

## Guidelines for Building US National Grid Polygons with ArcGIS

These guidelines assume a basic understanding of using ArcGIS, including opening attribute tables, removing and adding fields, and installing extensions and VBA macros. These guidelines also only work when building polygons that are wholly contained within one UTM zone! If creating polygons that span UTM zones, please see

[http://www.floridadisaster.org/gis/USNG/Documents/Creating\\_USNG%20Polygons.pdf](http://www.floridadisaster.org/gis/USNG/Documents/Creating_USNG%20Polygons.pdf).

1. Prior to building USNG polygons, tools are required to build identical sized grids and calculate X,Y coordinates for center points of polygons.

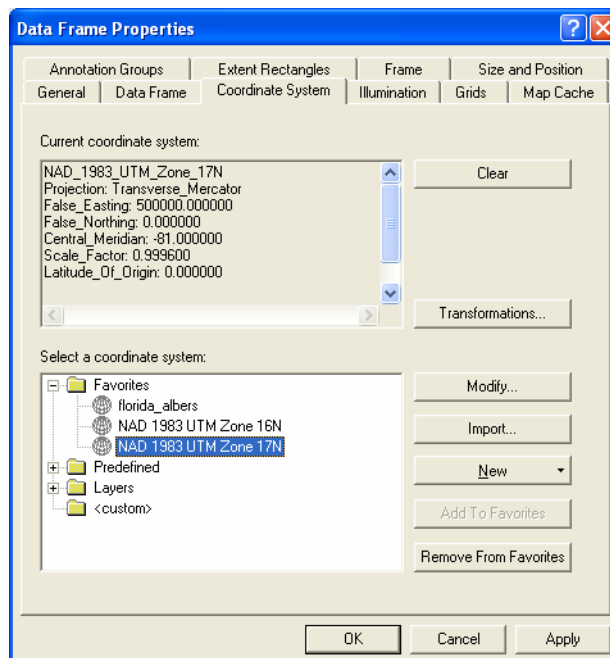
Numerous tools are available to accomplish these tasks – like XTools, Military Analyst, and other extensions to ArcGIS. The following 2 tools are recommended as they are absolutely free, available from ESRI’s ArcScripts, and come with good documentation on installation and use –

Fishnet - <http://arcscrips.esri.com/details.asp?dbid=12807> (courtesy of Robert Nicholas)

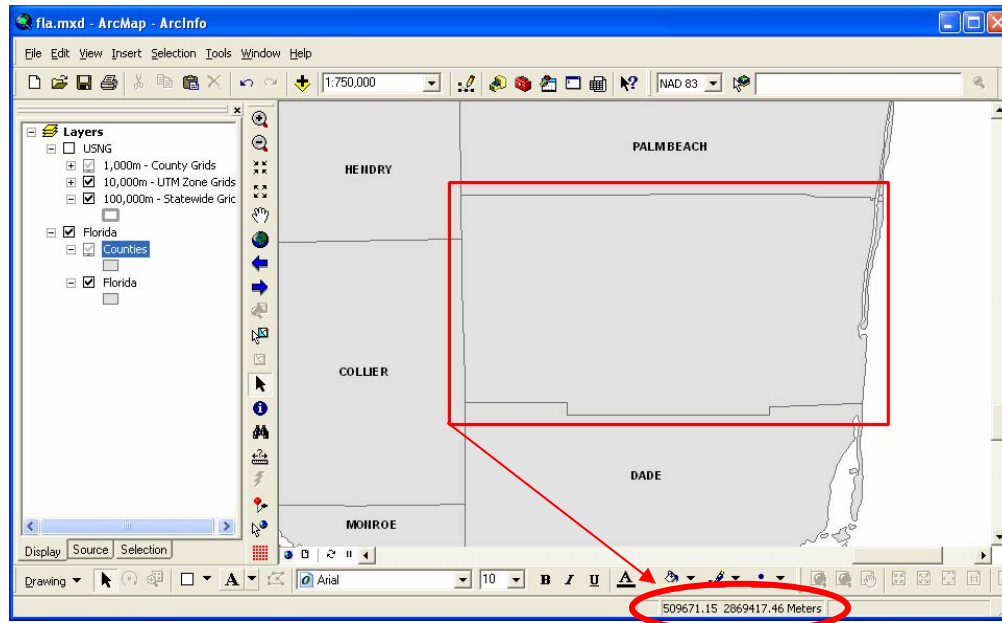
Add X,Y - <http://arcscrips.esri.com/details.asp?dbid=13920> (courtesy of Xiaoming Yang)

