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 We are still developing and optimizing this protocol

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Post Processing: Abundance and Distribution of Species in Open Vegetation Plots

Sabine St-Jean¹

¹Université de Sherbrooke

Canadian Airborne Biodiversity Observatory

Tech. support email: jocelyne.ayotte@umontreal.ca

Sabine St-Jean

Université de Sherbrooke

ABSTRACT

Here we describe the standardised protocol used by the [Canadian Airborne Biodiversity Observatory](#) (CABO) to obtain an estimation of the abundance and distribution of plant species surveyed in the open vegetation plots in sites where small drone pictures are taken using the DJI Mavic Air, being Mer Bleue Bog (Ontario) and Parc national des Îles-de-Boucherville (Québec) in 2019. The *SamplePoint* program is used to process the small drone pictures, where a virtual point frame grid is overlapped to the subplot pictures. The grid is made of 100 crosshairs, representing one crosshair every 10 cm. Every crosshair is then associated to a ground cover. This process results in an Excel spreadsheet where we can extract a percent cover for each species (measure of abundance), and see for each of the 100 crosshairs per subplot what percent cover is present (measure of distribution).

ATTACHMENTS

[buttons_explanations.xlsx](#) [BOU_TOT_21nov.XLS](#) [MB_TOT_15oct.xlsx](#)

Keywords: open vegetation,
virtual point frames,
SamplePoint, DJI drone

Photo Annotations

1 If the different species are difficult to tell apart visually, annotate the drone pictures.

1.1 From *Fulcrum*, download on your computer the small drone pictures from the 9 subplots of a given plot by following Vegetation Surveys: Herbs and Shrubs → Cover Estimates: Subplots → Subplots → Record [# from 1 to 9] → Vegetation Photos: Subplot → Download → Original.

Vegetation Surveys: Herbs and Shrubs	
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >

Subplots	
1 record	
Created Location	45.409077, -75.516663 (3m accuracy, 1.8m from the record)
Updated Location	45.397892, -75.698123 (15m accuracy, 14226.0m from the record)
Subplot	* 44083370-44100544, 1
Cover Estimates	
9 Items	
Total Canopy Cover (%): Subplot	
Bare Ground Cover (%): Subplot	
Leaf Litter Cover (%): Subplot	
Total Cover (%): Subplot	
Vegetation Photos: Subplot

1.2 Open the 9 pictures in a single PowerPoint file, with each slide corresponding to one subplot.

- 1.3** Use the species list from *Fulcrum* → Vegetation Surveys: Herbs and Shrubs → Subplot Record → Cover Estimates to locate each plant species, paying attention to the Canopy Remarks (abundance and distribution).

Vegetation Surveys: Herbs and Shrubs

1 record, July 19, 2019

Species List

Plant Taxa

12 Items

List of scientific names available:

- *Sphagnum magellanicum* Brid.
- *Sphagnum papillosum* Lindb.
- *Polytrichum strictum* Menzies ex Brid.
- *Maianthemum canadense* Desfontaines
- *Kalmia angustifolia* Linnaeus
- *Rhododendron groenlandicum* (Oeder) Kron & Judd
- *Larix laricina* (Du Roi) K. Koch
- *Vaccinium oxycoccos* Linnaeus
- *Eriophorum vaginatum* Linnaeus
- *Vaccinium myrtilloides* Michaux
- *Chamaedaphne calyculata* (Linnaeus) Moench
- *Vaccinium angustifolium* Aiton

Cover Estimates: Subplot

Subplots

9 Items

<div> <div> Vegetation Surveys: Herbs and Shrubs </div> <div> <div> 1 record, July 19, 2019 / Subplots (9 Items) </div> <div> </div> </div> </div>	
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >
1 record	View >

✕

Subplots

✎

✓

1 record

🔍

Subplot

44083370-44100544, 1

ⓘ

📁

Cover Estimates

9 Items

Total Canopy Cover (%): Subplot

ⓘ

Bare Ground Cover (%): Subplot

ⓘ

Leaf Litter Cover (%): Subplot

ⓘ

Total Cover (%): Subplot

ⓘ

Vegetation Photos: Subplot

✕

Subplots

✎

✓

1 record

/ Cover Estimates (9 Items)

🔍

Sphagnum magellanicum Brid.

View >

Sphagnum papillosum Lindb.

