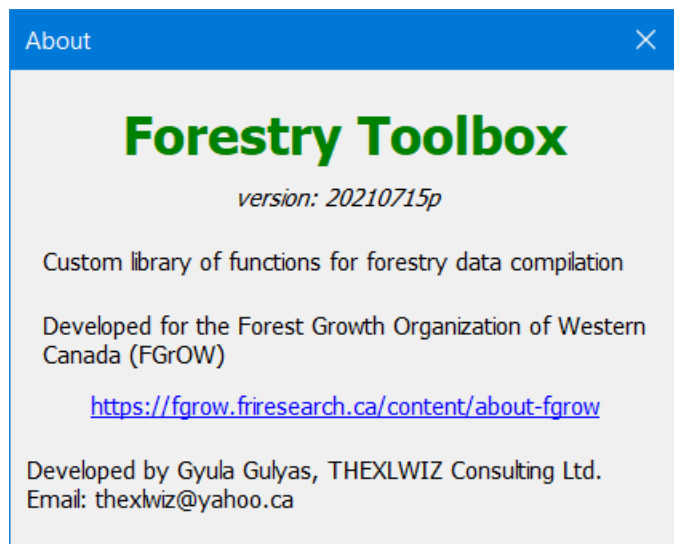


Figure 3-8. FTBX About Action Button

Several other action buttons could be added over time, such as the development of and RSA CSV file cleaner utility or a fully functional Recce Cruise Data Collection Template that also includes automatic compilation using the FTBX add-in function library, as the building block.

The Forestry Toolbox Excel add-in has functions that are commonly used in Alberta by forestry analysts. The FTBX library has over 20 functions including the GYPSY site index functions, tree volume functions, DBH-height equations and several others listed in Section 4. All functions have been independently audited for numerical accuracy.

All built-in Excel worksheet functions begin with an equal sign and include the arguments in parentheses after the function name. For example, in the function =SUM(D3:D10), the function name is SUM and the argument is the range D3:D10. The same applies to the FTBX custom functions.

The simplest way to use an Excel worksheet function is to start entering in a cell an equal sign (=) followed by the first few letters of the function we need. All FTBX add-in functions start with the prefix "ftbx_" which will pull up all associated functions in the FTBX library as shown in Figure 3-9. Scrolling down the list, the user can select a function and click the (fx) button to enter function arguments.

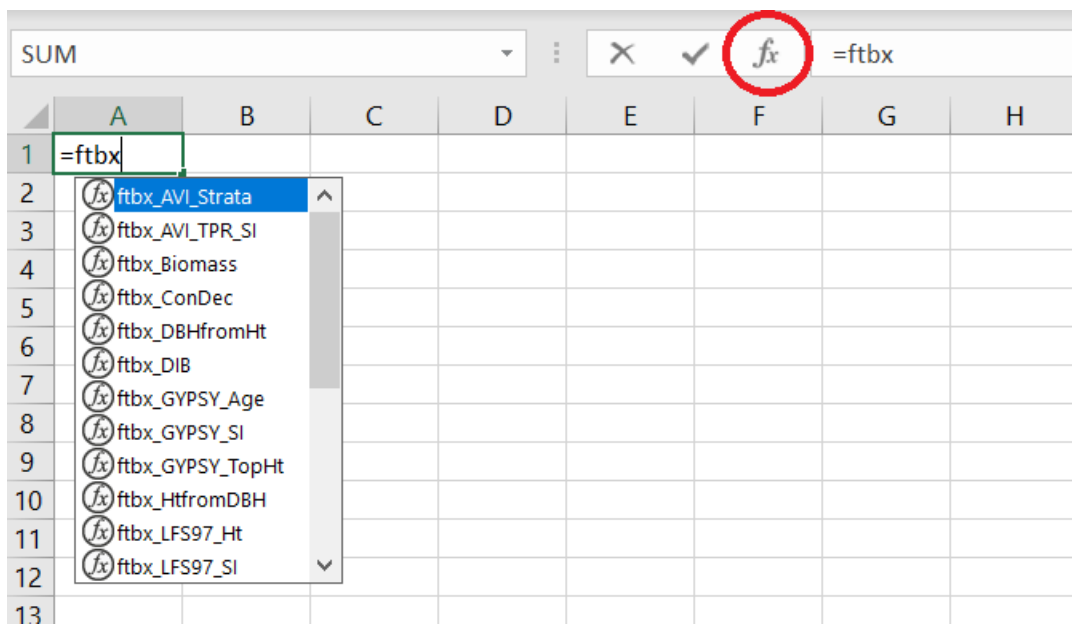


Figure 3-9. FTBX Worksheet Functions

In Figure 3-10, we calculate the merchantable height of a tree using the ftbx_MerchHeight() function which takes several arguments.

