Extraction of Landcover Area within Multiple Buffers

These instructions enable you to create multiple ring buffers – separate concentric zones (Multiring) and overlapping inclusive zones (Overlap) – using ArcGIS 9.3 with a custom toolbox containing python script tools. Two steps are involved:

- 1. Create multiple ring buffers
- 2. Intersect with landcover, dissolve by landcover class, and calculate areas



The Multiple Ring Buffer tool built in to ArcToolbox will do the same for the initial step of this analysis;

however, it has two issues for this particular analysis: 1) the creation of 10s to 100s of buffer rings is laborious and error-prone using the GUI; and 2) the dissolve function causes overlapping features to become blended together. The second step of the



analysis can also be done with the built-in ArcToolbox tools but the custom toolbox helps to automate the process.

When generating the multiple buffers you have the option of keeping the overlapping inclusive zone

buffers (the default is to delete them). The graphic to the left shows the difference between the two buffer types.



The tools are meant to be fairly generic for any type of ecological landscape analysis. Please note that the instructions here use a wetland ecology application whereby successive distances from pond edge are analyzed for landcover composition.

ORIGINAL DATA

ponds.shppolygons of input features that you want to create
successive zones surrounding it (this may be
points, lines, or polygons)landcover.shppolygons of landcover classes (this may be from a
vectorized satellite classification or digitized air
photo interpretation)

CREATED DATA

pond_MulitiRing.shp	polygons of successive concentric zones that do NOT overlap (i.e. donut rings)
pond_OverlapBuffer.shp	polygons of successive inclusive zones that DO overlap (i.e. pancakes of ascending sizes) – this is NOT created by default; select 'YES' if you want this output!
pond_MultiRing_Landcover.shp	polygons resulting from the intersection and dissolving of pond_MultiRing.shp with landcover.shp

Set up the ArcMap document with the custom toolbox:

- 1. Start ArcMap with a new empty map document
 - 2. Click the SHOW ARCTOOLBOX WINDOW button (if ArcToolbox is currently hidden)





Show Help >>

Run the 1_MultiBufferConcentricZones tool:

- 7. In ArcToolbox, double-click on 1_MultiBufferConcentricZones tool to open it
- 8. Click SHOW HELP button to view information about the tool
- 9. As you click on each of the parameters, the help sidebar provides information about that parameter
- 10. Click the TOOL HELP button to open the help file
- 11. Specify the following parameters:
 - Input Features: ponds.shp
 - Unique ID Field: POND ID
 - Maximum Buffer: 1000
 - Increment: 100
 - Output Workspace: C:\yourworkingdirectory\OUTPUT (or whatever your folder is named you can also create a new folder for this purpose)
 - Keep Overlap Output? NO is the default

(nput Features	1_MultiBufferConcentricZones
C:\WorkSpace_Research\BrettS\20090625\ponds.shp 🛛 🗃	Contract of the state of the st
Unique ID Field	Creates new polygon ring features using
POND_ID	a set of buffer distances derived by
Maximum Buffer	incrementing to a maximum buffer. This
1000	tool differs from ArcGIS' built-in multiple
Increment	ring buffer tool in two ways: 1) a very
100	automatically created 2) it allows for
Dutput Workspace	overlapping input features when dissolved
C:\WorkSpace_Research\BrettS\20090625\OUTPUT	to separate concentric zones
Keep Overlap Output?	ccn@ualberta.ca
NO	
	9

12. Click OK; wait a long while... then dismiss the status dialog when completed 13. Click the ADD DATA button and add the **pond_MultiRing.shp** file to the map

