## SamplePoint Tutorial



SamplePoint is a tool that facilitates point-sampling of digital images.

This presentation will demonstrate how to use SamplePoint 1.54 to collect cover data. Note that the program is updated more often than this tutorial, and thus some features may not be explicitly described here. Menu and interface may also change slightly with new versions. See the HELP menu for information about features not described in the tutorial.

## **REQUIRED**:

- •SamplePoint Installation file
- •18 MB free space on hard drive (performance increases with free space)
- •Digital image files taken from a nadir perspective (looking straight down).
- •Minimum 1024x768 monitor resolution (Control Panel>Display>Settings)
- Microsoft .NET Framework 2.0 installed (<u>www.microsoft.com</u>)
- •Unfettered write access to the image directory

## **RECOMMENDED:**

19" color display

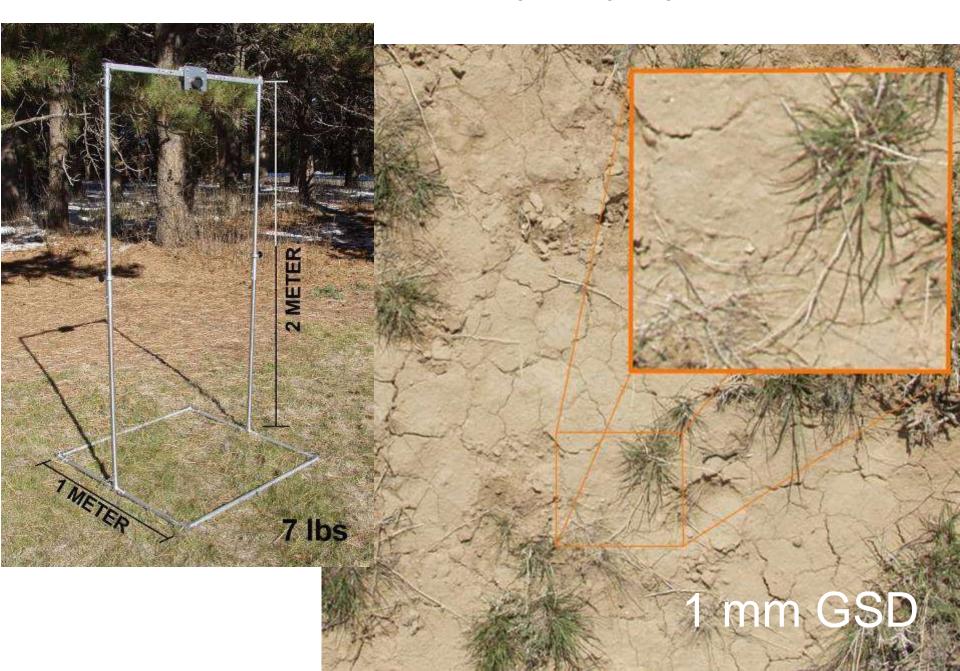
Obtain the SamplePoint installation file and double-click to begin installation. Follow the onscreen directions. The following files will be loaded onto your PC into the specified directory:

SamplePoint.exe SamplePointTutorial.pdf SamplePointHelp.pdf SPDB.xls Nadir Sample Image : dubois\_41.bmp

The Nadir Sample Image is one of the images used in this tutorial. It was acquired from 2m above ground level using an aluminum camera stand and an Olympus E20 digital SLR camera, and covers approx. 1m x 1m with a ground sample distance of 0.9 mm.

😰 SamplePoint v1.53 Setup: Installation Options 📃 🗖 🗙	🔐 SamplePoint v1.53 Setup: Installation Folder
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.	Setup will install SamplePoint v1.53 in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.
Select components to install: SamplePoint	Destination Folder
Space required: 17.1MB	Space required: 17.1MB Space available: 88.4GB
Cancel Nullsoft Install System v2.11 < Back Next >	Cancel Nullsoft Install System v2.11 < Back Install

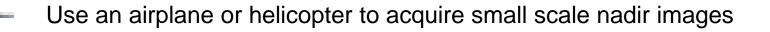
Use a camera stand to acquire nadir images using a digital camera.

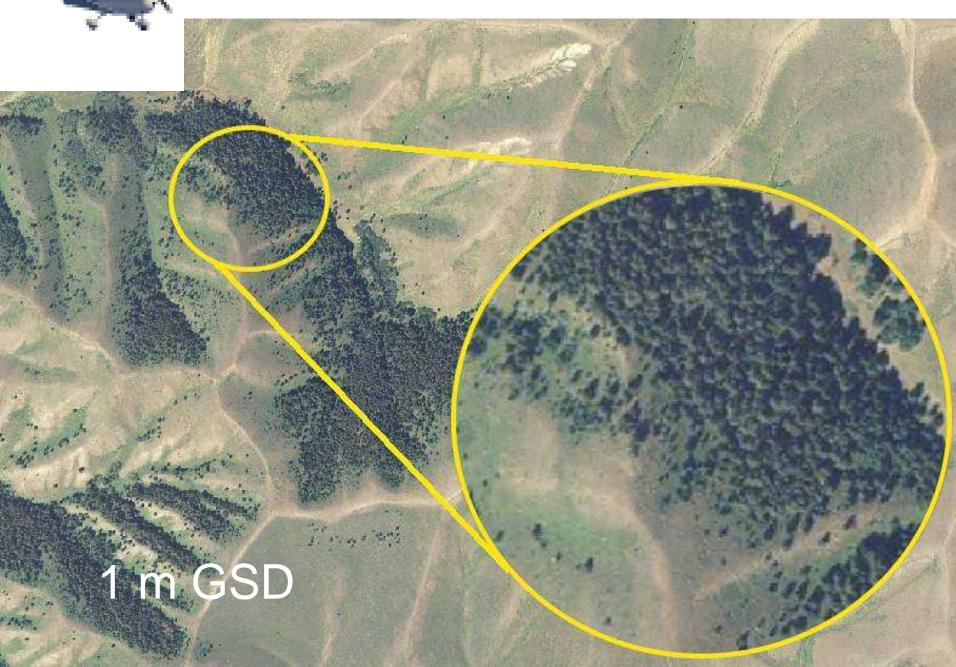


Use a light airplane to acquire large-scale nadir images

NUM







Save digital images to your hard drive in TIFF or BMP form. JPEG is a lossy-format but works as well as TIF at low compression ratios. Highly-compressed JPG files are not useful. Images MUST be nadir!

Subaic 2m Images

	File Edit View Favorites Tools Help
	🗢 Back 🔹 🔿 👻 🔂 Search 🖓 Folders 👋
	Address 🔄 oint Tutorial\Dubois 2m Images 💌 Links 🎽
	Name
ATT THE REAL PROPERTY AND THE READ THE REAL PROPERTY AND THE REAL	dubois_41.bmp
	dubois_42.bmp dubois_43.bmp
	Decos_recomp dubois_44.bmp
	👜 dubois_45.bmp
	🔊 dubois_46.bmp
	6 object(s) 31.3 MB 📃 My Computer 🏑

Open SamplePoint by clicking Start>Programs>SamplePoint>SamplePoint.exe. If you encounter trouble, please reference "SamplePointHelp.PDF" in the program directory.

📶 Samp																		
	Help NOTE:		ge First, the	n adjust ima	ige parame	eters!												
O Data	aBase 💽 Co	ur Image									Ne	xt Image	Begin	Commer	it			
Rotat	e																	
Darke																		
Lighte	n																	
R																		
>> Cor	nt																	
<< Cor	nt																	
Classi																		
⊖ Train																		
KEY	_																	
	k n																	
RST	-																	Exit
Zoom	Befre	sh	Grass	Forb	Shrub	Cactus	Litter	Soil	Rock	Unknow	Invasiv	btn10	btn11	btn12	btn13	btn14	btn15	
Point	Bac	k	btn16	btn17	btn18	btn19	btn20	btn21	btn22	btn23	btn24	btn25	btn26	btn27	btn28	btn29	btn30	1

Click Options>Database Wizard. Provide a name for the database, then click Create/Populate Database.

12	SamplePo	oint																	
Op	otions Help	NOTE: Rot	ate Imaç	ge First, the	n adjust ima	ige parame	ters!												
C	DataBase	e 💿 Cur li	nage									Nex	kt Image	Begin	Commen	t			
	Г															, ·			
	Rotate																		
-	notate																		
_	Darken										-1								
_				Create	and Pop	ulate th	e DataB	ase		>	<li></li>								
	Lighten																		
							200F												
	R					Dubois	2003												
						Dataf	Base Na	ame											
>	> Cont																		
-																			
	< Cont																		
						0	reate/P	opulato											
$\overline{\bullet}$	Classify					U U	DataE	nhaiais.											
	Train																		
F																			
				NOT															
				redu	E: If you ce the ni	get an ei imher of	rror mess files to le	age whe	en Ioadir 2001	ngrnes,									
				ICUU	co the m		mes to k	200 (Huli											
									ſ	Done									
	KEY		_																
Γ																			
	DII-																		
	Block Zoom																		
	DOT																		
	RST																		
	point																		Exit
	point																		
Zo	om 8	D-(		C	Forb	Ch	Carl	1 34 -	Soil	<b>D</b> 1	lu		L-10	L1-11	btn12	LL_12		L1-15	1
Pa	int 📃	Refresh		Grass	Ford	Shrub	Cactus	Litter	501	Rock	Unknow	Invasiv	btn10	btn11	DINIZ	btn13	btn14	btn15	
		Back		btn16	btn17	btn18	btn19	btn20	btn21	btn22	btn23	btn24	btn25	btn26	btn27	btn28	btn29	btn30	

Navigate to the folder containing the images you wish to classify. Select the images you want to classify. Click Open.