After selecting the function from the list and clicking the (fx) button, the user will be able to enter the function arguments. These arguments can be cell references to a value (e.g., DBH in cm is in cell C2) or a hard-coded number such as the top diameter inside bark (Dib_cm=10). The formula result will show on the bottom of the window and will be shown in the cell after the user clicks OK.

All function arguments have a description and the expected unit for numeric values. The description of what the function returns is also given. In our example, the function takes 5 arguments (species, natural subregion number, DBH in cm, height in m and the target top diameter inside bark in cm) and returns the merchantable height in meters using the official species-natural subregion specific taper coefficients for Alberta (Figure 3-10).

FGROW FORESTRY TOOLBOX USER'S GUIDE

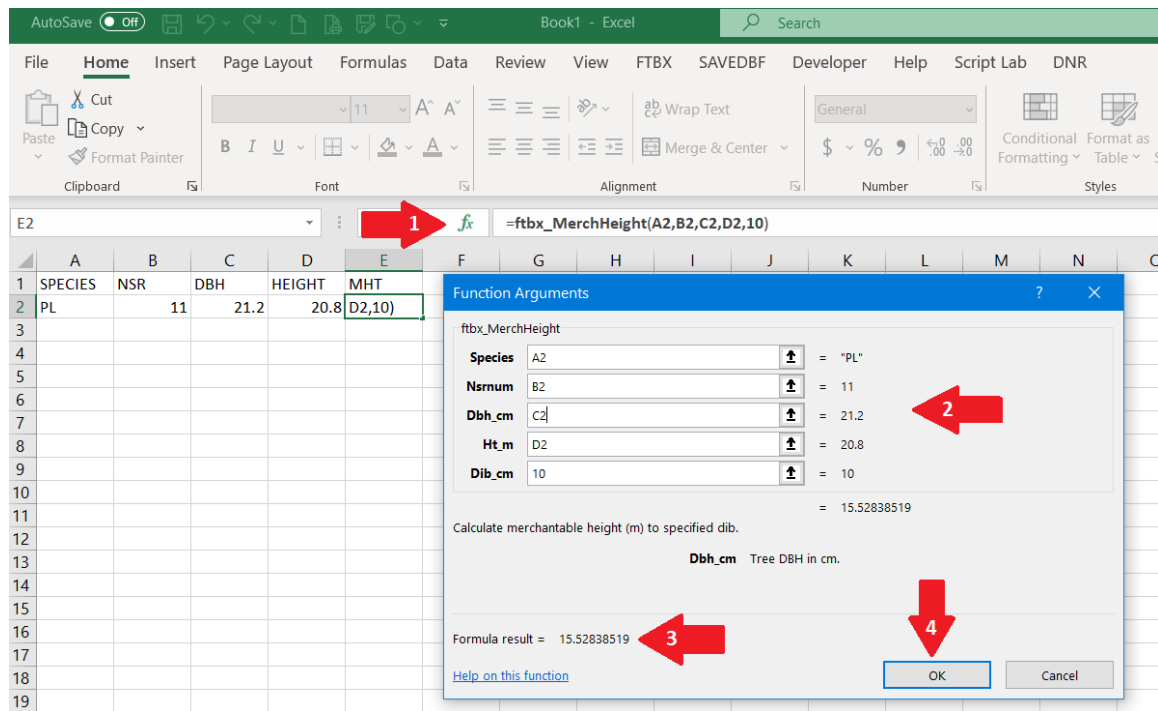


Figure 3-10. Example Use of an FTBX Worksheet Function

Some functions may take optional arguments (always identified in the description) that may be omitted by the user in which case the default values are used. Defaults are always provided in the argument description.

Some basic examples of using the FTBX functions as building blocks of Excel applications are given in Appendix I and Appendix II.