View >

Polytrichum strictum Menzies ex Brid.

View >

Maianthemum canadense Desfontaines

View >

Eriophorum vaginatum Linnaeus

View >

Kalmia angustifolia Linnaeus

View >

Vaccinium oxycoccos Linnaeus

View >

Vaccinium angustifolium Aiton

View >

Chamaedaphne calyculata (Linnaeus) Moench

View >

<div><div>✖</div><div>Cover Estimates</div></div>		<div><div>✎</div><div>✓</div></div>
<div><div></div><div>Maianthemum canadense Desfontaines</div></div>	<div><div>🔗</div></div>	
<div><div>🔍</div><div>Metadata</div></div>		
Created (device)	19/07/2019 à 11:57:13 3 weeks ago	
Updated (device)	19/07/2019 à 12:02:19 3 weeks ago	
Duration	35 seconds (Total Time) 16 seconds (Most Recent Update) 19 seconds (First Creation)	
Location	45.409164, -75.516638	
Created Location	45.409166, -75.516638 (3m accuracy, 0.2m from the record)	
Updated Location	45.409157, -75.516622 (3m accuracy, 1.5m from the record)	
<div><div>🔍</div><div>Taxon Cover</div></div>		
Scientific Name	• Maianthemum canadense Desfontaines	<div>?</div>
Canopy Cover (%)		<div>?</div>
Cover Remarks	<div>Bordure N milieu de l'est Milieu du NO</div>	<div>?</div>

NOTES ON COVER REMARKS:

Each subplot is divided in areas identified with direction acronyms (S = south, N = north, O or W = west, E = east, C = center). If relevant, they also have a note on the number of individuals for a given species.

- 1.4 For all of the species or specimens that are difficult to identify at first sight, in PowerPoint, in a white font, note the initials of the species (generally, format is first letter of genera + first letter of species) on top of its occurrences.

- 1.5 Save all PowerPoint slides (1 slide = 1 subplot) in .tif to your computer and name them in the format PlotNo.SubplotNo.

- 1.6** Crop all photos so that their shape is a tight square around the PVC pipes delimiting the subplot.

Example for subplot 1:

- 1.7** Save the cropped photos back to:
- 1) their original *Fulcrum* subplot record, under Vegetation Surveys: Herbs and Shrubs → Subplots → Record [# from 1 to 9] → Vegetation Photos: Subplot,

or 2) to a Google Photos folder, with all photos labelled with PlotNo.SubplotNo, shared with the Veg Crew Leader.

Virtual Point Framing

- 2 Classify 100 non-random crosshairs per subplot using the *SamplePoint* program, in order to obtain species distribution and abundance to the closest percent.

Note

Save everything related to *SamplePoint* (photos to classify (see 1.7), databases (see 2.2) and buttons (see 2.8) that will be created) in the same computer directory.

- 2.1 Indicate in the Veg_Crew_overview Google Doc on what plot(s) you will be working on that day, by writing the date and your initial next to the plot number.

2.2 Create a Database in *SamplePoint*, under Options → Database Wizard - Create DB.

Note

We are using one database per plot, and only later combining all the databases into one.

2.3 Name the database with an acronym for the site and the plot number.

Note

Boucherville: BOU#

Mer Bleue: MB#

2.4 Populate the database by selecting all 9 annotated .tiff or .tif pictures of this plot.

Note

Select All files from the menu in order to have access to the .tiff and .tif files.

2.5 Select Done and OK to complete.

- 2.6 Follow Options → Select DataBase, and select the file that you want to fill, then OK to open your database in *SamplePoint*.

Note

Warning: if you select a database that has already been used, you will overwrite your data. Therefore we are using one separate database per plot.

2.7 Create, upload or edit a *SamplePoint* button file for classifying the plot.

For every plot, using the plot species list in *Fulcrum*, under Vegetation Surveys: Herbs and Shrubs → [Appropriate plot] → Species List, all the species* must appear as a button in *SamplePoint*.

Note

SamplePoint allows for a maximum of 30 classification buttons.

- *: If there are more than 30 species in your list, add a button named Other that you will edit appropriately afterwards in the plot Excel Database. Make notes of the species of these Other-classified points in each subplot where they occur.
- Always include one button named Unknown, used for when you are not sure of the plant ID (for ex.: because of shade).
- If necessary, add buttons named Ground or Water.
- If necessary, add a button named Dry for cases where a plant is unidentifiable because only a dry stem remains.