📶 SamplePoir																		- 🗆 ×
	NOTE: Rotate		First, the	n adjust ima	ige parame	ters!												
O DataBase	💿 Cur Imag	je									Ne	xt Image	Begin	Commer	it			
Rotate																		
Darken										_								
Lighten			Create	and Pop	ulate th	e DataB	ase		Þ									
R					Dubois													-1
					Da <sup>Op</sup>	ben											? )	<u> </u>
>> Cont						L	.ook in:	🔁 Sam	plePoint 1	utorial			•	← 🔁	r 🔁	]•		
<< Cont Classify			NOTE redu	: If you ce the n	umbe	Pece Bece Deskt My Docu	op	1mNA dubois dubois dubois dubois Medic	;_41.bmp ;_42.bmp ;_43.bmp ;_44.bmp neLodge, reams_05	tif 42_RJ.tif								
KEY						🛒 My Com												
Block Zoom						My Netu	vork											
point						Place	:5	, File name			- ·			''dubois_4	2 🔻		Open	Exit
Zoom 8	Refresh		Grass	Forb	Shr			Files of ty	pe:	Image F	iles(*.BMf	P;*.JPG;*.	TIF)		<b>-</b>		Cancel	
Point	Back	ī	btn16	btn17	btn18	btn19	btn20	btn21	btn22	btn23	btn24	btn25	btn26	btn27	btn28	btn29	btn30	

Images may only be selected from one folder. All images must be selected at once (you cannot populate the database twice using the wizard). After images have been selected, click Done. The database is saved to, and must remain in, the folder containing the analysis images.

📶 SamplePoi	int																
	NOTE: Rotate		nen adjust im	age parame	ters!												
O DataBase	e 💿 Cur Imag	je								Ne	xt Image	Begin	Comme	nt			
Rotate																	
Darken																	
Lighten		🔛 Creat	e and Pop	ulate th	e DataB	ase		2	<b>1</b>								
R				Dubois													
>> Cont				Data	Base Na	ame											
<< Cont																	
<ul> <li>Classify</li> <li>Train</li> </ul>				с 	reate/P DataE	opulate Base											
		NO rec	TE: If you luce the n	get an e umberof	rror mes: files to l	sage wh ess than	200!	ngfiles, Done									
KEY																	
⊠ Block Zoom																	
RST																	
point																	Exit
Zoom 8	Refresh	Grass	Forb	Shrub	Cactus	Litter	Soil	Rock	Unknow	Invasiv	btn10	btn11	btn12	btn13	btn14	btn15	
Point	Back	btn1	btn17	btn18	btn19	btn20	btn21	btn22	btn23	btn24	btn25	btn26	btn27	btn28	btn29	btn30	1

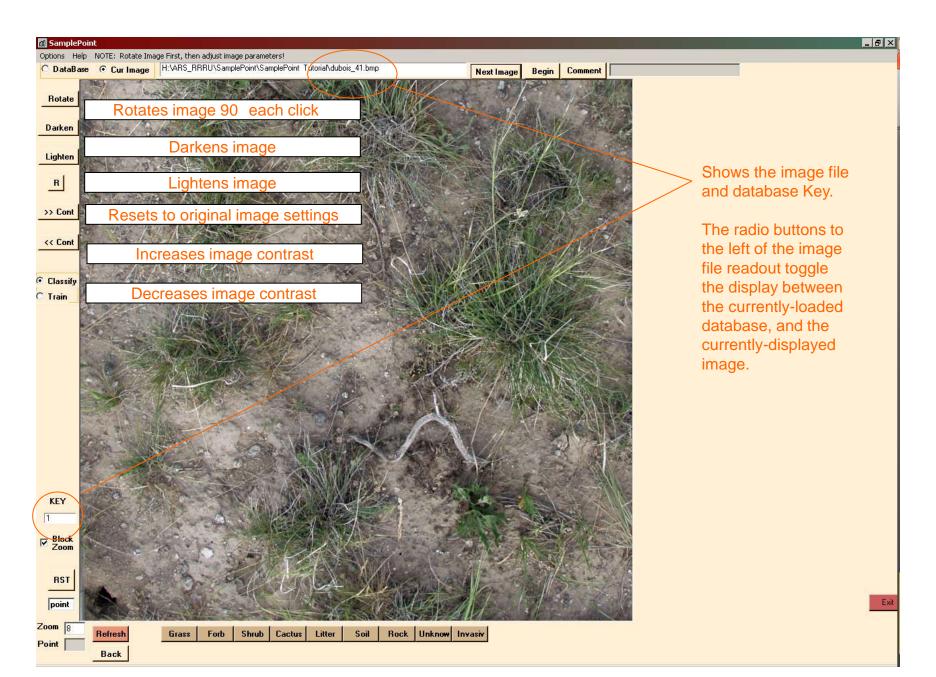
Click Options>Select Database and navigate to the image folder and select the \*.xls file. Click Open.

M SamplePoint													l	
Options Help NOTE: Rotate Im		ge parameters!							1	-				
O DataBase O Cur Image							Nex	t Image	Begin	Commen	t j			
Rotate														
Darken	Open									?	×			
Lighten	Look in:	CamplePoi	int Tutorial			•	+ 6	D 💣 🛙	<b>∷</b> . ▼					
R	📁 Recent	Dubois 2m I	5											
>> Cont	3	MEDLODGE	XLS											
<< Cont	Desktop	RIPARIAN.>	(LS											
Classify	<i>∲</i> My Documents													
○ Train														
	🗾 My Computer													
	<b>S</b>													
KEY	My Network Places													
⊠ Block Zoom		File name:	DUB	01S2005.X	LS			•		Open	]			
Bet		Files of type:	Exce	l Spreadsh	eets (*.xk	s,*XLS)		•		Cancel				
RST point														Exit
Zoom 8 Refresh	Grass Forb	Shrub Cactus	Litter	Soil	Rock	Unknow	In	btn10	btn11	btn12	btn13	btn14	btn15	
Point			-				Invasiv							1
Back	btn16 btn17	btn18 btn19	btn20	btn21	btn22	btn23	btn24	btn25	btn26	btn27	btn28	btn29	btn30	

A Pop-up box will confirm the number of images in the database. Click OK if this is correct.

📶 SamplePoi																	
	NOTE: Rotate Ima	ge First, then	i adjust ima	ige parame	eters!												
	e 💿 Cur Image									Ne	xt Image	Begin	Comme	nt			
Rotate																	
Darken																	
Lighten																	
R >> Cont																	
														×			
<< Cont		There a	re 4 imag	es to vie	w. If thi	s is less tl			ck the dat 1	abase for	rmat or re	create th	ne databa	se.			
<ul> <li>Classify</li> <li>Train</li> </ul>								ОК	]								
KEY																	
⊠ Block Zoom																	
RST point																	Exit
Zoom 8 Point	Refresh	Grass	Forb	Shrub	Cactus	Litter	Soil	Rock	Unknow	Invasiv	btn10	btn11	btn12	btn13	btn14	btn15	
, our	Back	btn16	btn17	btn18	btn19	btn20	btn21	btn22	btn23	btn24	btn25	btn26	btn27	btn28	btn29	btn30	

The first image listed in the database (Image Key 1) will appear in the screen at full-view. To begin classification using default settings of 100 systematic points and 8 default classes, click Begin.



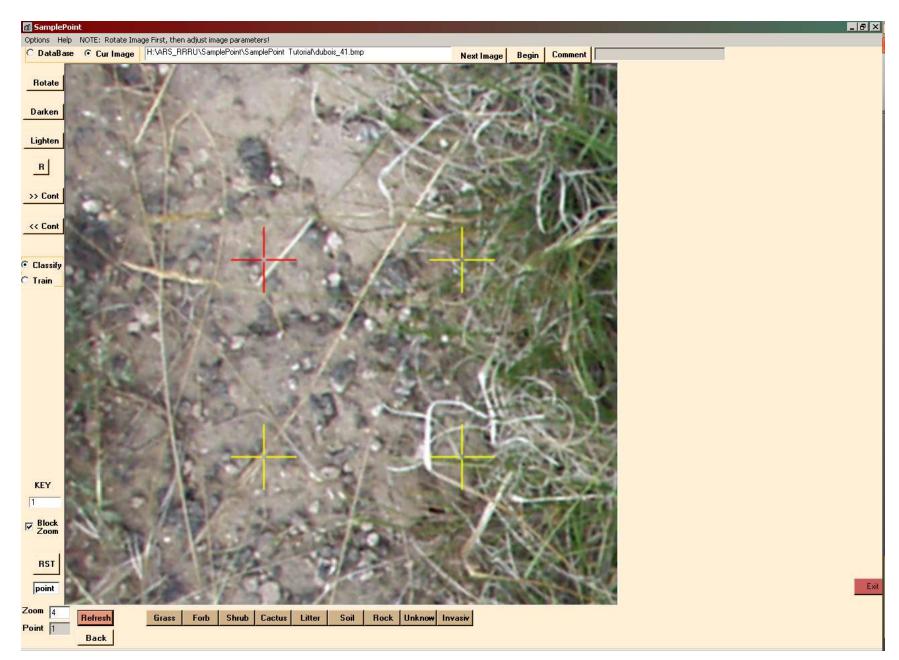
You are taken to point 1 in the upper left corner of the grid. Zoom in by pressing the ↑ key on your keyboard, zoom out by pressing ↓ key, zoom by typing a value in the Zoom box and pressing Refresh, or zoom by using a scroll wheel mouse.