4. Full List of FTBX Functions

Table 4-1. AVI Base 10 Stratum

Function Name	ftbx_AVI_Strata
Description	Calculate Base 10 Strata from AVI (e.g. C-SB or Sb)
sp1	Species 1.
sp1p	Species 1 percent.
sp2	Species 2.
sp2p	Species 2 percent.
sp3	Species 3.
sp3p	Species 3 percent.
sp4	Species 4.
sp4p	Species 4 percent.
sp5	Species 5.
sp5p	Species 5 percent.
ndx	Optional ndx: 1-BCG Type (default), 2-Regen Codes.
Reference	Alberta Sustainable Resource Development. 2006. Alberta Forest Management Planning Standard. Version 4.1, April 2006. Alberta Sustainable Resource Development, Public Lands and Forest Division, Forest Management Branch. 114 p.

Table 4-2. AVI Timber Productivity Rating

Function Name	ftbx_AVI_TPR_SI
Description	Calculate AVI 2.1 TPR or site index based on interpreted stand height and age at photo year.
sp1	AVI leading species: two-letter species code.
origin	Stand origin year.
photo_ht	AVI stand height in m.
photo_yr	AVI photo year.
ndx	Optional ndx: 1-TPR class (default), 2-Site index BH in m.
Reference	Alberta Forestry, Lands and Wildlife. 1991. Alberta Vegetation Inventory Standards Manual Version 2.1. Land Information Services Division, Resource Information Branch. Edmonton, AB. 53 p.

Table 4-3. Above-Ground Biomass

Function Name	ftbx_Biomass
Description	Calculate the whole tree above ground biomass (with foliage) dry weight in kg (take half for carbon).
species	Two-letter Alberta species code.
totvol	Total biological (0/0) tree volume in m ³ .
Reference	Singh, T. 1982. Biomass equations for ten major tree species of the prairie provinces. Environ. Can., Can. For. Serv., North. For. Res. Cent. Edmonton, Alberta. Inf. Rep. NOR-X-242.

Table 4-4. Conifer or Deciduous Species

Function Name	ftbx_ConDec
Description	Return (C)onifer or (D)eciduous for species group from species code.
species	Two-letter Alberta species code.
Reference	Alberta Forestry, Lands and Wildlife. 1991. Alberta Vegetation Inventory Standards Manual Version 2.1. Land Information Services Division, Resource Information Branch. Edmonton, AB. 53 p.

Table 4-5. Calculate Tree DBH from Tree Height

Function Name	ftbx_DBHfromHt
Description	Calculate tree DBH in cm.
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-20).
ht_m	Tree height in m.
Reference	Huang, S. 2016. Population and Plot-Specific Tree Diameter and Height Prediction Models for Major Alberta Tree Species. Report #1. Individual Tree Diameter Prediction Models from Tree Height. Technical Report Pub. No.: T/606. Alberta Agriculture and Forestry. Edmonton, AB. 60 p.

Table 4-6. Calculate Diameter Inside Bark at a Specified Height

Function Name	ftbx_DIB
Description	Calculate diameter inside bark (cm) at a specified height.
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-20).
dbh_cm	Tree DBH in cm.
ht_m	Total tree height in m.
hi_m	Specified height in m.
Reference	Huang, S. 1994. Ecologically based Individual Tree Volume Estimation for Major Alberta Tree Species: Report #1 Methods of Formulation and Statistical Functions. Alberta Environmental Protection, Land and Forest Service, Forest Mngmt. Division. Tech. Rep. Pub. No. T/288. 80 p.

Table 4-7. Calculate Tree Age from GYPSY

Function Name	ftbx_GYPSY_Age
Description	Calculate age from GYPSY model.
species	Two-letter Alberta species code.
topht	Top height in m.
sibh	Site index BH in m.
ndx	Optional ndx: 1-Total age in years(default), 2-BH age in years.
Reference	Huang, S., S.X. Meng and Y. Yang. 2009. A Growth and Yield Projection System (GYPSY) for Natural and Post-Harvest Stands in Alberta. Alberta Sustainable Resource Development, Forest Management Branch. Tech. Rep. Pub. No. T/216. Edmonton, AB. 22 p.