Vegetation Surveys: Herbs and Shrubs

1 record, July 9, 2019

Species List

Plant Taxa

20 Items

List of scientific names available:

- *Phragmites australis* (Cavanilles) Trinius ex Steudel
- *Solidago gigantea* Aiton
- *Rubus idaeus* Linnaeus
- *Cornus sericea* Linnaeus
- *Vicia cracca* Linnaeus
- *Sonchus arvensis* Linnaeus
- *Taraxacum officinale* F.H. Wiggers
- *Plantago major* Linnaeus
- *Euthamia graminifolia* (Linnaeus) Nuttall
- *Poa alsodes* A. Gray
- *Poa pratensis* Linnaeus
- *Carex intumescens* Rudge
- *Fraxinus pennsylvanica* Marshall
- *Equisetum variegatum* Schleicher ex F. Weber & D. Mohr
- *Vitis riparia* Michaux
- *Calamagrostis canadensis* (Michaux) Palisot de Beauvois
- *Solidago altissima* Linnaeus
- *Geum aleppicum* Jacquin
- *Arctium lappa* Linnaeus
- *Cirsium arvense* (Linnaeus) Scopoli

Cover Estimates: Subplot

Subplots

9 Items

2.8 Create a new set of buttons in *SamplePoint* by following Options → Custom Buttons → Create Custom Button Files.

2.9 Fill in the button names (4 letters, see buttons_explanations joined file) and descriptions (latin or common name; no single quotation marks) for every ground cover that will be used (ex.: species, bare ground, water, unknown, or other).

Button	Description (optional)	ShortCut	Description (optional)	ShortCut
Button 1	LYSA		Button 16	PLMA
Button 2	ASCSY		Button 17	POAL
Button 3	CALCA		Button 18	POPR
Button 4	CARL		Button 19	RUID
Button 5	CORSE		Button 20	GEAL
Button 6	FRPE		Button 21	VICR
Button 7	EQVA		Button 22	SOAL
Button 8	EUGR		Button 23	SONCH
Button 9	GATR		Button 24	SOGI
Button 10	ONSE		Button 25	ARLA
Button 11	CIRAN		Button 26	VRBP
Button 12	APCAN		Button 27	ANSY
Button 13	PHAU		Button 28	TAXOF
Button 14	agrgg		Button 29	PHLA
Button 15	FRNR		Button 30	unknown

4 letter names in caps lock can be seen more clearly and thus are more convenient.

2.10

If a set of buttons already exists for the site, use it as a base to create this new set by clicking on Load Existing. Make the required edits by renaming the appropriate button names and descriptions.

Note

The original button file will remain intact if the new one is given a new name.

Button	Description (optional)	ShortCut	Description (optional)	ShortCut
Button 1			Button 16	
Button 2			Button 17	
Button 3			Button 18	
Button 4			Button 19	
Button 5			Button 20	
Button 6			Button 21	
Button 7			Button 22	
Button 8			Button 23	
Button 9			Button 24	
Button 10			Button 25	
Button 11			Button 26	
Button 12			Button 27	
Button 13			Button 28	
Button 14			Button 29	
Button 15			Button 30	

SamplePoint
Define Custom Buttons

Button	Description (optional)	ShortCut	Button	Description (optional)	ShortCut
Button 1	LYSA Lythrum salicaria		Button 16	PLMA Plantago major Plantain majeur	
Button 2	ASCSY Asclepias syriaca Asclépiade commune		Button 17	POAL Poa alodes Pâleur des bosquets	
Button 3	CALCA Calamagrostis canadensis Calamagrostide du Canada		Button 18	POPR Poa pratensis Pâleur des prés	
Button 4	CARL Carex L.		Button 19	RUID Rubus idaeus Framboisier rouge	
Button 5	CORSE Cornus sericea Cornouiller hart-rouge		Button 20	GEAL Geum aleppicum	
Button 6	FRPE Fraxinus pennsylvanica		Button 21	VICR Viola cracca Vesce jargeau	
Button 7	EQVA Equisetum variegatum Prêle panachée		Button 22	SOAL Solidago altissima Verge dor haute	
Button 8	EUGR Euthamia graminifolia Verge dor à feuilles de graminée		Button 23	SONCH Sonchus oleraceus Laiteron des champs	
Button 9	GATR Galium triflorum		Button 24	SOGI Solidago gigantea Verge dor géante	
Button 10	ONSE Onoclea sensibilis		Button 25	ARLA Arctium lappa	
Button 11	CIRAR Cirsium arvense		Button 26	VIRIP Vitis riparia Vigne des rivages	
Button 12	APOAN Apocynum androsaemifolium		Button 27	ANSY Anthriscus sylvestris	
Button 13	PHAU Phragmites australis (Cavanilles) Triens ex Steudel subsp. Australis Roseau commun		Button 28	TAXOF Taraxacum officinale Pissenlit officinal	
Button 14	agrgig Agrostis gigantea Agrostide blanche		Button 29	PHLA Phalaris arundinacea	
Button 15	FRVI Fragaria virginiana		Button 30	unknown unknown	

