

Land Use/Land Cover Characterization for Well Networks Digitizing Quick Start Guide

These are basic instructions to get you started digitizing your Study Unit's land-cover data for the NAWQA land use/land cover characterization for well networks (LULC). These brief instructions are written for someone who already knows the basics of using ArcGIS. Remember – only areas that are at least 5% of the buffer area need to be digitized. These instructions cover:

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1) Introduction and naming conventions and required directory structure

The land use/land cover (LULC) characterization for well networks is a task required for all National Water-Quality Assessment (NAWQA) program ground-water sites that are in a land use or reference network (specific instructions about the LULC characterization task are provided at <http://water.usgs.gov/nawqa-only/luchar/>). The LULC characterization is done by study unit personnel usually around the time the well network is sampled and the digitized LULC spatial data is sent to Terri Arnold to be QA/QCd and archived. The QA/QC and archiving formerly was managed by the Central Processing Group (CPG) (until Sept 2007).

The LULC characterization and archiving process has evolved over the years. During cycle 1 of the NAWQA program (1991-2001), a series of amls that ran in ArcInfo workstation were used to digitize the LULC data into coverage format. As of September 2007, the digitizing process is being migrated into ArcGIS where data is digitized into the file geodatabase format.

Naming conventions (using index numbers as names)

Spatial datasets are named following a specific method. Please follow this method. If you are updating LULC for a previously mapped site, please use the same index number to name the data set. If you are creating a new LULC data set, please select the next sequentially highest number not already used by your study unit for any network. Use this look up table to verify which CPG index numbers/STaIDs that already have been used:

http://water.usgs.gov/nawqaonly/luchar/LU_SpatialData/staidindex.dbf.

The index-number naming convention is unique within each Study Unit (SUID) folder.

Dataset suffix descriptions:

w(index)_ptc

Wellpoint derived from latitude/longitude coordinates. This point cover contains the Well attribute fields.

w(index)_pti

Wellpoint derived visually from the rectified image. This is an optional dataset that is used to generate the 500-meter buffer when a visual discrepancy is observed between the coordinate derived well location, and the location observed on the image. This dataset does not contain well attributes. It is primarily used to spatially generate the adjusted 500-meter buffer.

Note: the PTC cover is never deleted, even when an optional PTI wellpoint is created. It always remains as a reference cover, and is the source cover used to update the STAID_CPGNAME.LUT lookup table.

w(index)_acc

Accuracy buffer cover generated from the GPS error (if reported)

w(index)_buf

the 500 meter landuse buffer cover

w(index)_lu

the 500 meter LULC cover. This coverage contains the LULC, Drainage, and Irrigation attribute fields.

w(index)_rps

Control points (registration points) cover used for in-house image rectification. The images created from this process are being replaced over time with USGS DOQs (digital-ortho-photoquads) where available.

The image names, use the full STAID as a naming component.

w(STAID).tif -- the background image (usually DOQ) used for lulc digitizing

w(STAID).tfw -- the image worldfile used for geo-referencing

Required Directory Structure

Please place your spatial data in the following directory structure. Make a folder named data. Inside that folder create a folder named your study unit abbreviation. Inside that folder place your spatial data and metadata. For example:

data → lirr → lirr.gdb

When you submit your data for archiving, you will submit the entire data folder

2) Getting started:

You will use a copy of the previous LULC as a base for updating the spatial data to current land use conditions. Download your Study Unit's last land-use characterization spatial geodatabase from LULC web page <http://water.usgs.gov/nawqa-only/luchar/> (fig. 1).

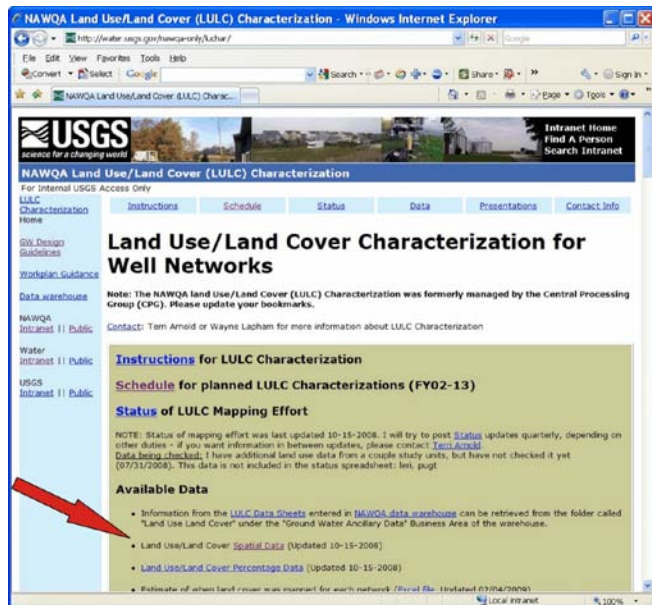


Figure 1. You can download the previous LULC Spatial Geodatabase from the Web.