Table 4-8. Calculate Site Index from GYPSY

Function Name	ftbx_GYPSY_SI
Description	Calculate site index in m from GYPSY model.
species	Two-letter Alberta species code.
topht	Top height in m.
age	Tree age in years.
agetype	Tree age type: T-total, B-breast height, S - stump.
ndx	Optional ndx: 1-Sltot, 2-Sibh (default), 3-Yrs to BH, 4-Yrs to SH.
Reference	Huang, S., S.X. Meng and Y. Yang. 2009. A Growth and Yield Projection System (GYPSY) for Natural and Post-Harvest Stands in Alberta. Alberta Sustainable Resource Development, Forest Management Branch. Tech. Rep. Pub. No. T/216. Edmonton, AB. 22 p.

Table 4-9. Calculate Top Height from GYPSY

Function Name	ftbx_GYPSY_TopHt
Description	Calculate top height in m from GYPSY model.
species	Two-letter Alberta species code.
si	SI in m.
sitype	SI Type: B-BH, T-Total.
age	Tree age in years.
agetype	Tree age type: T-total, B-breast height, S - stump.
ndx	Optional ndx: 1-TopHt in m (default), 2-SI other, 3-Yrs to BH, 4-Yrs to SH.
Reference	Huang, S., S.X. Meng and Y. Yang. 2009. A Growth and Yield Projection System (GYPSY) for Natural and Post-Harvest Stands in Alberta. Alberta Sustainable Resource Development, Forest Management Branch. Tech. Rep. Pub. No. T/216. Edmonton, AB. 22 p.

Table 4-10. Calculate Tree Height from Tree DBH

Function Name	ftbx_HtfromDBH
Description	Calculate tree height in m.
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-20).
dbh_cm	Tree DBH in cm.
Reference	Huang, S., Y. Yang and D. Aitkin. 2016. Population and Plot-Specific Tree Diameter and Height Prediction Models for Major Alberta Tree Species. Report #4. Updated Population and Plot-Specific Individual Tree Height-Diameter Models for Major Alberta Tree Species. Technical Report Pub. No.: T/609. Alberta Agriculture and Forestry. Edmonton, AB. 76 p.

Table 4-11. Calculate Height from Site Index based on LFS 1997 models

Function Name	ftbx_LFS97_Ht
Description	Calculate height in m based on the LFS 1997 model.
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-16).
sibh	Site index BH in m.
age	Age in years.
agetype	Age type: T-total, B-breast height.
Reference	Huang, S.; Titus, S.J.; Morgan, D.J. 1997. A Compatible Height-Site Index-Age Model for Young and Mature Aspen Based on Natural Subregions; Forest Management Research Note; Alberta Environmental Protection Land and Forest Service: Edmonton, Alberta, Canada. Publication No. T/355.

Table 4-12. Calculate Site Index from Height based on LFS 1997 models

Function Name	ftbx_LFS97_SI
Description	Calculate site index BH in m based on the LFS 1997 model.
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-16).
ht_m	Height in m.
age	Age in years.
agetype	Age type: T-total, B-breast height.
Reference	Huang, S. 1997. A Subregion-Based Compatible Height-Site Index-Age Model for Young and Mature White Spruce in Alberta; Forest Management Research Note; Alberta Environmental Protection Land and Forest Service: Edmonton, Alberta, Canada. Publication NO. T/354.

Table 4-13. Calculate Merchantable Tree Height

Function Name	ftbx_MerchHeight
Description	Calculate merchantable height (m) to specified diameter inside bark.
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-20).
dbh_cm	Tree DBH in cm.
ht_m	Total tree height in m.
dib_cm	Specified diameter inside bark in cm.
Reference	Huang, S. 1994. Ecologically based Individual Tree Volume Estimation for Major Alberta Tree Species: Report #1 Methods of Formulation and Statistical Functions. Alberta Environmental Protection, Land and Forest Service, Forest Mngmt. Division. Tech. Rep. Pub. No. T/288. 80 p.

Table 4-14. Calculate Merchantable Tree Volume to a Specified Utilization

Function Name	ftbx_MerchVol
Description	Calculate gross merchantable tree volume to a specified utilization (tree-length) in m ³ .
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-20).
dbh_cm	Tree DBH in cm.
ht_m	Total tree height in m.
stumpdob_cm	Optional: Minimum stump DOB in cm. Default 15 cm.
topdib_cm	Optional: Top DIB in cm. Default 10 cm.
stumpht_cm	Optional: Stump height in cm. Default 30 cm.
minml_m	Optional: Minimum merchantable length. Default 3.66 m.
Reference	Huang, S. 1994. Ecologically based Individual Tree Volume Estimation for Major Alberta Tree Species: Report #1 Methods of Formulation and Statistical Functions. Alberta Environmental Protection, Land and Forest Service, Forest Management. Division. Tech. Rep. Pub. No. T/288. 80 p.