NOTE: You need the 1.47 or greater database to create shortcuts!

NOTE: a description can contain any character EXCEPT the ". It must also be less than 255 characters.

NOTE: Y, y, N, and n are NOT allowed as ShortCuts!

Cancel Load Existing Save

Back PLMA POAL POPR RUID GEAL VICR SOAL SONCH SOGI ARLA VIRIP ANSY TAXOF PHLA unknown

NOTE: To create a custom button file, enter the button labels in the corresponding fields as shown. A blank field will result in an invisible button.

Save the definition into a file. After a database has been loaded, use the menu item to select a Custom Button File to load the definition into the database.

After the button is loaded into the database, it will be used for classification and statistical analysis.

Also note that the "Load" Button can be used to edit an existing set of buttons. They still need to be saved when done.

Note that the ShortCut characters must be alphabetic e.g. A-Z or a-z.

SamplePoint
Define Custom Buttons

Button	Description (optional)	ShortCut	Button	Description (optional)	ShortCut
Button 1	CAIN Carex intumescens		Button 16	PLMA Plantago major Plantain majeur	
Button 2	ASCSY Asclepias syriaca Asclépiade commune		Button 17	POAL Poa alodes Pâleur des bosquets	
Button 3	CALCA Calamagrostis canadensis Calamagrostide du Canada		Button 18	POPR Poa pratensis Pâleur des prés	
Button 4	CARL Carex L.		Button 19	RUID Rubus idaeus Framboisier rouge	
Button 5	CORSE Cornus sericea Cornouiller hart-rouge		Button 20	GEAL Geum aleppicum	
Button 6	FRPE Fraxinus pennsylvanica		Button 21	VICR Viola cracca Vesce jargeau	
Button 7	EQVA Equisetum variegatum Prêle panachée		Button 22	SOAL Solidago altissima Verge dor haute	
Button 8	EUGR Euthamia graminifolia Verge dor à feuilles de graminée		Button 23	SONCH Sonchus oleraceus Laiteron des champs	
Button 9	GATR Galium triflorum		Button 24	SOGI Solidago gigantea Verge dor géante	
Button 10	agrgig Agrostis gigantea Agrostide blanche		Button 25	ARLA Arctium lappa	
Button 11	CIRAR Cirsium arvense		Button 26	VIRIP Vitis riparia Vigne des rivages	
Button 12	APOAN Apocynum androsaemifolium		Button 27	ANSY Anthriscus sylvestris	
Button 13	PHAU Phragmites australis (Cavanilles) Triens ex Steudel subsp. Australis Roseau commun		Button 28	TAXOF Taraxacum officinale Pissenlit officinal	
Button 14	ground ground		Button 29	PHLA Phalaris arundinacea	
Button 15	dry dry		Button 30	unknown unknown	

NOTE: You need the 1.47 or greater database to create shortcuts!

NOTE: a description can contain any character EXCEPT the ". It must also be less than 255 characters.

NOTE: Y, y, N, and n are NOT allowed as ShortCuts!

Cancel Load Existing Save

Back PLMA POAL POPR RUID GEAL VICR SOAL SONCH SOGI ARLA VIRIP ANSY TAXOF PHLA unknown

NOTE: To create a custom button file, enter the button labels in the corresponding fields as shown. A blank field will result in an invisible button.

Save the definition into a file. After a database has been loaded, use the menu item to select a Custom Button File to load the definition into the database.