📶 Sample	ePoint	_ 8 ×
Options H	Help NOTE: Rotate Image First, then adjust image parameters!	
C DataB	Base Cur Image H:\ARS_RRRU\SamplePoint\SamplePoint Tutorial\dubois_41.bmp Next Image Begin Comment	
Rotate		
Darken		
12.64	The second s	
Lighten		
R		
	and the second	
>> Cont		
<< Cont		
	and the second	
Classify	and the second	
C Train	and the second	
	THE PROPERTY OF CASE OF CASE OF CASE OF CASE OF CASE	
	AND A DESCRIPTION OF A	
	THE REAL PROPERTY AND A REAL PROPERTY AND A REAL PROPERTY.	
	And TALK TALK AND	
	THE R. P. LEWIS CO., LANSING MICH. LANSING MICH.	
	A CONTRACTOR OF THE OWNER O	
KEY	A LOUGH AND A L	
1	A CONTRACT OF A	
☑ Block Zoom	AND IN THE REAL PROPERTY AND ADDRESS OF A DREAM AND ADDREAM AND AND ADDREAM AND ADDREAM AND ADDREAM AND	
Zoom	and the second	
RST		
point		Exit
		Full
Zoom 8	Refresh Grass Forb Shrub Cactus Litter Soil Rock Unknow Invasiv	
Point 1		
	Back	

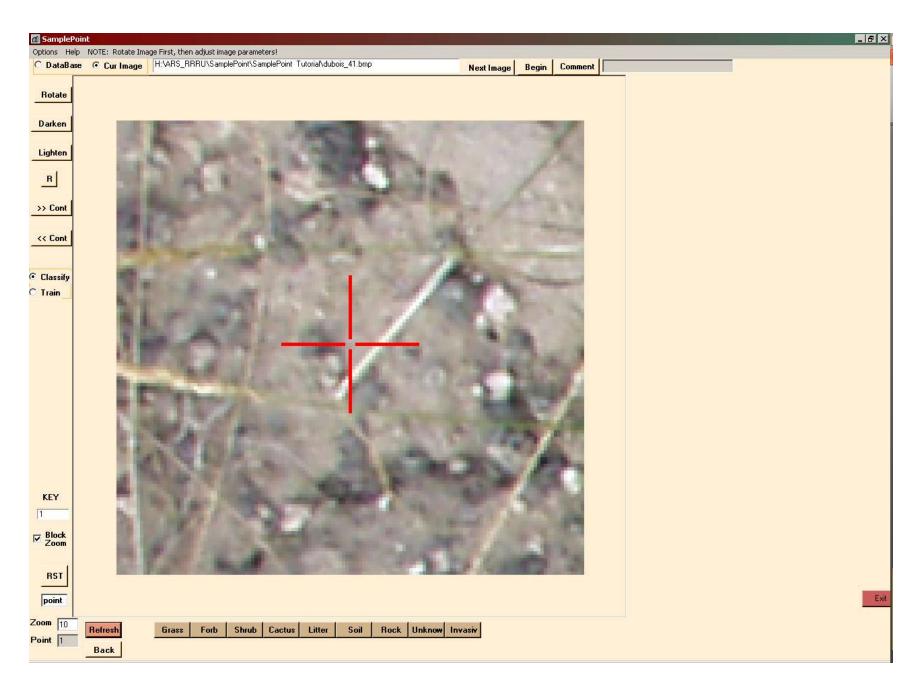
### Zoomed in to 28X.

📶 SamplePoi	int									
		age First, then adjust	image parameters!							
C DataBase	🖲 Cur Image	H:\ARS_RRRU\S	amplePoint\SampleF	Point Tutorial\dubo	ois_41.bmp	Next In	nage Begin	Comment	_	
<b></b>										
Rotate										
Darken										
Lighten										
R								C - 68		
>> Cont										
<< Cont										
Classify										
O Train										
			_							
KEY										
1										
☑ Block Zoom										
Zoom										
pr-1										
RST										
point										E
Zoom 28										
Point 1	Refresh	Grass Fort	) Shrub Ca	ctus Litter	Soil Rock (	Jnknow Invasiv				
	Back									

Zoomed out to 4X. Note that the point is no longer centered as you zoom further out and are on the edge of the image. Current point is red, all others are yellow.



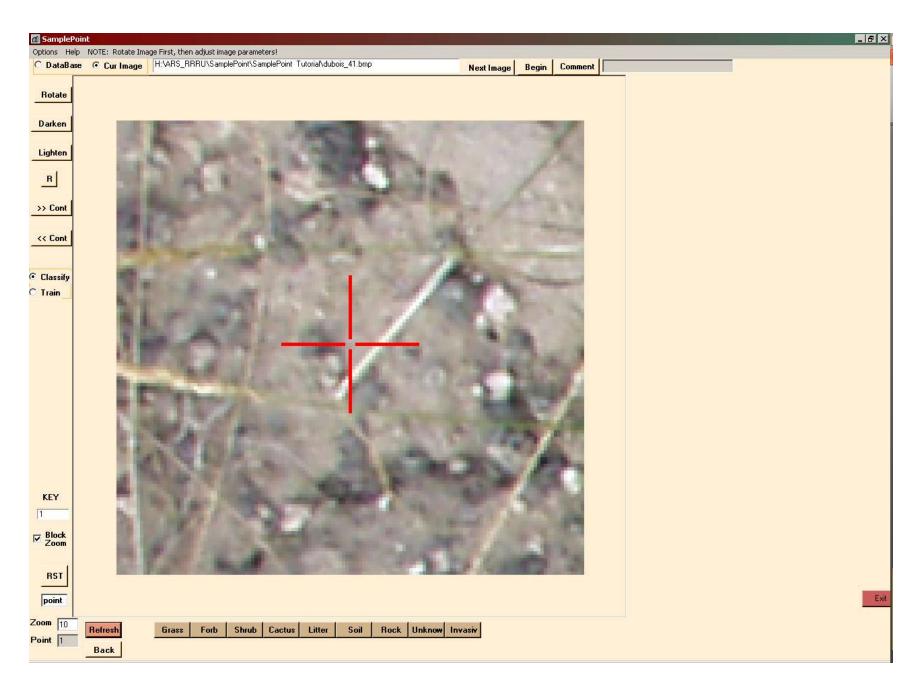
You should be able to distinguish individual pixels. The goal is to classify the single pixel in the center of the crosshairs. Zoom out if needed to gain perspective.



If you have a 2- or 3-monitor array, you can view multiple zoom levels on different screens by launching SP Tracker, and/or selecting Dual Monitor mode. This saves the time required to zoom in and out.

📶 SamplePoint			
Options Help NOTE: Rotate	Image First, then adjust image parameters!		
Change Crosshair Color Create Statistics Files Custom Buttons Database Wizard - Create Di Dual Monitor	H:\ARS_RRRU\SamplePoint\SamplePoint Tutorial\dubois_41.bmp	Next Image Begin Comment	
GoTo Image Launch SPTracker Preload the Next Image Select DataBase Select Grid Size SnapZoom			
>> Cont	13 Parties		
© Classify © Train		80	
KEY	The Name and Address of the Owner	ALC: NOT A DECK	
1	A REAL PROPERTY AND A REAL		
E Block	the second s	and the second se	
RST point	the same start		Exit
Zoom 10 Point 1 Back	Grass Forb Shrub Cactus Litter Soil Rock Unknow In	vasiv	

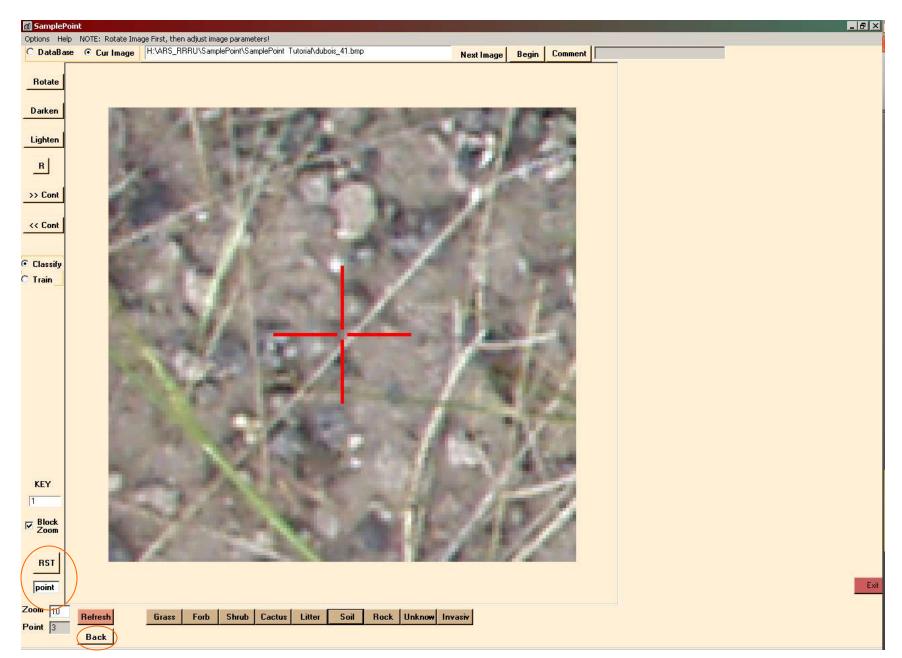
Classify by clicking on the button below the image which describes the point. In this case, Soil. The button will flash red, then you will be taken to point 2. The classification is automatically saved to the database.