Table 4-15. Lookup Natural Subregion Code from ATS Township (Provincial 1994)

Function Name	ftbx_NSR1994
Description	Lookup numeric code for Alberta Natural Subregion 1994 provincial coverage.
mer	ATS - Meridian (4, 5 or 6).
rge	ATS - Range (1-30).
twp	ATS - Township (1-126).
Reference	Cosmin Tansanu, Alberta Agriculture and Forestry

Table 4-16. Lookup Numeric Natural Subregion Code

Function Name	ftbx_NSRNumber
Description	Lookup numeric code for Alberta Natural Subregion.
nsrcode	NatSubReg 2- or 3-letter code.
Reference	Alberta Agriculture and Forestry. 2015. Provincial Growth and Yield Initiative: Minimum Standards and Suggested Protocol and Priorities for Establishing and Measuring Permanent Sample Plots in Alberta. Alberta Agriculture and Forestry and Forest Growth Organization of Western Canada, July 2015, 53 p.

Table 4-17. Calculate Tree Expansion Factor for Fixed Area Plots

Function Name	ftbx_PHF_Fixed
Description	Calculate Tree Per Hectare Factor for fixed area plots.
area_m2	Plot area in sq. meters.
Reference	N/A

Table 4-18. Calculate Tree Expansion Factor for Prism (Variable Radius) Plots

Function Name	ftbx_PHF_Prism
Description	Calculate Tree Per Hectare Factor for prism plots.
dbh_cm	Tree DBH in cm.
baf	Prism basal area factor (BAF).
ishalf	Optional ishalf: False - plot is a full plot (default), True - plot is a half plot.
Reference	N/A

Table 4-19. Calculate Quadratic Mean DBH

Function Name	ftbx_QMD
Description	Calculate the quadratic mean DBH in cm.
baha	Basal area in sq. meters per ha.
stemha	Stems per hectare.
Reference	N/A

Table 4-20. Calculate Site Index from Growth Intercept

Function Name	ftbx_SlfromGI
Description	Calculate site index from 5-year GI above 1.3 m.
species	Two-letter species code (PL, SW or AW).
totgi_5yr_m	Total GI length of 5 years above BH in m.
Reference	Huang, S. 1996. Interim growth intercept models for predicting site index in young spruce, pine and aspen stands. Pub. No.: T/338. Land and Forest Service, Forest Management Division. Edmonton, Alberta. 15 p.

Table 4-21. Calculate Stump Diameter Over Bark

Function Name	ftbx_StumpDOB
Description	Calculate stump diameter (cm) outside bark.
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-20).
dbh_cm	Tree DBH in cm.
ht_m	Total tree height in m.
stumpht_cm	Stump height in cm.
Reference	Huang, S. 1994. Ecologically based Individual Tree Volume Estimation for Major Alberta Tree Species: Report #1 Methods of Formulation and Statistical Functions. Alberta Environmental Protection, Land and Forest Service, Forest Mngmt. Division. Tech. Rep. Pub. No. T/288. 80 p.

Table 4-22. Calculate Total Tree Volume

Function Name	ftbx_TotVol
Description	Calculate gross total biological tree volume in m ³ .
species	Two-letter Alberta species code.
nsrnum	Natural subregion number (0-20).
dbh_cm	Tree DBH in cm.
ht_m	Total tree height in m.
Reference	Huang, S. 1994. Ecologically based Individual Tree Volume Estimation for Major Alberta Tree Species: Report #1 Methods of Formulation and Statistical Functions. Alberta Environmental Protection, Land and Forest Service, Forest Mngmt. Division. Tech. Rep. Pub. No. T/288. 80 p.

