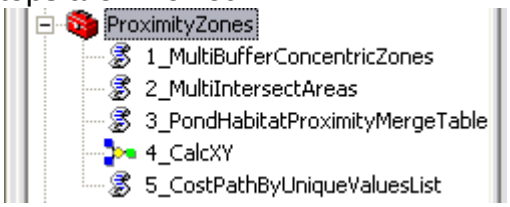
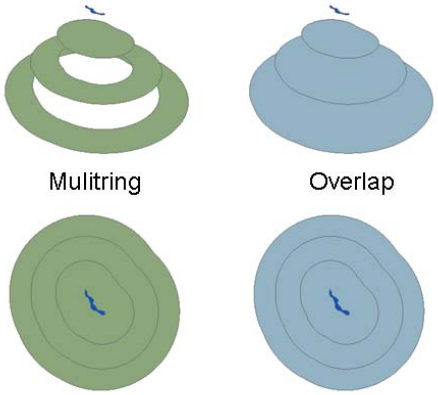
Extraction of Landcover Area within Multiple Buffers

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:

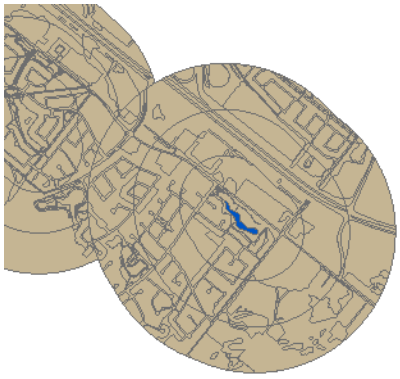
1. Create multiple ring buffers
2. Intersect with landcover, dissolve by landcover class, and calculate areas



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

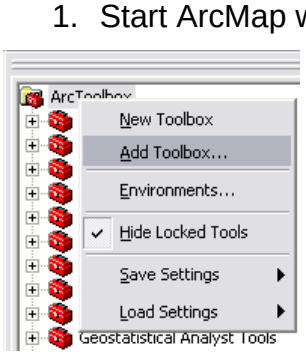
ponds.shp	polygons of input features that you want to create successive zones surrounding it (this may be points, lines, or polygons)
landcover.shp	polygons of landcover classes (this may be from a vectorized satellite classification or digitized air photo interpretation)

CREATED DATA

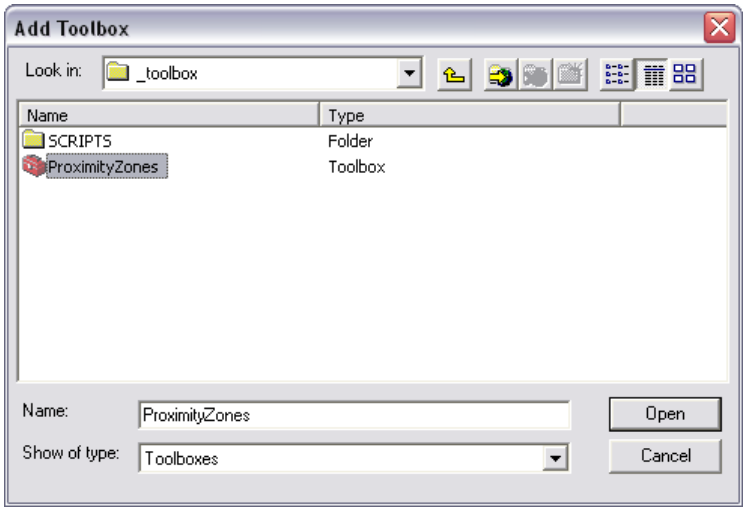
pond_MulitiRing.shp	polygons of successive concentric zones that do NOT overlap (i.e. donut rings)
pond_OverlapBuffer.shp	polygons of successive inclusive zones that DO overlap (i.e. pancakes of ascending sizes) – *this is NOT created by default; select 'YES' if you want this output!*
pond_MultiRing_Landcover.shp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

Set up the ArcMap document with the custom toolbox:

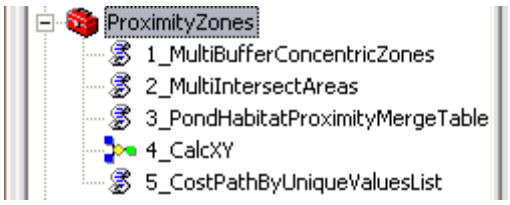
1. Start ArcMap with a new empty map document
2. Click the SHOW ARCTOOLBOX WINDOW button (if ArcToolbox is currently hidden)



3. Right-click on ArcToolbox and choose ADD TOOLBOX



4. Navigate to the directory that contains the **ProximityZones.tbx** file, select it and click OPEN
5. Click the "+" beside **ProximityZones** to expand the toolbox and view all the tools it contains