Extract the zip file and save the geodatabase as the name SUID_currentyear.gdb (ex: lirr_2009.gdb).

Start a new ArcMap document.

Add the land use (w##_lu) and well point (w##_ptc) features from the downloaded geodatabase for one of your wells to your map document. I suggest making your land use hollow with red lines (thicker lines are easier to see). Check the boxes to display the land use and point features. A key to the 'w' index numbers and corresponding well STAID is available on the web site where you downloaded the spatial data: <http://water.usgs.gov/nawqa-only/luchar/LULCSpatialData.html#relatefiles>

Add ESRI's world imagery or an equivalent from the Main File Menu using the 'Add Data from Resource Center' Option. Select 'Imagery' and save to your desktop (remember the location). Add the World Imagery Layer to your ArcMap document. If you get a message about 'Geographic Coordinate System Warning' because of different coordinates, click OK.

Check the position of the land use and well points by plotting them over the imagery. For various and unidentified reasons, some Study Units have misaligned LULC spatial data. If the well point does not plot over the imagery in the correct location then create a new point feature for your well and create a new 500-m buffer around the correct well point. Use as much of the previous LULC line work in your new buffer as possible. If it doesn't make sense to use any of the line work because the position is too far off, then remap the entire LULC. If you have questions, please see the LULC FAQs (<http://water.usgs.gov/nawqa-only/luchar/TroubleshootingFAQ.htm>) or you can contact Terri Arnold (tlarnold@usgs.gov).

In the Selection tab (fig. 2) of the table of contents along the left side, make sure your land use featureclass is selected with a check mark. This will allow you to select and edit features in the land use featureclass.

Turn on the Editor and Topology Editor toolbars (fig. 2).

On the Editor toolbar, select 'Start Editing'.

Set the Editor toolbar Target to the current land use feature.

On the Editor toolbar, select 'Snapping' and then check the boxes for the land use layer (vertex, edge, and end). Also check 'Edit sketch' and 'Topology Elements'. Close the snapping toolbox.

On the Editor toolbar, select Editing Options. Go to the General tab and set the snapping tolerance to 1 pt. Select 'Show snap tips'. Make Stream mode 'Group 25 points together when streaming'. Click 'Ok' to close the options dialog box.