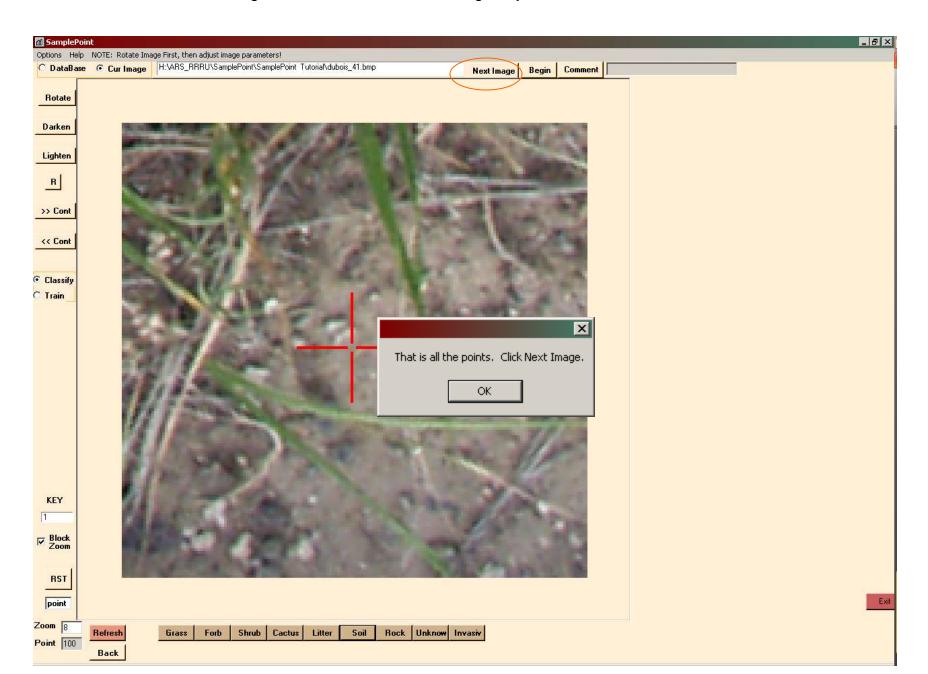
Note that the point number is displayed in the lower left corner. The zoom setting stays the same from point to point unless you change it. If you want the zoom to always return to a certain level, click Options>Snap Zoom>On and specify zoom level. Classify point 2: It is close to a piece of litter, but the center pixel is in fact soil. Zoom in if you are unsure.

SamplePoint	
Options Help NOTE: Rotate Image First, then adjust image parameters!	
Change Crosshair Color  H:\ARS_RRRU\SamplePoint\SamplePoint Tutorial\dubois_41.bmp Next Image Begin Comment	
Create Statistics Files	
Custom Buttons	
Database Wizard - Create DB	
Dual Monitor	
GoTo Image	
Launch SPTracker	
Preload the Next Image	
Select DataBase	
Select Grid Size	
SnapZoom • ON	
✓ OFF	
>> Cont	
the second se	
ALL DESCRIPTION OF THE OWNER OF T	
<< Cont	
the second se	
A 16 CONTRACTOR OF A CONTRACTOR OF	
the second se	
the second se	
the second se	
and the second	
A REAL PROPERTY AND A REAL	
and the second se	
and the second	
The second se	
the second se	
The second se	
a start to be a start of the st	
KEY	
- Plat	
R Block Soom	
A REAL PROPERTY OF A READ REAL PROPERTY OF A REAL P	
RST	
point	Exit
Zoom 10 Refresh Grass Forb Shrub Cactus Litter Soil Rock Unknow Invasiv	
Point 2	
Back	

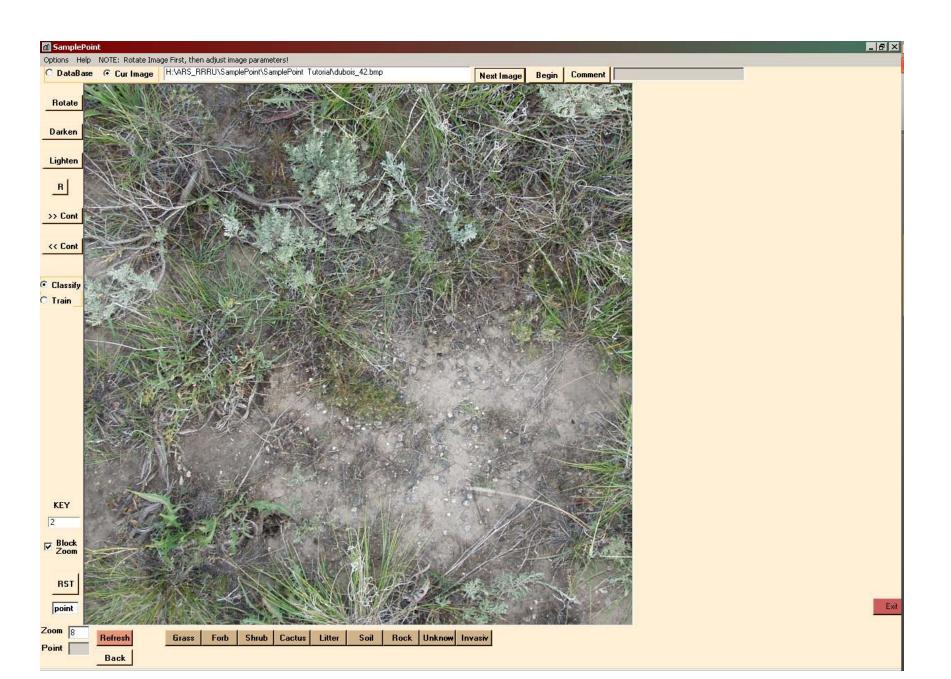
Now you're on point 3. If you feel you made a mistake on point 2, you can click the Back button to go back and reclassify point 2. If you want to start over at point 1 or go back 10 points at once, type in the target point number in the lower left corner "point" box, then click the RST (reset) button. Point location is constant for each image unless you alter the grid size.



A notification pop-up appears when the final point for each image is classified. Click OK, then click the Next Image button to continue to the Image Key 2.



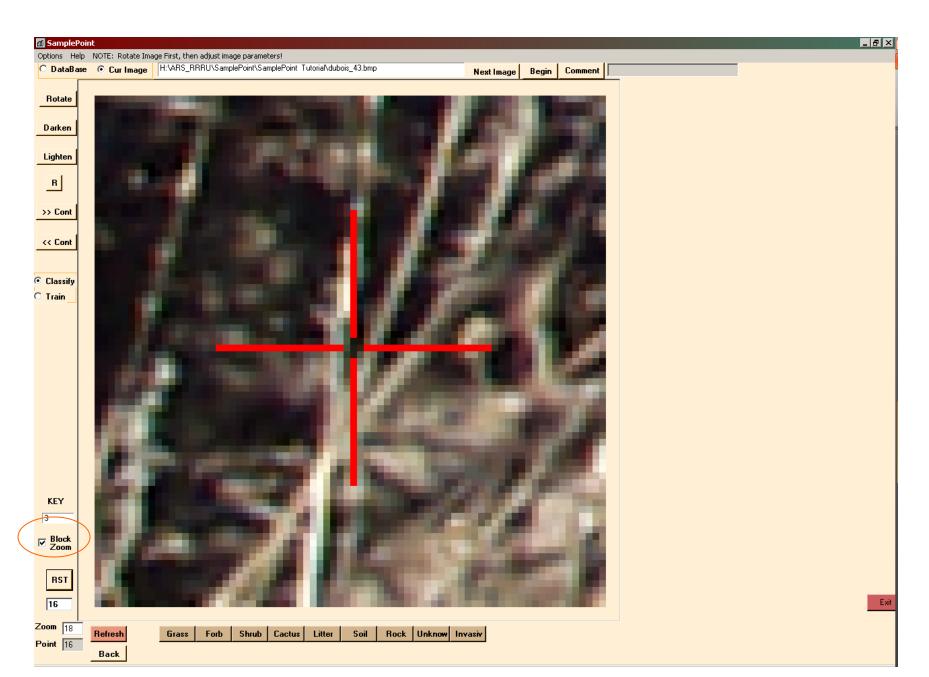
The next image will appear at full size. Note the Key now reads 2. Click Begin to start classification.



At no point do you need to save anything. All classification is saved automatically and instantly by SamplePoint. You can Exit at any time, even in the middle of an image, without losing any data. To restart at a different time on a particular image, select the database, then click Options>Go To Image, and type in the KEY of the image you want to start with. Click OK and the image will load.

📶 SamplePoint		_ 6 ×
Options Help NOTE: Rotate :	Image First, then adjust image parameters!	
Change Crosshair Color	H:\ARS_RRRU\SamplePoint\SamplePoint Tutorial\dubois_42.bmp     Next Image Begin Comment	
Create Statistics Files		
Custom Buttons Database Wizard - Create DB		
Dual Monitor		
GoTo Image		
Launch SPTracker		
Preload the Next Image		
Select DataBase		
Select Grid Size		
SnapZoom		
2 M		
>> Cont		
SS aleast		
<< Cont		
	🖌 🔛 GetKey	
Contraction of the second s		
Classify		
C Train	Please Enter the KEY of the Desired Image.	
- Indin		
	4	
and the second		
and the second second		
	ОК	
SNA ST		
A VIII		
KEY		
California and California		
2		
E Block		
✓ Block Zoom		
RST		
point		Exit
and all all all all all all all all all al		
Zoom 8 Refresh	Grass Forb Shrub Cactus Litter Soil Rock Unknow Invasiv	
Point Refresh	CIG222 LOID SUIND FACINZ FIIIGI SOIL UOCK OUKUOM IUASIM	
Back		

The Unknown button is useful for places like shadow, where the actual groundcover cannot be discerned. Toggling between pixelated and interpolated view is accomplished with the Block Zoom check box. Default is for block zoom.