Table 4-23. Calculate Tree Basal Area

Function Name	ftbx_TreeBA
Description	Calculate the tree basal area in m ² .
dbh_cm	Diameter at breast height in cm.
Reference	N/A

Appendix I – Example of a Cruise Compiler

FGROW || FRIAA
FORESTRY TOOLBOX USER'S GUIDE

STANDID	12345
PLOT SIZE	150
NSR	11

STDOB	15
TOPDIB	12
STHT	30

NPLOTS	3
--------	---

PLOTID	TREENO	SPP	DBH	HT	PERHA	BA	GMV	BAHA	GMVHA	ISMERCH
1	1	PL	18.2	19.1	66.7	0.0260	0.188	1.73	12.51	Yes
1	2	PL	22.9	21.7	66.7	0.0412	0.372	2.75	24.83	Yes
1	3	PL	22.3	21.4	66.7	0.0391	0.346	2.60	23.10	Yes
1	4	PL	24.8	22.6	66.7	0.0483	0.460	3.22	30.66	Yes
1	5	AW	26.6	23.3	66.7	0.0556	0.495	3.70	33.03	Yes
1	6	PL	28.6	24.2	66.7	0.0642	0.658	4.28	43.88	Yes
1	7	PL	20.7	20.6	66.7	0.0337	0.281	2.24	18.71	Yes
1	8	PL	18.5	19.3	66.7	0.0269	0.198	1.79	13.22	Yes
2	1	PL	25.7	23.0	66.7	0.0519	0.504	3.46	33.61	Yes
2	2	PL	24.2	22.4	66.7	0.0460	0.432	3.07	28.77	Yes
2	3	PL	20.1	20.2	66.7	0.0317	0.257	2.12	17.15	Yes
2	4	PL	23.6	22.1	66.7	0.0437	0.404	2.92	26.92	Yes
2	5	AW	15.8	17.9	66.7	0.0196	0.089	1.31	5.96	Yes
2	6	PL	24.7	22.6	66.7	0.0479	0.455	3.19	30.35	Yes
2	7	AW	15.6	17.7	66.7	0.0191	0.083	1.27	5.51	Yes
2	8	PL	16.8	18.1	66.7	0.0222	0.140	1.48	9.32	Yes
2	9	AW	24.7	22.7	66.7	0.0479	0.411	3.19	27.38	Yes
2	10	PL	27.5	23.8	66.7	0.0594	0.598	3.96	39.84	Yes
3	1	AW	23.9	22.3	66.7	0.0449	0.377	2.99	25.13	Yes
3	2	AW	15	17.3	66.7	0.0177	0.062	1.18	4.12	Yes
3	3	AW	21.3	21.2	66.7	0.0356	0.275	2.38	18.32	Yes
3	4	AW	25	22.8	66.7	0.0491	0.424	3.27	28.24	Yes
3	5	AW	21.6	21.3	66.7	0.0366	0.286	2.44	19.07	Yes
3	6	PL	19.3	19.8	66.7	0.0293	0.227	1.95	15.15	Yes
3	7	SW	21.8	19.6	66.7	0.0373	0.257	2.49	17.16	Yes
3	8	SW	26.2	22.3	66.7	0.0539	0.446	3.59	29.71	Yes
3	9	PL	22	21.3	66.7	0.0380	0.334	2.53	22.25	Yes
3	10	PL	29.5	24.5	66.7	0.0683	0.710	4.56	47.31	Yes
3	11	PL	23.5	22.0	66.7	0.0434	0.399	2.89	26.62	Yes
3	12	PL	21.2	20.8	66.7	0.0353	0.301	2.35	20.04	Yes

Statistics for Stand: 12345					
SPECIES	MBAHA	MVHA	MSTHA	PS	QMD
ALL	27.0	232.6	666.7	2.9	22.7
PL	17.7	161.4	422.2	2.6	23.1
AW	7.2	55.6	200.0	3.6	21.5
SW	2.0	15.6	44.4	2.8	24.1

Appendix II – Example of a Site Index Lookup Table

FGROW
FORESTRY TOOLBOX USER'S GUIDE

Species **SW**

GYPSY Site Index @ BH (m)