After the button is loaded into the database, it will be used for classification and statistical analysis.

Also note that the "Load" Button can be used to edit an existing set of buttons. They still need to be saved when done.

Note that the ShortCut characters must be alphabetic e.g. A-Z or a-z.

2.11 Save and name this new custom button file.

2.12 In *SamplePoint*, follow Options → Custom Buttons → Load Custom Button File to select and load the buttons that you will be using to classify the photos from your database.

Note

The Button File selected needs to remain untouched for the whole database.

2.13 Edit the picture as needed. The rotation has to be done once only, before classification. The rest can be done at any point and undone by clicking on R.

Note

Use the buttons on the left menu to Rotate*, Darken, Lighten, reset (R), increase contrast (>> Cont), or lower contrast (<< Cont) of the picture.

Key indicates the Subplot number.

Leave Block Zoom ticked. Only untick it if your computer performances are slow.

*: Use the subplot number (title of the picture) and compare the picture in *SamplePoint* to its copy in *Fulcrum*** to know what rotation is needed.

**: Especially useful for subplot no. 5.

2.14 Under Options → Select Grid Size, select 10x10 = 100. This means that we are using a 10x10 grid of points (100 crosshairs) to classify each subplot.

2.15 Click on Begin to start classifying. The 100 crosshairs are now regularly placed on the image, and one crosshair at a time (the red one) will be activated. To classify it, click on one of the 30 buttons of the lower menu.

Note

The meaning of each button is indicated in the joined buttons_explanations Excel file.
 The Zoom can be adjusted by rotating the wheel of a wheel mouse.
 The Point field indicates the point (#/100) you are currently classifying.
 The Back button is used to correct a previous crosshair classification.

- 2.16** To classify each crosshair, help yourself by opening (ideally on a different monitor) the *Fulcrum* Vegetation Survey: Herbs and Shrubs of that specific plot. Before starting to work on each subplot, open in two different tabs 1) the species list for the subplot and 2) the Original picture (not annotated) of that subplot.

Note

Compare the *Fulcrum* species list to the annotated picture on *SamplePoint* to locate where the different species are. Use the zoom in the Original picture, as well and the Lighten, Darken, and contrast options in *SamplePoint* to help identify less obvious plants.

Subplots	
1 record / Cover Estimates (7 Items)	
Asclepias syriaca Linnaeus	View >
Phalaris arundinacea Linnaeus	View >
Vicia cracca Linnaeus	View >
Salix interior Rowlee	View >
Equisetum variegatum Schleicher ex F. Weber & D. Mohr	View >
Poa pratensis Linnaeus	View >
Poa alsodes A. Gray	View >

- 2.17 When the 100 points of an image have been classified, click on Next Image, then Begin to start again for the next image (= key = subplot).

Note

You can stop working on a plot at any time (at the end of a plot, at the end of a subplot, or through a subplot) by clicking on the Exit button in the lower right corner of the screen.

Make a note of the point where you stopped.

To start back where you left, click Next image on the top menu until you reach the desired image. Then, enter the number of the point in the point field in the left menu and hit RST (restart).

Data Combining

- 3 Combine all the databases into one. Keep the originals as a backup.

- 4 In Excel, create another version of the existing species per dot per subplot table, that doesn't contain the RGB values. To do so, copy the name of the image column and the point numbers row. Then, for a given point * subplot cell, write the formula =LEFT(E3,4). This new table must contain 900 cells (100 points * 9 subplots).

E3 being the name of the original cell, and 4 being the amount of characters kept, starting from the left.

5 In Excel, create a final table to calculate the percent cover (abundance) of each species in each subplot.

- The subplot numbers are now used as the top row, and the species button names as the left column.
- In each new cell, write the formula =COUNTIF(E\$12:CZ\$12, C23)

where E\$12:CZ\$12 is the list of the 100 buttons for the given subplot, and C23 is the name Excel is searching for.