Comments typed into the Comment field are also saved to the Excel database. When you've completed the last image, a notification pops up to tell you so. Click OK.

📶 SamplePoir	nt		_ 5 ×
		age First, then adjust image parameters!	
C DataBase	Cur Image	H:\ARS_RRRU\SamplePoint\SamplePoint Tutorial\dubois_44.bmp Next Image Begin Comment SamplePoint is awesomet!	
Rotate			
Darken	99	CONTRACTOR OF A STATE	
Lighten	100	AND AND AN AND AND AND AND AND AND AND A	
R	1		
>> Cont	15		
<< Cont		A A A A A A A A A A A A A A A A A A A	
Classify	and the second se	X	
C Train		That is all the points. Click Next Image.	
KEY	at los ten a	СК	
		A REAL PROPERTY OF A REAP	
4	100	A REAL PROPERTY OF A REAP	
RST			
RST 16			Exit
Zoom 6 Point 100	Refresh Back	Grass Forb Shrub Cactus Litter Soil Rock Unknow Invasiv	

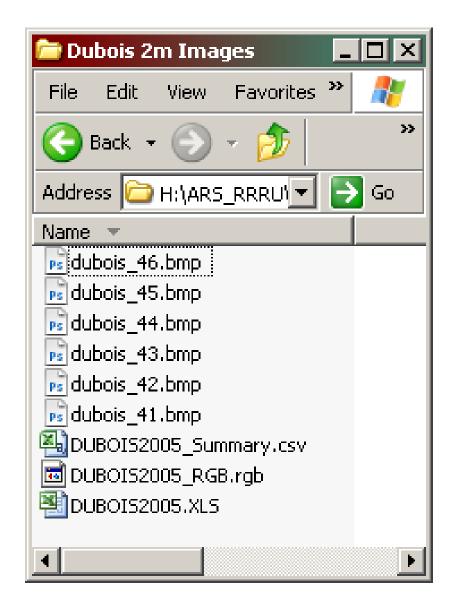
Click Options>Create Statistics Files. This generates two comma-delimited text files with a summary of the results. You can create these files at any time during the classification process, instead of waiting until all images are classified. These files are saved to the image folder.

M SampleP	oint																			_ 8 ×
Options Hel	lp NOTE: Rota																			
	rosshair Color	► H:	VARS_RRF	(U\Sample	ePoint\Sar	mplePoint	t Tutorial <sup>y</sup>	\dubois_4	44.bmp				Next Image	Begin	Comme	nt Sam	plePoint is aweso	mell		
	atistics Files																1			
Custom Bu																				
Database Dual Monit	Wizard - Create	DB																		
GoTo Imag				22011/2010																
Launch SP	yo Yiracker	1		ALC: NO		- Corres	-		-	10	Tel			a area	THE					
	ie Next Image		And Personne of the local division of the lo	-		1.0	100		- 10 - Core			100		ALC: NO.						
Select Dat				At Sector	State of		ALC: NO		1	A Inches										
Select Gric	d Size		1.1	ALL DO	4	and the	ALC: NO	A 19.00		-	10-10	-	141		No.					
SnapZoom	1	•	the life	-	-				1. 34	1.0				100	ALC: NO					
		1000	March 1	1. 1. 1.	-		- Ball	10 B	-	101	100				100					
>> Cont		( in . 16	ALC: N	-		-	1000				100	-	The Ree	100	- 191					
		and in the local	Contraction of the		a sea of the sea of th	-	The second	1.1		100	-			100	All Property lies					
<< Cont		1	and street of	-	All and	and the second	The second		ALC: NO	and the	No. of Concession, name		Sugar Street, or	-	The second					
(C LONG		Margare .	-	The Party of the	140.16	and the se	The state	and a set	-	1	10. 10.	1	a sea	14.74	-					
	1	The second second		1	ALC: N		C. A. B	and the second second			7 10		The second	and a state	1000					
C 01 7		Charles Street	and store	and the second second		Sec. 1	10.00	Taxa and	L'ALL	a cin			A second		ALC: NO					
Classify		124	Sec. 1	1	and the second	-	100		THE REAL	ALC: NO.	100	Same.	No. of Lot.	States of	all a					
C Train		State of the second		and the second second	The second		a state	distant.	10.0		ALC: NOT	1.0	-	100	100					
		1000	The Real Property lies, name	-	-	1 1		1		-		1	- H-	- E	- State					
			-	and a state	1000	-	-	2. 7 1	3 .	and the second	TRITIE	100	JEL.	and the second	1					
		1	Ch.	114		100		1	10.00		4 14	and the second	ALC: NO	and the	101					
	-	the second	1	- These	The P	100.00	100	100			1-34	-		Sec. 1	Contraction of the local division of the loc					
				11 - W		1	1000	Part and	-		No. of Concession, Name	-	1	ALC: NOT THE OWNER.	Statement of					
		Bed Lat		Mr. B	and the second second	and the state	100	Sec. 1		all a	and The	and a			1					
		" I Down		1. 2. 1		and the	1	100		1			and the Party of	2000	1.1					
		100		The Party	-	100	Land I	A	a the	1	1.000	122	Barris Contraction	Station of the	Sugar St.					
		1000	Contrast of	States of the local division of the local di	-	L			and a		-	1 Party and		10.00	100					
		a T		The Party of	100	12.1	and.	1 15	and the second		mail and	1		100	-					
		All Property lies	-	1000	1 5	and in such	the state		Contraction of	The Tax		-		Sec. 1	and the second					
		and in such as	and the second	74	130	100	1. 19.5	ALC: NO	The d	1.1			1000	1.1						
		min a	10 mg	-	A PERMIT	100	100		-	24	28		APR A	A	1000					
		-	State 12	1 Same	- Spinking		10	-		1	100		A State	10.00	Sec.					
			- Carlos	ALC: NO.	1	J. Contraction	-	Sales and	1	1	1			-	1000					
KEY		A DESCRIPTION OF			All summer	and the	1	-		1000		ALC: NO	of the local division of the local divisiono	Concession in which the	1					
4		1	APR -		Contraction of the local division of the loc			With Lot of Lot	1.1	10	1	and the state of t	1000		100					
		A THE A		State of the second	and the second second	Station in which	ALC: N	1	B. Seren		and the second s	The state	ALC: NOT T	18. C						
₽ Block Zoom		Sec. 1		The set			No. of Concession, name	-	1	1			and the second	S. T. C.	1000					
Zoom		and in the	No. of Concession, name		and the second			-	and the second	The state	Day 1/6	- AL	1 1	-	-					
		Charles and	100	1	The Party of the P	100		-	1	and the second	ALC: NOT		18 C 10 1	-						
RST				-					1			-		Transfer of the	Contraction of the					
																				1
16																				Esit
																				-
Zoom 6	manual		e	Fred I	Ch. 1	0				n 1	11-1	1.								
Point 100	Refresh		Grass	Forb	Shrub	Cactus	s Litt	er S	Soil I	Rock	Unknow	Inva	214							
1100	Back																			

After the Statistics Files are created, look in the image folder. You'll see the database Excel file (DUBOIS2005.XLS), the data summary file (DUBOIS2005\_Summary.csv) and a text file listing the red green blue values of every classified pixel (DUBSOI2005\_RGB.rgb).

The .csv file is the summary that can be opened in Excel. It simply calculates % cover for each class for all images and is the starting point for statistical comparisons.

The .rgb file is simply a comma-delimited list of each classification with respective red, green and blue pixel values. This is sometimes useful to compare pixel color distribution among different classes. It can be opened in either Notepad or Excel.



If you Exit SamplePoint, you can examine the database using Excel. It shows the Key, Image file, Gridsize and classification of each point. The numbers beside the classification are the RGB values for the classified pixel. Custom button information is also stored in the database in columns HV-HX. You cannot open the database in SamplePoint if it is open in Excel on your PC, and vice-versa. You can add image files to the database manually using Excel by typing in additional keys and filenames or pasting them from a list. Filenames are case sensitive.

M	Microsoft Excel - DUB0I52005.XL5											
:	Eile	<u>E</u> dit <u>V</u> iew <u>I</u> ns	sert F <u>o</u> rmat <u>T</u> ools <u>D</u> ata	<u>W</u> indow	Help			Type a question	for help 🛛 🚽 🗖 🗙			
	2	🔒 🔒 🕼 🛍	🖺 •   🌖 •   Σ • Å	🛄 🔞	🙄 🕴 Arial	• 12 • <b>B</b> <i>I</i>	[1] 🛯 🗐 🗐 🔄 🛛	% , *.0 .00	🗄 • 🂁 • 🗛 • 💂			
	C9	-	f×									
	A	В	С	D	E	F	G	Н				
		<u> </u>	Comment	GridSize		Point2	Point3	Point4	Point5			
2		dubois_41.bmp		100	Soil, 192, 182, 174	Litter, 198, 190, 180	Soil, 141, 130, 129	Soil, 147, 155, 154	Soil, 141, 142, 134			
3		dubois_42.bmp		100	Soil, 192, 182, 174	Litter, 198, 190, 180	Soil, 141, 130, 129	Soil, 147, 155, 154	Soil, 141, 142, 134			
4		dubois_43.bmp				Litter, 124, 81, 66	Litter, 165, 136, 120	Litter, 143, 120, 95	Litter, 196, 149, 15			
5	4	dubois_44.bmp	SamplePoint is Awesome	100	Soil, 192, 182, 174	Litter, 198, 190, 180	Soil, 141, 130, 129	Soil, 147, 155, 154	Soil, 141, 142, 134			
6												
7 8												
9												
10			;									
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23 24												
24												

This is the Summary file displayed in Excel. It shows the % cover for each image by cover type. For each cover class, the first column shows the actual number of hits, and the second column shows the percent of hits in the image.