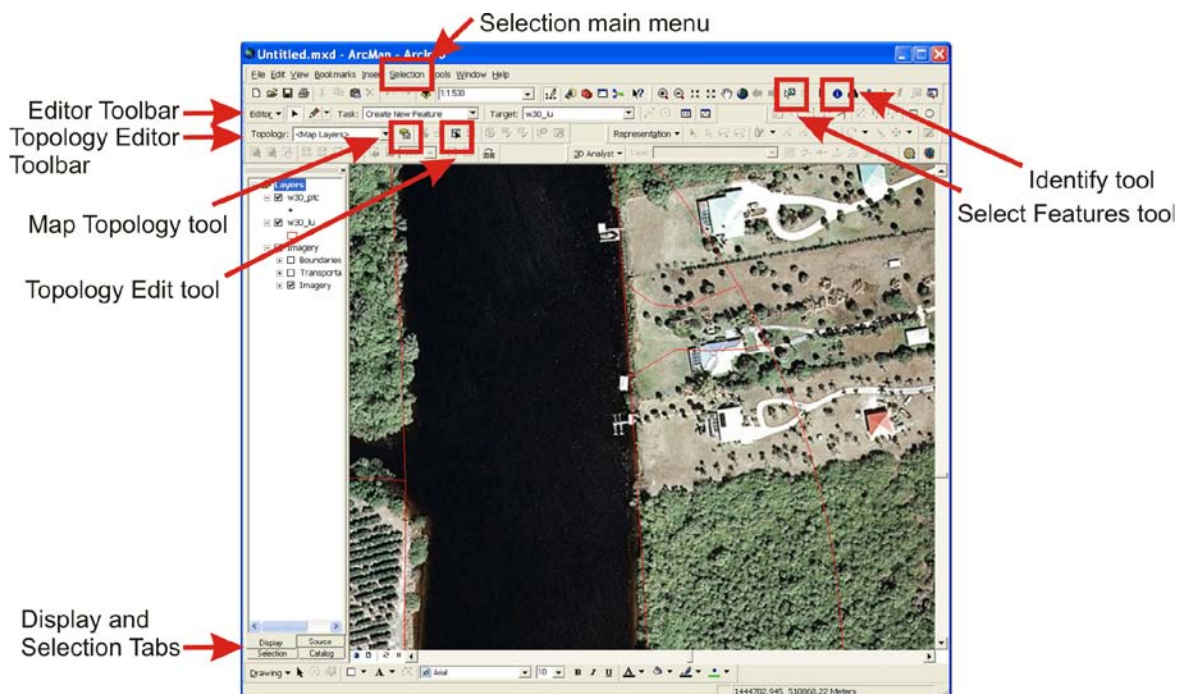


Figure 2. Toolbars and menus mentioned in this quick start guide.

4) Delete one of two adjacent polygons - merge two polygons together:

On the Topology toolbar, select the 'Map Topology' tool (fig. 2). Check the box next to the current land use feature and click ok.

With the regular Select Features tool (fig. 2), select one polygon, hold down the shift key and select the second polygon. Two polygons should be highlighted (fig. 4)

On the Editor toolbar, click on editor and then select Merge (fig. 4). In the dialog box, select one of the features to be merged into the other one (deleted). Click ok.

Check and edit attributes of remaining polygon as needed. Use the Identify tool (fig. 2) to check the attributes of the original and new polygons. If the attributes need to be updated then do the following: In the Display tab (fig. 2) of the table of contents along the left side, right click on the name of the land use feature and select open attribute table. The selected feature should be highlighted. Update attributes as needed. Close attribute table by clicking on the red x in the upper right hand corner.

Go to Selection main menu (fig. 2) along the top menu bar and select 'clear selected features'.

On the Editor toolbar (fig. 2), select 'Save Edits'. This saves the edits you just made. Saving the map document with 'Save' on the Main File menu will NOT save your edits – that save only saves the map document layout.

If you are finished editing, then select 'Stop Editing' on the Editor toolbar (fig. 2).

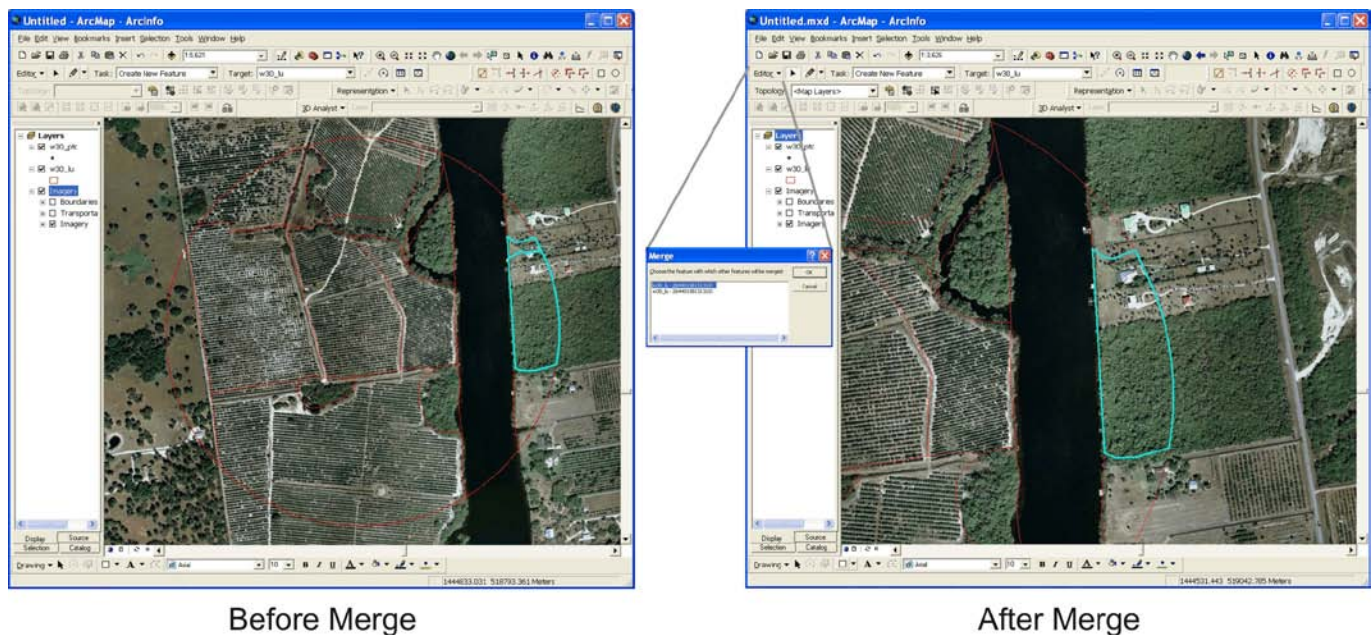


Figure 4. Before the merge, there will be two polygons selected. After the merge, there will only be one of the two polygons remaining.