Prior to proceeding, please download and install these or similar tools.

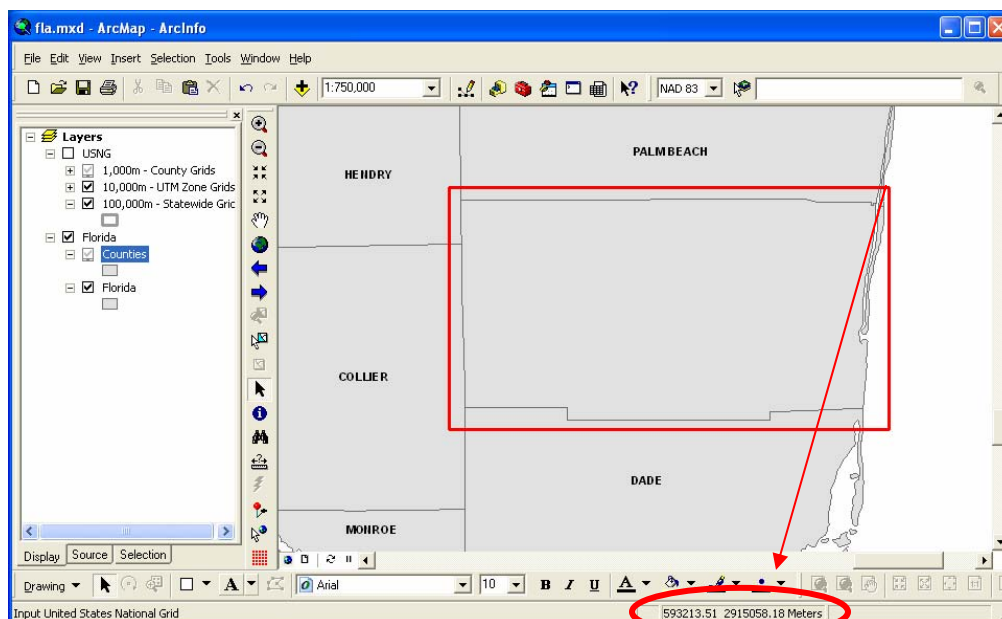
2. Open ArcGIS, load some boundary data and zoom to your area of interest.
3. Click **View**, pull down and select **Data Frame Properties**, click the **Coordinate System** tab, under *Select a coordinate system:*, click on *Predefined*, navigate through the folders to *Project Coordinate Systems, UTM, Nad 1983*, and select the appropriate UTM Zone.



- Place the cursor on the lower, left corner of a bounding polygon for which you would like to create a grid. Note the coordinates displayed in the lower, right corner of the ArcMap window...in this example, to create a 1,000 meter grid, 509671.15 meters should be rounded **DOWN** to 509000 and 2869417.46 meters should be rounded **DOWN** to 2869000.