Σ	Microsoft Excel - DUBOIS2005_Summary.txt											
:	<u>F</u> ile	<u>E</u> dit <u>V</u>	'iew	Insert	F <u>o</u> rmat	<u>T</u> ools <u>D</u> ata	a <u>W</u> indow	<u>H</u> elp				
1	🚰 l	3 🔒	3	🛍	🗅 🖺 🛛	🤊 🛛 😣	$\Sigma - \frac{A}{Z} \downarrow \frac{Z}{A}$	l 🛍 🔞	📮 i Aria	al	- 10	- B I
	21		сь I	913	3	Pa 🔂   🔻	Reply with 🤇	_hanges E	<u>n</u> d Review	÷		
	B2	-		f <sub>x</sub>	dubois_4	1.bmp						
	Α		В		С	D	E	F	G	Н		J
1	Key	Image			GridSize	Actual	Grass	%Grass	Forb	%Forb	Shrub	%Shrub
2	1	dubois	<u>41.</u> ł	omp 📘	100	100	16	16.00%	1	1.00%	0	0.00%
3	2	dubois	_42.ł	omp	100	100	23	23.00%	4	4.00%	8	8.00%
4	3	dubois	_43.t	omp	100	100	16	16.00%	27	27.00%	0	0.00%
5	4	dubois	_44.8	omp	100	100	6	6.00%	45	45.00%	0	0.00%
6	5	dubois	_45.t	omp	100	100	23	23.00%	17	17.00%	0	0.00%
7	6	dubois	46.t	omp	100	100	29	29.00%	2	2.00%	6	6.00%

This is the RGB file in Excel. This file allows easy mathematical summary and analysis of the class color characteristics.

D	the second s		A DESCRIPTION OF TAXABLE PARTY.	11001	Reply wit	h Changes	End R
-	A1 A	₹ B	& Class C	D	E	F	(
1	Class	Rvalue	Gvalue	Bvalue	<del>-</del>		
2	Soil	189	179	169			-
3	Soil	146	145	129			
4	Soil	135	132	134			
5	Litter	154	175	169			
6	Soil	142	152	137			
7	Litter	138	145	132			
8	Soil	162	155	146			-
9	Grass	71	93	53			
10	Soil	170	163	157			
11	Soil	151	132	132			
12	Grass	119	128	109			
13		145	132	121			
14		128	105	96			
15		154	163	135			
16		189	199	204			-
17		155	150	130			
18	and the second s	186	174	171			
19	Litter	222	206	204			
20	Soil	173	162	146			-
21	Soil	158	150	138			
22	Litter	59	47	49			
23	Grass	101	103	85			
24	Grass	46	72	44			
25	Soil	154	139	129			
26	Contraction and the second second	111	123	98			
27	Soil	116	114	90			
28	Soil	128	108	106			
29	Soil	82	66	61			
30	Soil	167	153	151			
31	Soil	167	187	162			
32	Soil	148	140	126			-
33	Soil	115	100	92			
34	and the state of the second	146	142	129			-

# OPTIONS

•Defining custom buttons

- •Changing the number of classification points
- •Random classification points

The classification buttons can be defined by the user. To create up to 30 custom classes, click Options>Custom Buttons>Create Custom Button Files. Define the button labels with titles of 6-7 characters each, perhaps using NRCS species codes as button titles and including species and common names in the description field. Create one letter shortcuts for keyboard classification. Click Save when complete and name the button file.

[	📶 SamplePoin								_ 8 ×
	Options Help	NOTE: Rotate Image First, then adjust image parameters!							
	Change Cross		bmp		Next	Image Begin Comment			
1	Create Statisl Custom Butto Database Wiz Dual Monitor GoTo Image Launch SPTra Preload the N	ans ) Create Custom Button Files Display Descriptions in DataBase Load Default Buttons Load Custom Button File							
🚽 Define (	ustom Button	5							
		Description (optional)	ShortC	. Note: You	need the 1.4	7 or greater database to create shortcuts!	Description (optional)	ShortCut	
Button 1	PASM	Pascopyrum smithii (Rydb. A. Love (western wheatgrass)	w	Button 16					NOTE: To create a custom button file,
Button 2	HECO	Hesperostipa comata (Trin. & Rupr.) Barkworth ssp. comata (needle and thread)	t	Button 17			× *		enter the button labe in the corresponding fields as shown. A
Button 3	PSSP	Pseudoroegneria spicata (Pursh) A. Love (bluebunch wheatgrass)	р	Button 18			× •		blank field will result in an invisible button.
Button 4	FEID	Festuca idahoensis Elmer (Idaho fescue)	i	Button 19			* *		Save the definition into a file. After a
Button 5	BRTE	Bromus tectorum L. (cheatgrass)	C	Button 20			×		database has been loaded, use the men
Button 6	POSE	Poa secunda J. Presl (Sandberg bluegrass)	\$	Button 21			×		item to select a Custom Button File to Ioad the definition int
Button 7	VUOC	Vulpia octoflora (Walter) Rydb. (sixweeks fescue)	f	Button 22			×		the database. After the button is
3utton 8	Grass	Any grass not specifically covered by previous grass buttons	g	Button 23			×		loaded into the database, it will be
Button 9	Forb	Any broadleaf herbaceous plant	0	Button 24			×		used for classification and statisticial analysis.
Button 1		Any woody plant	h	Button 25			×		Also note that the
Button 1		Minimum diameter 1"		Button 26			×		'Load' Button can be used to edit an existing set of
Button 1		Any senesced, detached portion of the plant		Button 27			×		buttons. They still need to be saved
Button 1		Bare mineral soil and rocks <1" diameter	b	Button 28			×		when done. Note that the ShortC
Button 1		Areas of unknown identity due to shadow	d	Button 29			×.		characters must be alphabetic e.g. A-Z o
Button 1	5 7777	Unknown item	k	Button 30			× *		<b>a</b> −z.
		Cancel Load Stream	ave			a description can contain any character EX Y, y, N, and n are NOT allowed as ShortCut		255 characters.	
	Zoom 8	Refresh Grass Forb Shrub Cactus Litter So Back	il F	ock Unknow	Invasiv				

Navigate to the Image folder, name the button class file, then click Save.

đ	SamplePoin			
(	Options Help	NOTE: Rotate Image First, then adjust image parameters!		
	Change Cross Create Statist		rial\dubois_41.bmp Next Image Begin Comment	
	Custom Butto	ns Create Custom Button Files tard - Create DB Display Descriptions in DataBase Load Default Buttons Load Custom Button File cker		
Define Cu	istom Button	5		×
		Description (optional)	ShortCut Note: You need the 1.47 or greater database to create shortcuts! Description (optional) ShortCut	
Button 1	PASM	Pascopyrum smithii (Rydb. A. Love (western wheatgrass)	W Button 16 NOTE: To create	e, 🛛
Button 2	HECO	Hesperostipa comata (Trin. & Rupr.) Barkworth ssp. comata (needle and th	s a la spond	ding
Button 3	PSSP	Pseudoroegneria spicata (Pursh) A. Love (bluebunch wheatgrass)	will re	sult
Button 4	FEID	Festuca idahoensis Elmer (Idaho fescue)	- Save in: 🗁 SamplePoint Tutorial 🔽 🖛 🗈 📸 🎹 🕶 ble bu efinitio Aftera	
Button 5	BRTE	Bromus tectorum L. (cheatgrass)	as bere ether	en
Button 6	POSE	Poa secunda J. Presl (Sandberg bluegrass)	Recent a aerial.Btn tton F	
Button 7		Vulpia octoflora (Walter) Rydb. (sixweeks fescue)	Se. Se. Se. Str. Str. Str. Str. Str. Str. Str. Str	
Button 8	Grass	Any grass not specifically covered by previous grass buttons	Desktop	De
Button 9	Forb	Any broadleaf herbaceous plant	assific cial	ation
Button 10		Any woody plant	My Documents hat the	
Button 11		Minimum diameter 1''		ibe
Button 12		Any senesced, detached portion of the plant	Tof hey st My Computer	
Button 13	Soil	Bare mineral soil and rocks <1'' diameter	in the short state of the short	a d'A d
Button 14	Shadw	Areas of unknown identity due to shadow		be
Button 15	????	Unknown item	My Network Places	
			File name: GrassSpecies.Btn	
		Cancel Load Existing	Save as type: Custom Button Files (*.Btn,*BTN)  Cancel	
7				
	oom 8	Befresh         Grass         Forb         Shrub         Cactus         Litter           Back	itter Soil Rock Unknow Invasiv	

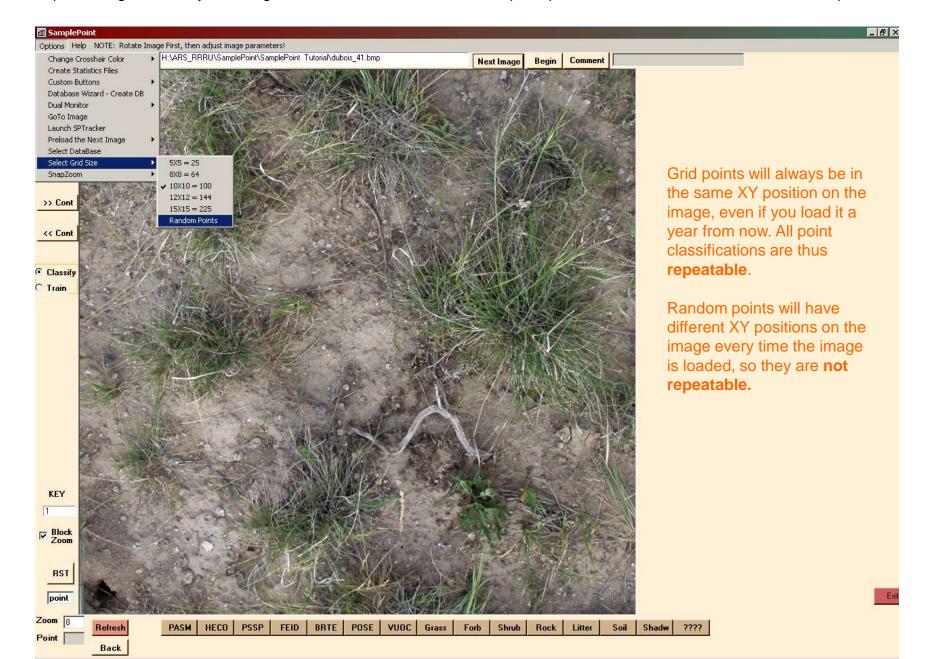
To activate the custom buttons, click Options>Custom Buttons>Load Custom Button File. Select the file you just created, or some other \*.btn file. Click Open. You must have a database loaded before you can load a custom button file.