	Attri	butes of po	ond_MultiRing		_	
	FID	Shape *	B_AREA	FIRST_POND	LAST_BUFF_	
E	0	Polygon	103362.046723	400	100	
	1	Polygon	149658.415301	400	200	
	2	Polygon	212103.25677	400	300	=
	3	Polygon	274765.417009	400	400	
	4	Polygon	337491.148957	400	500	
	5	Polygon	400257.612159	400	600	
	6	Polygon	463027.081664	400	700	
	7	Polygon	525805.405295	400	800	
	8	Polygon	588590.024654	400	900	
	9	Polygon	651379.684255	400	1000	
	10	Polygon	161231.118327	405	100	
	11	Polygon	192389.42008	405	200	
	12	Polygon	253202.984292	405	300	▼
Record: II I I I I Show: All Selected Records V						

15. CLOSE table when finished

document

- 14. Right-click on the layer name to OPEN ATTRIBUTE TABLE – notice the field headings:
 - B_AREA total area of each buffer ring
 - FIRST_POND this corresponds to the original unique ID field you specified
 - LAST_BUFF_ this corresponds to the buffer distance and is a multiple of the increment you specified

Run the 2_MultiIntersectAreas tool:

- 16. In ArcToolbox, double-click on 2_MultiIntersectAreas tool to open it
- 17. The help sidebar provides information about each parameter
- 18. Optionally, click the TOOL HELP button to open the help file
- 19. Specify the following parameters:
 - Input Buffer Features: pond_Multipart.shp
 - Unique ID Field: FIRST_POND (this will be different if using the *_OverlapBuffers features if you selected YES in the previous tool)
 - Buffer Distance Field: LAST_BUFF_ (this will be different if using the *_OverlapBuffers features if you selected YES in the previous tool)
 - Buffer Area Field: B_AREA
 - Input Landcover Features: landcover.shp
 - Landcover Class Field: Number
 - Output Workspace: C:\yourworkingdirectory\OUTPUT

Input Buffer Features	2_MultiIntersectAreas
C:\WorkSpace_Research\BrettS\20090625\OUTPUT\pond_Mu 🛛 🗃	
Unique ID Field	To help analyze the amount of classes
FIRST_POND	within multiring buffers, this tool performs
Buffer Distance Field	an intersect overlay, a dissolve on user-
LAST_BUFF_	specified fields (output as multipart), and
Buffer Area Field	finally calculates the percent area for
B_AREA	each grouping of user-specified fields
Input Landcover Features	(i.e. unique buffer ID, buffer distance, and
C:\WorkSpace_Research\BrettS\20090625\landcover.shp 🛛 🗃	class values). ccn@ualberta.ca
Landcover Class Field	
Number 💌	
Output Workspace	
C:\WorkSpace_Research\BrettS\20090625\OUTPUT	
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- 20. Click OK; wait a short while... then dismiss the status dialog when completed
- 21. Click the ADD DATA button and add the pond_MultiRing_Landcover.shp file
- 22. Right-click on the layer name to OPEN ATTRIBUTE TABLE

UNIQUE COMDINATION Of III Attributes of pond_MultiRing_Landcover	I Attributes of pond_MultiRing_Landcover						
Unique ID	I_AREA	PERCENT					
(FIRST POND).	35026.064401	33.886775 📟					
1 Polygon 103362.046723 400 100 6	6657.597425	6.441046					
DUTTER DISTANCE 2 Polygon 103362.046723 400 100 9 1	13425.246827	12.988565					
(IAST BLIFE) and 3 Polygon 103362.046723 400 100 12 1	10432.095884	10.092772					
4 Polygon 103362.046723 400 100 13 1	13729.932535	13.28334					
IandCover class 5 Polygon 103362.046723 400 100 16	61.962017	0.059947					
(Number) fields there 6 Polygon 103362.046723 400 100 17 2	24029.147629	23.247554					
7 Polygon 149658.415301 400 200 3 4	48954.093726	32.710552					
are automatically 8 Polygon 149658.415301 400 200 6	5910.073174	3.949042 🔽					
calculated intersection Record: II I II Show: All Selected Records (0	0 out of 424 Sele	ected)					

percent composition (PERCENT) values (I_AREA / B_AREA).

23. Click the OPTIONS button to EXPORT the table to .dbf or .txt file for external use