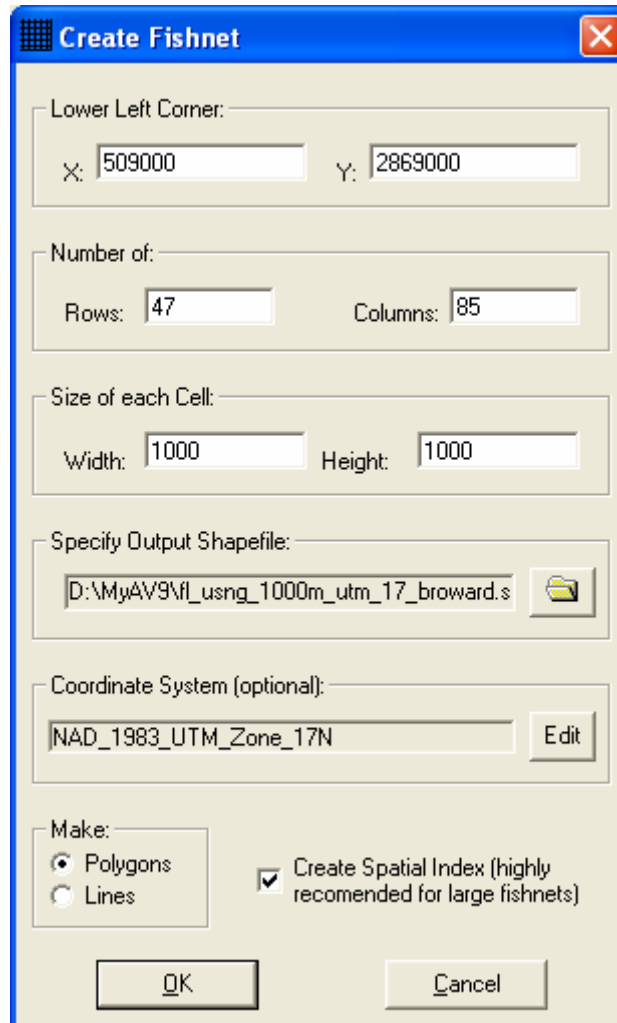
- Also place the cursor on the upper, right corner of a bounding polygon for which you would like to create a grid, and make a note of these coordinates... in this example, to create a 1,000 meter grid, 593213.51 meters should be rounded **UP** 594000 and 2915058.18 meters should be rounded **UP** to 2916000.



- Subtract the lower, left coordinates from the upper, right coordinates, and divide by the units of your proposed grid to determine the number of rows and columns required for the grid.

<u>Columns</u>	<u>Rows</u>
594000	2916000
- 509000	- 2869000
-----	-----
85000/1000 = 85	47000/1000 = 47

- Click  **Create Fishnet Shapefile** to open **Create Fishnet**
- Enter the X and Y coordinates for the lower, left corner. Enter the number of rows and columns. Specify the size of each grid cell. Specify the output shapefile. Choose the appropriate coordinate system. Select Polygons and check to create a spatial index. Click **OK**.



9. Open the Attribute Table for the new grid, and add the following fields...

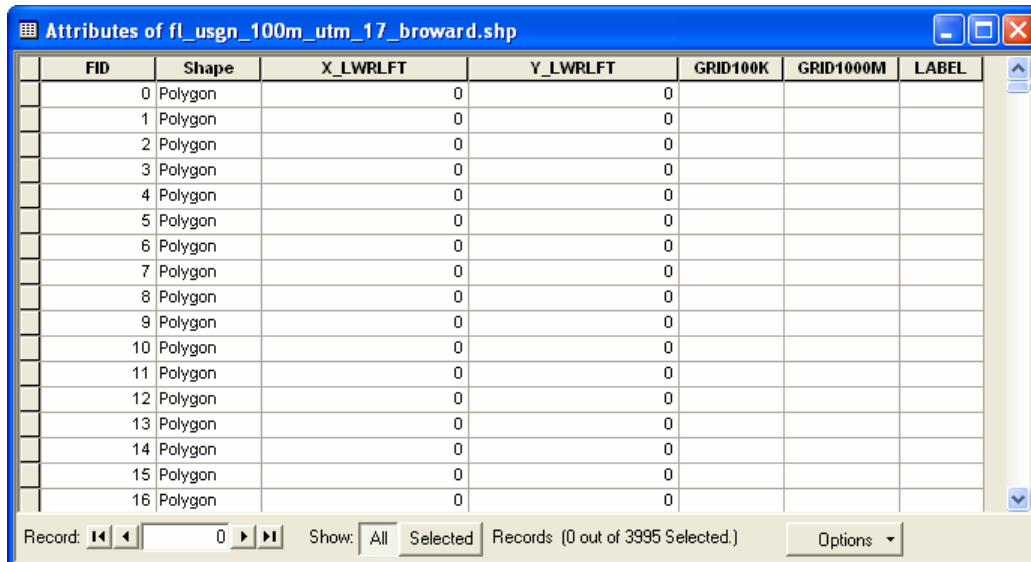
NAME	TYPE	LENGTH	PRECISION	SCALE
X_LWRLFT	Double		18	11
Y_LWRLFT	Double		18	11
GRID100K	Text	2		
GRID1000M*	Text	5**		
LABEL	Text	7***		