Total Age (years)	Top Height (m)																				
	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0
10	17.7	20.0	22.0	23.8	25.5	27.0	28.4	29.7	30.9	32.1	33.2	34.3	35.3	36.3	37.2	39.0	40.7	42.3	43.8	45.2	46.6
11	16.2	18.4	20.3	22.1	23.6	25.1	26.5	27.7	28.9	30.0	31.1	32.1	33.1	34.1	35.0	36.7	38.4	39.9	41.4	42.8	44.2
12	14.9	17.0	18.8	20.5	22.0	23.5	24.8	26.0	27.2	28.2	29.3	30.3	31.3	32.2	33.1	34.8	36.4	37.9	39.3	40.7	42.1
13	13.7	15.8	17.5	19.2	20.6	22.0	23.3	24.5	25.6	26.7	27.7	28.7	29.6	30.5	31.4	33.0	34.6	36.1	37.5	38.9	40.2
14	12.8	14.7	16.4	18.0	19.4	20.7	22.0	23.1	24.2	25.3	26.3	27.2	28.1	29.0	29.9	31.5	33.0	34.5	35.9	37.2	38.5
15	11.9	13.7	15.4	16.9	18.3	19.6	20.8	21.9	23.0	24.0	25.0	25.9	26.8	27.7	28.5	30.1	31.6	33.1	34.4	35.7	37.0
16	11.1	12.9	14.5	16.0	17.3	18.6	19.7	20.8	21.9	22.9	23.8	24.8	25.6	26.5	27.3	28.9	30.3	31.8	33.1	34.4	35.7
17	10.5	12.2	13.7	15.1	16.4	17.6	18.8	19.9	20.9	21.9	22.8	23.7	24.5	25.4	26.2	27.7	29.2	30.6	31.9	33.2	34.4
18	9.9	11.5	13.0	14.3	15.6	16.8	17.9	19.0	20.0	20.9	21.8	22.7	23.6	24.4	25.2	26.7	28.1	29.5	30.8	32.1	33.3
19	9.3	10.9	12.3	13.6	14.9	16.0	17.1	18.1	19.1	20.0	20.9	21.8	22.6	23.4	24.2	25.7	27.1	28.5	29.8	31.0	32.3
20	8.9	10.4	11.7	13.0	14.2	15.3	16.4	17.4	18.3	19.3	20.1	21.0	21.8	22.6	23.4	24.8	26.2	27.6	28.8	30.1	31.3
21	8.4	9.9	11.2	12.4	13.6	14.7	15.7	16.7	17.6	18.5	19.4	20.2	21.0	21.8	22.6	24.0	25.4	26.7	28.0	29.2	30.4
22	8.1	9.4	10.7	11.9	13.0	14.1	15.1	16.0	16.9	17.8	18.7	19.5	20.3	21.1	21.8	23.2	24.6	25.9	27.2	28.4	29.5
23	7.7	9.0	10.2	11.4	12.5	13.5	14.5	15.4	16.3	17.2	18.0	18.8	19.6	20.4	21.1	22.5	23.9	25.1	26.4	27.6	28.8
24	7.4	8.6	9.8	10.9	12.0	13.0	13.9	14.9	15.7	16.6	17.4	18.2	19.0	19.7	20.4	21.8	23.2	24.4	25.7	26.9	28.0
25	7.1	8.3	9.4	10.5	11.5	12.5	13.4	14.3	15.2	16.0	16.8	17.6	18.4	19.1	19.8	21.2	22.5	23.8	25.0	26.2	27.3
26	6.8	8.0	9.1	10.1	11.1	12.1	13.0	13.9	14.7	15.5	16.3	17.1	17.8	18.5	19.2	20.6	21.9	23.1	24.3	25.5	26.7
27	6.6	7.7	8.7	9.8	10.7	11.7	12.5	13.4	14.2	15.0	15.8	16.6	17.3	18.0	18.7	20.0	21.3	22.5	23.7	24.9	26.0
28	6.3	7.4	8.4	9.4	10.4	11.3	12.1	13.0	13.8	14.6	15.3	16.1	16.8	17.5	18.2	19.5	20.8	22.0	23.2	24.3	25.4
29	6.1	7.2	8.2	9.1	10.0	10.9	11.8	12.6	13.4	14.1	14.9	15.6	16.3	17.0	17.7	19.0	20.2	21.4	22.6	23.8	24.9
30	5.9	6.9	7.9	8.8	9.7	10.6	11.4	12.2	13.0	13.7	14.5	15.2	15.9	16.5	17.2	18.5	19.7	20.9	22.1	23.2	24.3

For additional information, please contact:

Brian Roth, *PhD*

Director

Forest Growth Organization of Western Canada

1176 Switzer Drive

Hinton, Alberta

T7V 1V3

Telephone : (780) 709-1393

Email : brian.roth@friresearch.ca