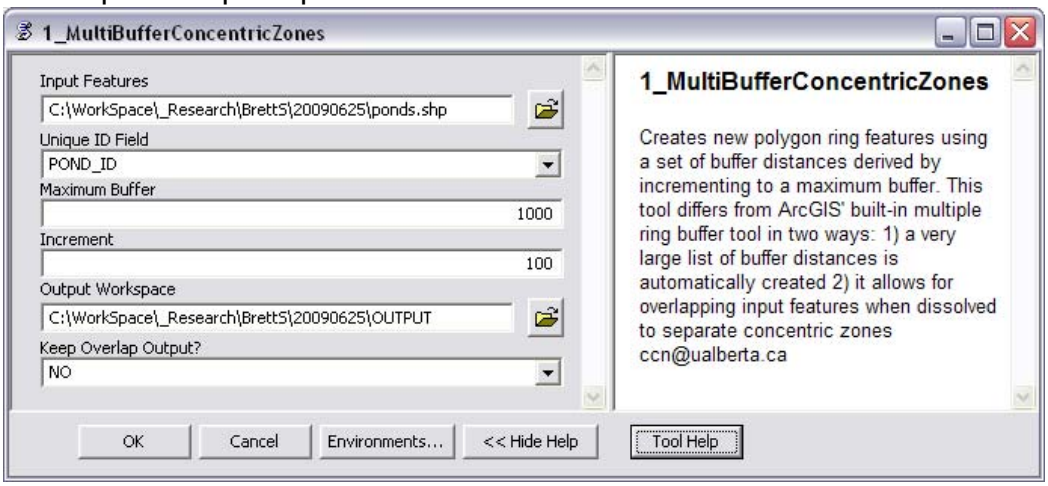


6. Click the ADD DATA button and add the following layers:
   - landcover.shp
   - ponds.shp

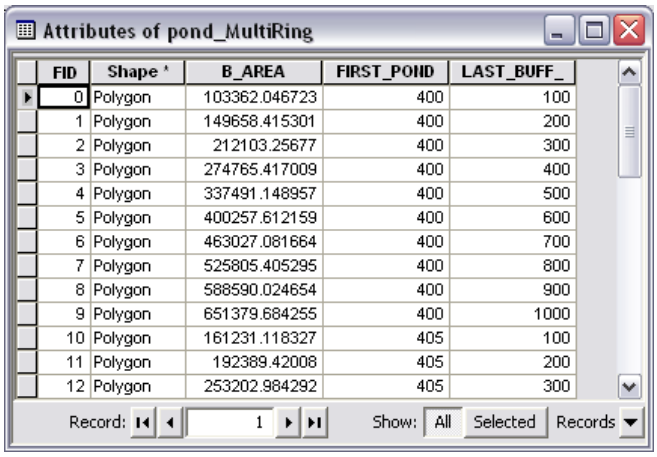
Run the 1_MultiBufferConcentricZones tool:

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



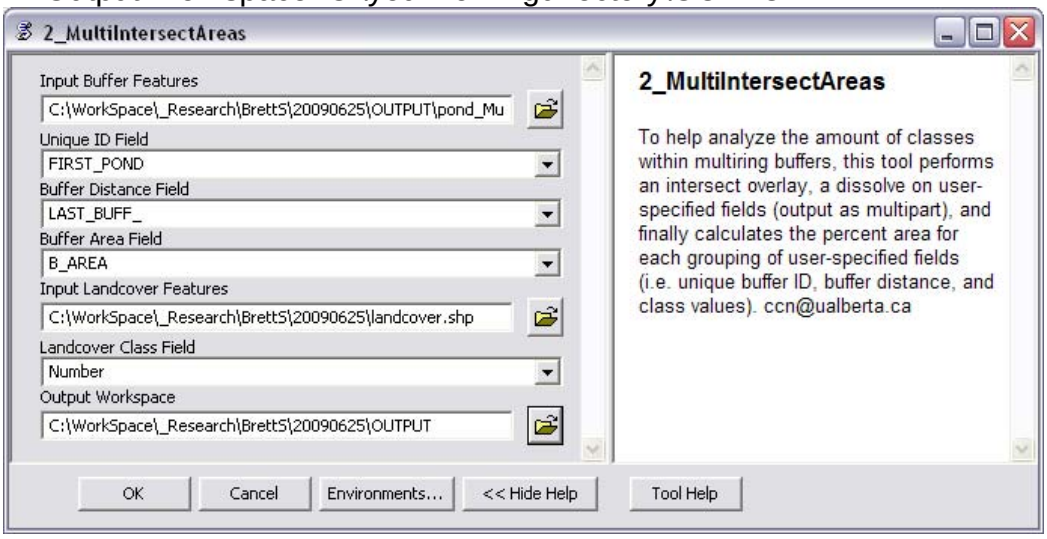
12. Click OK; wait a long while… then dismiss the status dialog when completed
13. Click the ADD DATA button and add the **pond_MultiRing.shp** file to the map document



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
15. CLOSE table when finished

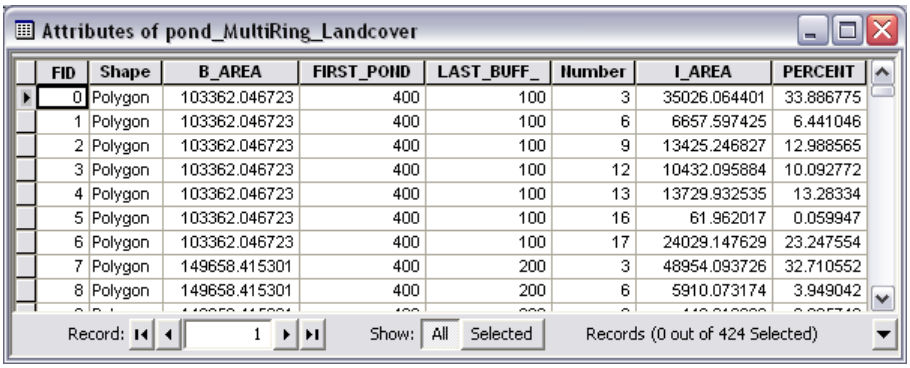
Run the 2_MultiIntersectAreas tool:

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



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

For every possible unique combination of unique ID (FIRST_POND), buffer distance (LAST_BUFF_), and landcover class (Number) fields, there are automatically calculated intersection area (I_AREA) and 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