\* Change field name to match your particular grid, like *GRID100M* for 100 meter.

\*\* Add 2 more spaces if creating 100 meter grid.

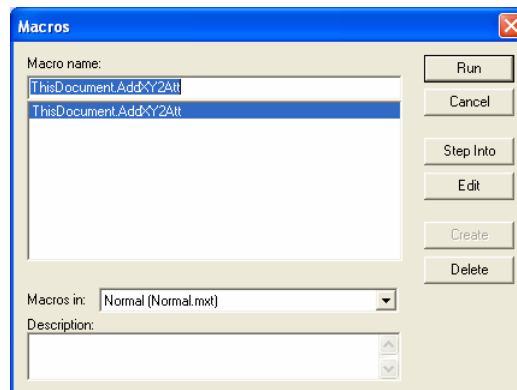
\*\*\* Add 3 more spaces if creating 100 meter grid.

You may delete the field *Col\_Row*. The resulting table should look as follows...



FID	Shape	X_LWRLFT	Y_LWRLFT	GRID100K	GRID1000M	LABEL
0	Polygon	0	0			
1	Polygon	0	0			
2	Polygon	0	0			
3	Polygon	0	0			
4	Polygon	0	0			
5	Polygon	0	0			
6	Polygon	0	0			
7	Polygon	0	0			
8	Polygon	0	0			
9	Polygon	0	0			
10	Polygon	0	0			
11	Polygon	0	0			
12	Polygon	0	0			
13	Polygon	0	0			
14	Polygon	0	0			
15	Polygon	0	0			
16	Polygon	0	0			

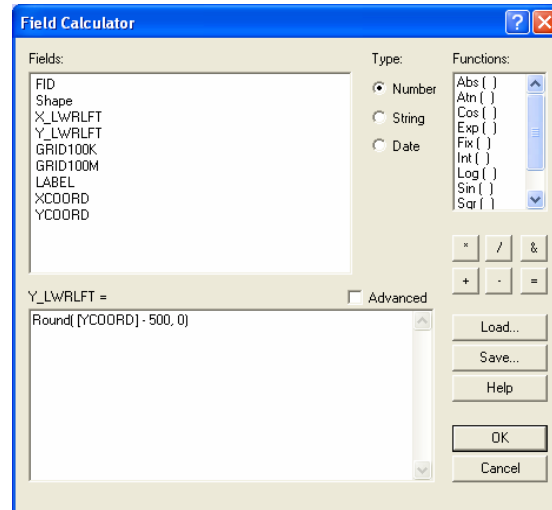
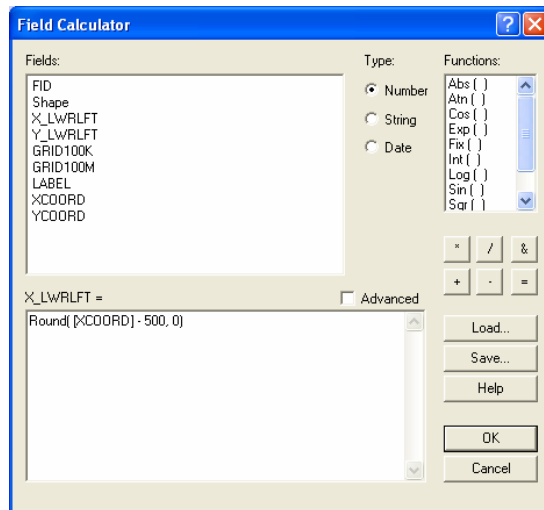
10. With the layer you have created selected within the ArcMap table of contents, run the macro **AddXY2Att**.