Enregistrement automatique BOU_TOT_25oct - Mode de c

Fichier Accueil Insertion Mise en page Formules Données Révision Affichage Aide

Coller 12 A^ A^ Nombre Mise en forme conditionnelle

Presse-papiers Police Alignement Nombre

SOMME =NB.SI(E\$12:CZ\$12,C23)

	A	B	C	D	E	F	G	H	I	J
9	8	1.8.tif		100	ASSY, 45, 65, 14	SAIN, 76, 94	SAIN, 129, 14	SAIN, 85, 104	SAIN, 102, 12	SAIN, 207, 2
10	9	1.9.tif		100	UNKW, 30, 36, 1	UNKW, 33, 5	EUGR, 58, 71	UNKW, 43, 5	SAIN, 139, 18	SAIN, 121, 14
11										
12				11.tif	UNKW	PHLA	PHLA	SAIN	UNKW	SAIN
13				12.tif	SAIN	UNKW	ASSY	SAIN	UNKW	UNKW
14				13.tif	SAIN	SAIN	SAIN	SAIN	UNKW	EUGR
15				14.tif	SAIN	SAIN	SAIN	UNKW	SAIN	SAIN
16				15.tif	SAIN	SAIN	SAIN	POAL	SAIN	SAIN
17				16.tif	SAIN	SAIN	SAIN	SAIN	PHLA	SAIN
18				17.tif	POPR	POPR	VICR	POPR	POAL	PHLA
19				18.tif	ASSY	SAIN	SAIN	SAIN	SAIN	SAIN
20				19.tif	UNKW	UNKW	EUGR	UNKW	SAIN	SAIN
21				subplot1	subplot2	subplot3	subplot4	subplot5	subplot6	subplot7
22		Factor for unseen but present	APAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23		0.5	ASSY	CZ\$12,C23	1.0	0.0	1.0	3.0	0.0	0.0
24			CACA	0.0	0.0	0.0	0.0	0.0	0.0	0.0

- The value that will appear in the new cell is the relative abundance of the given species in the given subplot.

Enregistrement automatique

Fichier Accueil Insertion Mise en page Formules

Coller Arial 12 A^ A^ Alignement

Presse-papiers Police Alignement

D23 =NB.SI(E\$12:CZ\$12,C23)

	A	B	C	D	E
9	8	1.8.tif		100	ASSY, 45,
10	9	1.9.tif		100	UNKW, 30
11					
12				11.tif	UNKW
13				12.tif	SAIN
14				13.tif	SAIN
15				14.tif	SAIN
16				15.tif	SAIN
17				16.tif	SAIN
18				17.tif	POPR
19				18.tif	ASSY
20				19.tif	UNKW
21				subplot1	subplot2
22		Factor for unseen but present	APAN	0.0	
23		0.5	ASSY	3.0	
24			CACA	0.0	

- At the end of the table, add one row to calculate the sum of the relative abundances. The sum should be of 100.

Enregistrement automatique ☐

Fichier Accueil Insertion Mise en page Formules Données

Coller 12 A^ A^

Police Alignement

SOMME =SOMME(D22:D62)

	A	B	C	D	E
27			ELRE	0.0	0.0
28			EQVA	2.0	5.0
29			EUGR	0.0	0.0
30			FRVI	0.0	0.0
31			GATR	0.0	0.0
32			GEAL	0.0	0.5
33			IMCA	0.0	0.0
34			AGGI	0.0	2.0
35			PHAU	0.0	0.0
36			PLMA	0.0	0.0
37			POAL	0.5	2.0
38			POPR	0.5	0.0
39			RUID	0.0	0.0
40			SAIN	69.0	31.0
41			SOAL	0.0	0.0
42			SOAR	0.0	0.0
43			SOGI	0.0	2.0
44			SORU	0.0	0.0
45			SYNA	0.0	0.0
46			TAOF	0.0	0.0
47			VICR	1.0	0.0
48			VIRI	0.0	0.0
49			TRRE	0.0	0.0
50			OTHR	0.0	0.0
51			UNKW	18.0	20.0
52			LYSA	0.0	0.0
53			PHLA	7.0	37.0
55			PHPR	0.0	0.0
56			ASIN	0.0	0.0
57			QHMA	0.0	0.0
58			TRDU	0.0	0.0
59			PHPR	0.0	0.0
60			EUMA	0.0	0.0
61			SALL	0.0	0.0
62			CARL	0.0	0.0
63				0 D22:D62	101.0
64				7	3
65					

- Add one last row under the previous one, containing the number of species per subplot. The formula to enter is
`=COUNTIF(D22:D62, ">0")`
 where the cells D22:D62 are the percent cover values across all species within the subplot, and >0 accounts for presence.