📶 SamplePoint								_ 8 ×
Options Help NOTE: Rotate	Image First, then adjust image parame							
Change Crosshair Color Create Statistics Files	H:\ARS_RRRU\SamplePoint\Sa	mplePoint Tutorial\dubois_4	1.bmp	Next Image Begin	Comment	1		
Custom Buttons	Create Custom Button Files							
Database Wizard - Create DB					1 - an alling			
Dual Monitor	Load Default Buttons	CON CARD	A AND A A	State By aller				
GoTo Image	Load Custom Button File	MANTERS.	X XIA		Mar Harthan			
Launch SPTracker	THE REAL PROPERTY OF	Walter Mary			ALL ALL			
Preload the Next Image		Contract of the second s						
Select DataBase		)pen					? ×	
Select Grid Size								
SnapZoom		Look in:	🚞 SamplePoint Tul	orial	6	- 🎬 🎦		
>> Cont		20	🛅 Dubois 2m Image:	;				
Same -			aerial2.Btn					
<< Cont		Recent						
A national			🔎 aerial.Btn					
SI - SA			🔎 Grasses.Btn					
Classify	Y SALES AND THE REAL OF		GrassSpecies.Btn					
C Train								
	A STATISTICS	Desktop	🔎 riparian.Btn					
See 5 see								
	A CONTRACTOR							
A STATE		My Documents						
	Constant Constant							
3 - 1 - 1 - 1		<b>1</b>						
	金 萨 唐 《 图 二	<u>_</u>						
		My Computer						
and the second sec								
the second	Muddle Frank							
the second	A DI	S 10						
and the second se	Very all is the							
A AND A		My Network						
State Con	Contraction of the second	Places	1					
KEY	ALC: NO TO BE					-	0	
1			File name:	irassSpecies.Btn			Open	
	a free and a second						Connect	
Block Zoom	and the second s		Files of type: (	Custom Button Files	(*.Btn,*BTN)	<b>-</b>	Cancel	
Zoom	57 N 2 4							
and the second	The state of the s	Se Contraction		All and a star	Ates had the			
RST	1. S. 1. S. 1. 1.	1 TALSAL	Melan And	1 - Constant	Sa milli			
Here and			All parts		The B			
point	the the work	A No Co	NV ALLER O		The second			Exi
	MAN THE STATE	DEE THE	an canno had	Here all	Sector Mark			1.1
Zoom 8 Refresh	Grass Forb Shrub	Cactus Litter 9	ioil Rock Unknow In	vasiv				
Point								
Back								

The custom classes are now ready to use. The data saved to the database will be saved using these classes. The custom buttons must be in place prior to classification, with one exception: A class can be added to the end of a custom button file at any time with no adverse effect. Just follow the same steps as above and overwrite the old button file.



To change the number of classification points from the default of 100, click Options>Select Grid Size> and select the desired number of points. All points are systematically placed with equal points in rows and columns. The selected grid is used for all subsequent images unless you change it, or exit the software. Random point placement is also available for 25 to 200 points.



To ensure classification consistency across users, you can train users with a completed database. When any completed database is loaded, click the Train radio button. In Train mode, data is not written to the database, but is instead simply compared to the database and the user is given feedback on their classification. This is a good step to take when someone takes over SamplePoint classification duties from someone else.

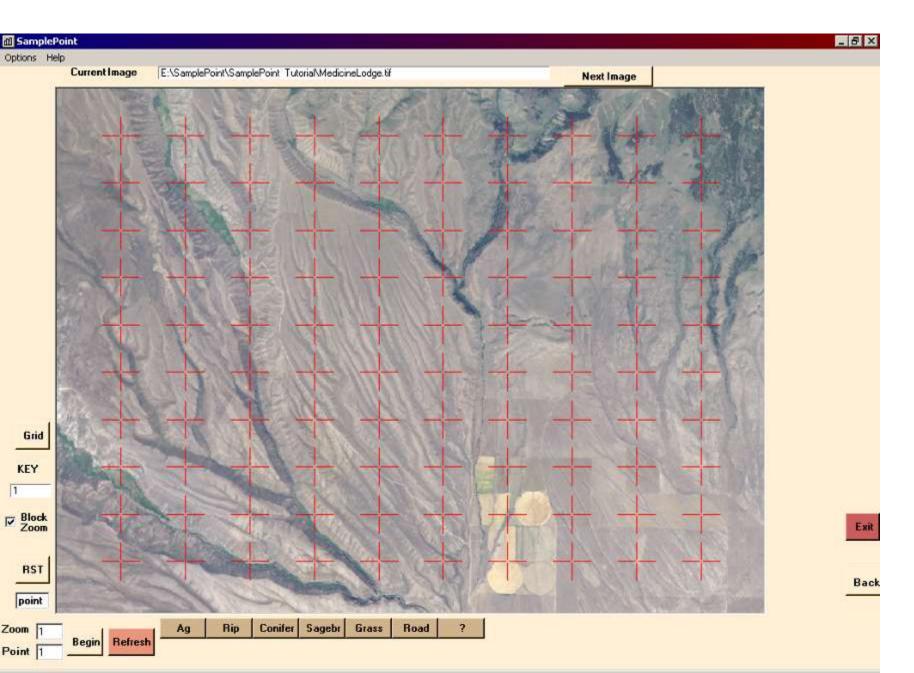
📶 SampleP	Point	_ 8 ×
	ap NOTE: Rotate Image First, then adjust image parameters!	
C DataBa	ise Cur Image H:\ARS_RRRU\SamplePoint\SamplePoint Tutorial\dubois_41.bmp Next Image Begin Comment	
Rotate		
Darken		
Lighten		
R	A DATA STRA	
>> Cont		
<< Cont	A REAL PROPERTY OF A REAL PROPER	
C Classify	🔚 Training Error 🔀	
• Train	ERROR	
	Your input = Rock	
	Your input = Rock DataBase = Soil	
	ОК	
<b>KEY</b>	A DECK OF A	
Block Zoom	the same that is a state of the same that the same the s	
RST		Exi
point		
Zoom 8 Point 1	Refresh         Grass         Forb         Shrub         Cactus         Litter         Soil         Rock         Unknow         Invasiv	
. one p	Back	

### APPLICATIONS

The previous example utilized images taken with the camera positioned 2m above ground level (AGL) using a camera stand. Aerial images are also easily analyzed using SamplePoint. This aerial image was acquired 100m AGL from a light airplane. SamplePoint operates in the same way regardless of the image type. Note the new custom buttons specific to this project.

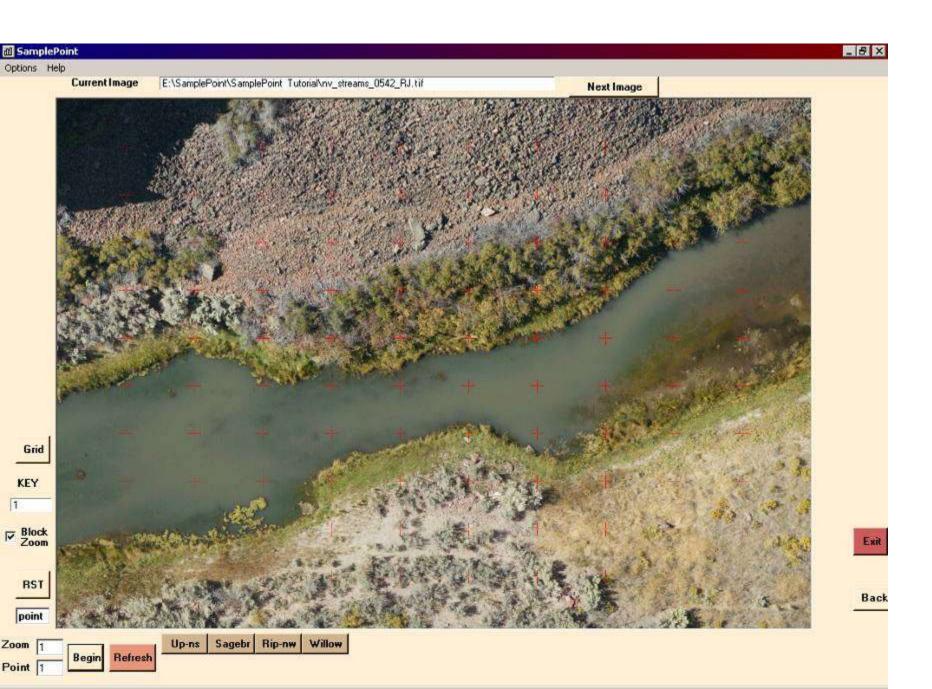


This image was acquired from 3000m AGL. Landscape-scale cover types, such as riparian zone, conifer forest, sagebrush steppe, etc., can be obtained using SamplePoint.