11. Running this tool will add an *XCOORD* and *YCOORD* field to the attribute table, with the X,Y of the center of each polygon.

FID	Shape	X_LWRLFT	Y_LWRLFT	GRID100K	GRID1000M	LABEL	XCOORD	YCOORD
0	Polygon	0	0				509500.000025	2869500.00004
1	Polygon	0	0				509500.000025	2870500.00004
2	Polygon	0	0				509500.000025	2871500.00004
3	Polygon	0	0				509500.000025	2872500.00005
4	Polygon	0	0				509500.000025	2873500.00005
5	Polygon	0	0				509500.000025	2874500.00005
6	Polygon	0	0				509500.000025	2875500.00005
7	Polygon	0	0				509500.000025	2876500.00005
8	Polygon	0	0				509500.000025	2877500.00005
9	Polygon	0	0				509500.000025	2878500.00005
10	Polygon	0	0				509500.000025	2879500.00005
11	Polygon	0	0				509500.000025	2880500.00005
12	Polygon	0	0				509500.000025	2881500.00005
13	Polygon	0	0				509500.000025	2882500.00005
14	Polygon	0	0				509500.000025	2883500.00006
15	Polygon	0	0				509500.000025	2884500.00006
16	Polygon	0	0				509500.000025	2885500.00006