Enregistrement automatique

Fichier Accueil Insertion Mise en page Formules

Coller 11 A^ A^

Police Alignement

SOMME =NB.SI(D22:D56,">0")

	A	B	C	D	E
27			ELRE	0.0	0.0
28			EQVA	0.0	0.0
29			EUGR	0.0	0.0
30			FRVI	0.0	0.0
31			GATR	0.0	0.0
32			GEAL	0.0	0.0
33			IMCA	0.0	0.0
34			AGGI	84.0	87.0
35			PHAU	1.0	0.0
36			PLMA	0.5	1.0
37			POAL	0.0	0.0
38			POPR	0.0	0.0
39			RUID	0.0	0.0
40			SAIN	0.0	0.0
41			SOAL	0.0	0.0
42			SOAR	0.0	2.0
43			SOGI	1.0	0.0
44			SORU	0.0	0.0
45			SYNA	0.0	0.0
46			TAOF	0.0	1.0
47			VICR	0.0	0.0
48			VIRI	0.0	0.5
49			TRRE	0.0	0.0
50			OTHR	0.0	0.0
51			UNKW	0.0	0.0
52			FRPE	3.0	2.0
53			CARL	0.0	0.0
54			BEPO	0.0	0.0
55			CACR	0.0	0.0
56			0	0.0	0.0
57			0	100.5	100.5
58				">0")	7

- 6 Species that occur within the *Fulcrum* subplot species list BUT that are not observed by the point frame are assigned an abundance value of 0.5% in the Excel spreadsheet to account for their presence.

Note

The last column (no. of species per subplot) of the table generated at step 5 is useful to compare your data to the *Fulcrum* records, when looking for absent species. Ground covers that are not species should be left out of the count.

	A	B	C	D
33			IMCA	0.0
34			AGGI	0.0
35			PHAU	0.0
36			PLMA	0.0
37			POAL	0.0
38			POPR	0.0
39			RUID	0.0
40			SAIN	69.0
41			SOAL	0.0
42			SOAR	0.0
43			SOGI	0.0
44			SORU	0.0
45			SYNA	0.0
46			TAOF	0.0
47			VICR	1.0
48			VIRI	0.0
49			TRRE	0.0
50			OTHR	0.0
51			UNKV	18.0
52			LYSA	0.0
53			PHLA	7.0
55			PHPR	0.0
56			ASIN	0.0
57			QHMA	0.0
58			TRDU	0.0
59			PHPR	0.0
60			EUMA	0.0
61			SALL	0.0
62			CARL	0.0
63			0	100.0
64				5

The Excel spreadsheet generated from *SamplePoint* only contains 5 species, while the original *Fulcrum* record contains 7 in the same subplot.

Subplots		
1 record	/ Cover Estimates (7 Items)	
Asclepias syriaca Linnaeus	View	>
Phalaris arundinacea Linnaeus	View	>
Vicia cracca Linnaeus	View	>
Salix interior Rowlee	View	>
Equisetum variegatum Schleicher ex F. Weber & D. Mohr	View	>
Poa pratensis Linnaeus	View	>
Poa alsodes A. Gray	View	>

Enregistrement automatique			
Fichier	Accueil	Insertion	Mise en page
Coller	Arial 12		
Police	Align		
D66			
A	B	C	D
33		IMCA	0.0
34		AGGI	0.0
35		PHAU	0.0
36		PLMA	0.0
37		POAL	0.5
38		POPR	0.5
39		RUID	0.0
40		SAIN	69.0
41		SOAL	0.0
42		SOAR	0.0
43		SOGI	0.0
44		SORU	0.0
45		SYNA	0.0
46		TACF	0.0
47		VICR	1.0
48		VIRI	0.0
49		TRRE	0.0
50		OTHR	0.0
51		UNKV	18.0
52		LYSA	0.0
53		PHLA	7.0
55		PHPR	0.0
56		ASIN	0.0
57		QHMA	0.0
58		TRDU	0.0
59		PHPR	0.0
60		EUMA	0.0
61		SALL	0.0
62		CARL	0.0
63			0 101.0
64			7

The species that were absent from the Excel spreadsheet generated from *SamplePoint* but present in the original *Fulcrum* record are given a value of 0.5% to account for their presence even though they were not targeted by the 100 crosshairs.