5) Change the shape of a polygon to incorporate a new area of similar land use:

On the Topology toolbar, select the 'Map Topology' tool (fig. 2). Check the box next to the current land use feature and click ok.

On the Topology edit tool, select the 'Topology Edit' tool (fig. 2).

Select the edge that you want to reshape. A single line should be highlighted.

On the editor toolbar task menu, select 'Topology task, reshape edge'

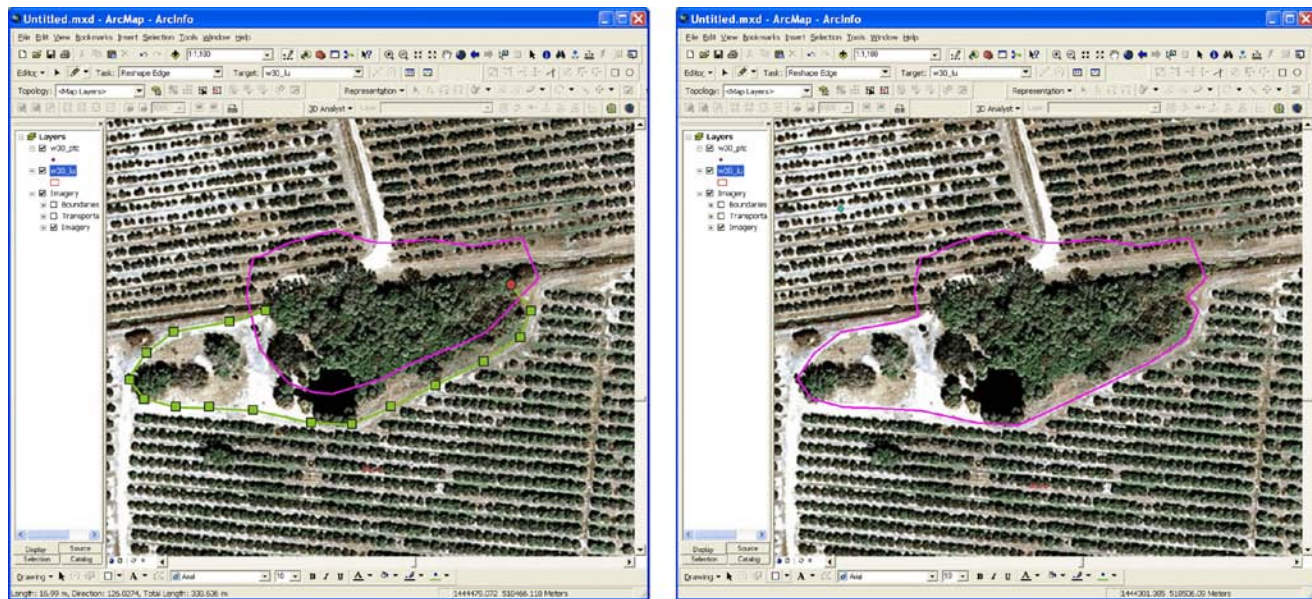
Select the pencil on the Editor menu. Draw the shape of the new edge following the imagery (fig. 5). Begin the sketch inside the original polygon that you want to make bigger, click once each time you want to add a new vertex to follow the imagery and end the sketch inside the original polygon by double clicking or right click and select 'Finish Sketch'.

Check and edit attributes of remaining polygon as needed. Use the Identify tool (fig. 2) to check the attributes of the original and new polygons. If the attributes need to be updated then do the following: In the Display tab (fig. 2) of the table of contents along the left side, right click on the name of the land use feature and select open attribute table. The selected feature should be highlighted. Update attributes as needed. Close attribute table by clicking on the red x in the upper right hand corner.

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If you are finished editing, then select 'Stop Editing' on the Editor toolbar (fig. 2).



Before Reshape

After Reshape

Figure 5. Reshape the edge of a polygon to expand the polygon or fix the boundary to align with the imagery. Before reshaping the polygon edge, the forest polygon does not align with the imagery. After the first reshaping, an additional edit could be made to make the top of the polygon match the imagery better.