12. Calculate *X\_LWRLFT* and *Y\_LWRLFT* values as follows...

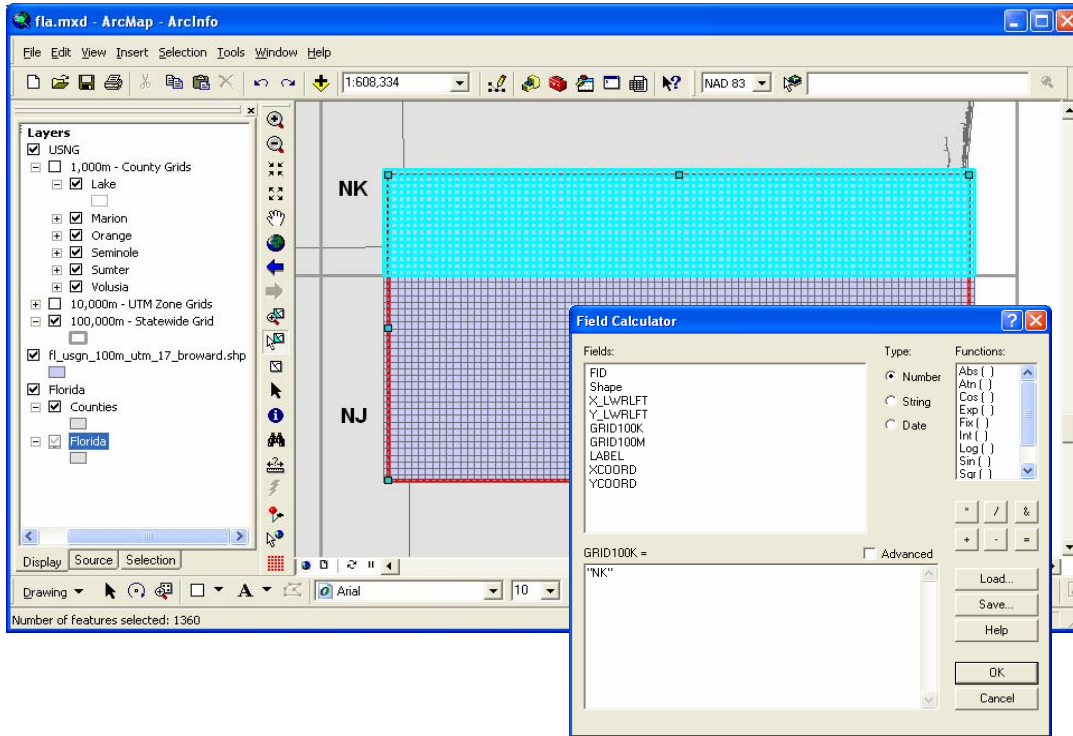


**1000m Grid - Round ( [XCOORD] - 500, 0 )**  
**100m Grid - Round ( [XCOORD] - 50, 0 )**

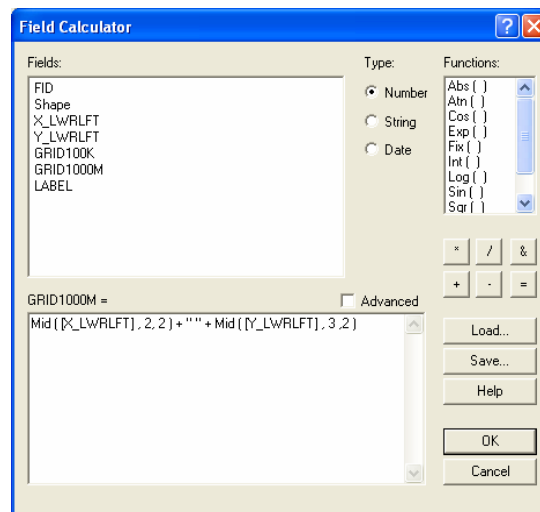
**Round ( [YCOORD] - 500, 0 )**  
**Round ( [YCOORD] - 50, 0 )**

13. After these calculations, the *XCOORD* and *YCOORD* fields may be deleted.

14. Calculate *GRID100K* performing a selection using the 100,000 meter statewide grid available for download at <http://www.floridadisaster.org/gis/USNG>. Do this for all tiles in the grid.

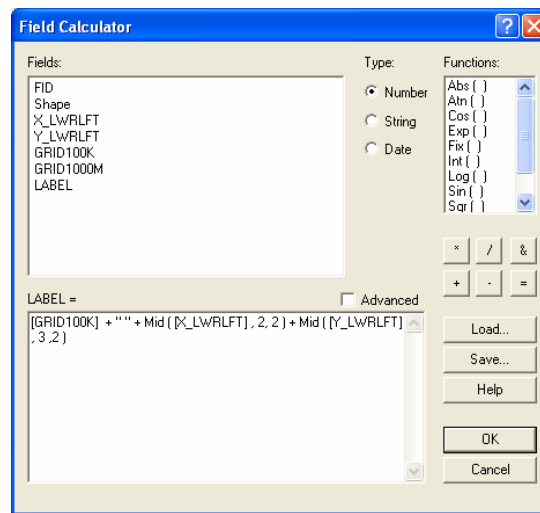


15. Calculate *GRID1000M* or *GRID100M* as follows...



*1000m Grid* -  $\text{Mid}([X\_LWRLFT], 2, 2) + " " + \text{Mid}([Y\_LWRLFT], 3, 2)$   
*100m Grid* -  $\text{Mid}([X\_LWRLFT], 2, 3) + " " + \text{Mid}([Y\_LWRLFT], 3, 3)$

16. Calculate *LABEL* as follows...



*1000m Grid* - [GRID100K] + "" + Mid ([X\_LWRLFT] , 2, 2) + Mid ([Y\_LWRLFT] , 3, 2)

*100m Grid* - [GRID100K] + "" + Mid ([X\_LWRLFT] , 2, 3) + Mid ([Y\_LWRLFT] , 3, 3)

17. Create metadata, zip, and ship!

Please submit grids you construct, and send corrections, questions, or comments to:

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850-413-9907