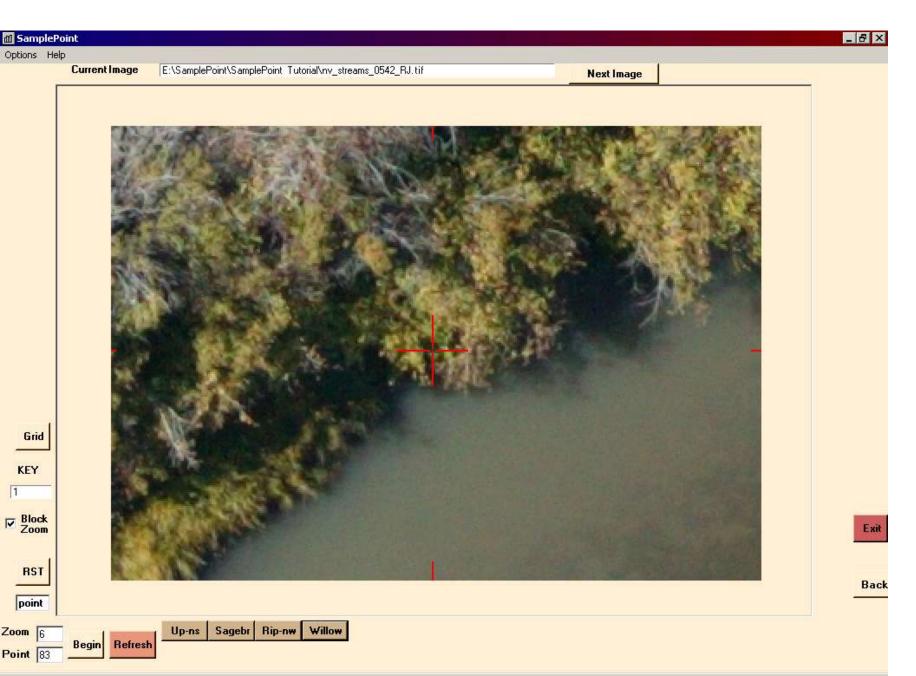


# APPLICATIONS

Previous examples demonstrate how to obtain cover measurements over an entire image, but cover measurements can also be made within a specific area of the image. For example, a user wants to measure the % willow cover within the riparian area, and the % sagebrush cover in the surrounding upland area. This can be done using 4 customized buttons: Willow, Sagebrush, Riparian-not willow (Rip-nw) and Upland-not Sagebrush (Up-ns). Demonstration made with SamplePoint v1.25. The custom buttons are created and loaded, and a database is created with a single aerial image (≈ 2cm GSD).



Points falling in water are here classified as "Riparian-not willow" but it would be a simple change to add a separate water class for those points.



#### **Classification results:**

Sagebrush = 6% Upland Non-sagebrush = 39% Willow = 15% Riparian Non-willow = 40%

An implicit assumption is that sagebrush are found only in upland areas, and willows are found only in riparian areas. If this assumption is true, then any point classified as willow is inherently classified as riparian. Thus, willow cover in the riparian area is calculated as:

Willow / (Willow + Riparian Non-Willow) = 15 / (15 + 40) = 27%

And, sagebrush cover in surrounding upland area is calculated as:

Sagebrush / (Sagebrush + Upland Non-sagebrush) = 6 / (6 + 39) = 13%

Conclusion of this classification:

Willow cover in the riparian area is 27%, and Sagebrush cover in the surrounding upland area is 13%.

# APPLICATIONS

Because systematic classification points are assigned based on image size, and are always located in the same X,Y position for images of equal size, SamplePoint provides a simple way to perform accuracy assessments on image classification by software like Erdas Imagine or VegMeasurement.



Export the processed image from VegMeasure or Imagine as a TIF or BMP, and run both the original and processed images through SamplePoint. In this example, a processed image from VegMeasurement was used. Since point 1 will occupy the same X,Y location on both images, classification accuracy can be determined by comparing the known to classified for a number of points over a number of images.

For example, point 1 in the original image is classified as bare ground. Point 1 in the classified image is white, so point 1 was correctly classified.

To perform the assessment, the first step is to classify all points into the classes of interest, though you cannot change buttons mid-assessment. In this example, white color is classified as bare ground, black is classified as other.

REMEMBER: You must use systematic point distribution for this operation.

Microsoft Excel - NNSG-VMAccuracyCheck-RESULTS.xls								
:	<u>File E</u> dit <u>V</u> iew <u>I</u> nsert F <u>o</u> rmat	<u>T</u> ools <u>D</u> ata <u>W</u> indow <u>H</u> elp						
1	😂 🛃 💪 i 🎒 i 🎇 i 🖻 🛍 • i i	🔊 -   🤮 Σ - A 🖁 🗛   🛄						
📴 🖆 🚵 🧠 🦉   🏹 🏷   💆 🎭 📦   💖 Reply with Changes								
D2000 ▼ f								
	A	В						
1	other, 0, 11, 0	bare, 255, 255, 255						
2	other, 10, 21, 14	bare, 255, 255, 255						
3	other, 10, 22, 33	bare, 255, 255, 255						
4	other, 100, 99, 80	bare, 255, 255, 255						
5	other, 101, 108, 94	bare, 255, 255, 255						
6	other, 101, 118, 77	bare, 255, 255, 255						
7	other, 102, 129, 110	bare, 255, 255, 255						
8	other, 102, 57, 42	bare, 255, 255, 255						
9	other, 102, 78, 63	bare, 255, 255, 255						
10	other, 103, 109, 104	bare, 255, 255, 255						
11	other, 103, 69, 59	bare, 255, 255, 255						
12	other, 104, 103, 112	bare, 255, 255, 255						
13	other, 104, 81, 53	bare, 255, 255, 255						
14	other, 104, 93, 87	bare, 255, 255, 255						
15	other, 105, 120, 62	bare, 255, 255, 255						
16	other, 106, 119, 44	bare, 255, 255, 255						
17	other, 106, 83, 67	bare, 255, 255, 255						
18	other, 106, 99, 95	bare, 255, 255, 255						
19	other, 107, 111, 85	bare, 255, 255, 255						
20	other, 107, 81, 78	bare, 255, 255, 255						
21	other, 108, 97, 98	bare, 255, 255, 255						
22	other, 109, 130, 115	bare, 255, 255, 255						
23	other, 110, 106, 72	bare, 255, 255, 255						
24 25	other, 110, 115, 92	bare, 255, 255, 255						
25	other, 110, 117, 77 other, 180, 168, 161	bare, 255, 255, 255 bare, 0, 0, 0						
20	other, 110, 95, 88	bare, 255, 255, 255						
28	other, 111, 109, 104	bare, 255, 255, 255						
20								
A → N Original / Images / Processed Combined								

The second step takes place in Excel. Sort the data from the database into two columns, where original images line up with processed images precisely. For example, point 56 of original image 28 lines up with point 56 of processed image 28. Sort both columns in ascending order. For a binary classification, this will lump the data into 4 groups:

Other – Other (Correct classification) Bare – Bare (Correct classification) Other - Bare (Omission error)

Bare – Other (Commission error)

Overall accuracy is calculated as:

Correct / (Correct + Incorrect) The use of an error matrix will facilitate the calculation of user's and producer's accuracy rates (Congalton 1991).

This technique allows, by default, an assessment of user classification accuracy. If bare ground is always white in the processed image, then any point with black RGB values that is classified as bare ground is an error, and vice versa. This yields the user error rate, as opposed to the software error rate.

Congalton, RG. 1991. A review of assessing the accuracy of classification of remotely sensed data. Remote Sens. Environ. 37:35-46.

		Original Images (Reference Data)		
		Bare Ground	Other	Total
Processed	Bare Ground	60	134	194
Images	Other	434	1372	1806
	Total	494	1506	2000

A simple error matrix set up with original image classification data in columns, and processed-image classification data in rows. For example, a total of 494 points were classified as Bare Ground in the original images, but only 194 points were so classified by the automated analysis.

*Overall Accuracy* = (60 + 1372)/2000 = 71.6%

This is often a misleading statistic if what you're really interested in is a small class, such as bare ground. Measures of accuracy that ignore other classes are more useful.

### **Bare Ground:**

*Producer's Accuracy:* Probability that a point of known cover type is correctly classified by the software.

60/494 = 12.1%

*User's Accuracy:* Probability that a point classification made by the software is correct. 60/194 = 30.9%



**United States Department of Agriculture** 



The SamplePoint concept was developed by the USDA Agricultural Research Service, Rangeland Resources Research Unit in Cheyenne, Wyoming, and the USDI Bureau of Land Management Wyoming State Office, Cheyenne, WY. Software code was written by Robert Berryman of Boulder, CO. Installation file was generated using Nullsoft Install System v 2.11. SamplePoint is free software available at www.SamplePoint.org

For user information not covered in this tutorial, click Help>Contents to open the PDF Help File. For publications on SamplePoint, go to <u>www.SamplePoint.org</u>.

This Tutorial is current as of February 1, 2012.

For technical assistance, email support@samplepoint.org

