Guidelines for Building US National Grid Polygons with ArcGIS 10.2.2

These guidelines assume a basic understanding of using ArcGIS, including opening attribute tables, removing and adding fields, and calculating geometry. 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**.**

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 tool and calculation can be performed directly in ArcMap 10.2.2.

   Create Fishnet - Toolboxes\System Toolboxes\Data Management Tools.tbx\Feature Class\Create Fishnet
   **Calculate Geometry** – calculation performed in attribute table for X & Y Coordinates

2. Open ArcGIS, load some boundary data, i.e. County or City boundaries 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.
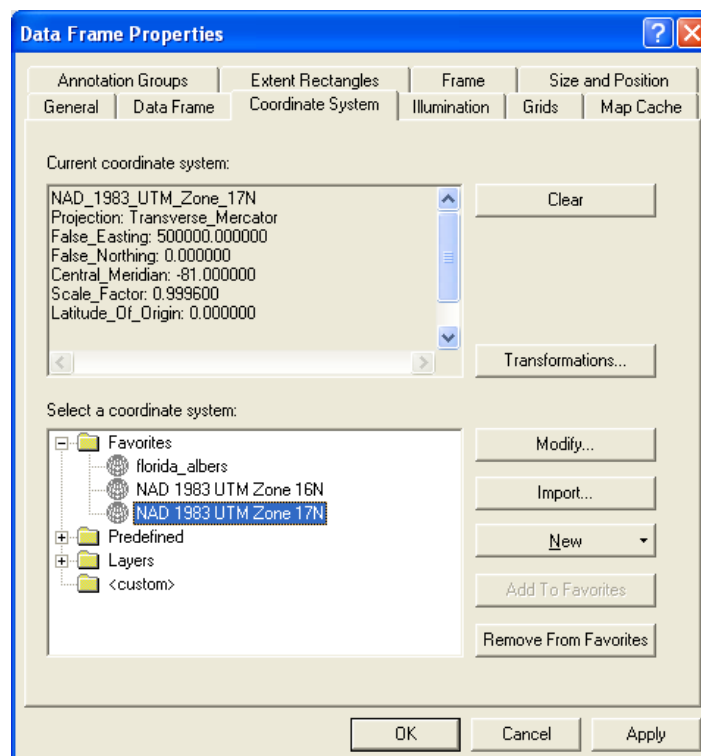
4. Determine boundary extent to add into **Create Fishnet** tool. Write down your findings.
    Place the cursor on the lower, left corner of a bounding polygon for which you would like to create a grid. Note the coordinates displayed in the lower, right corner of the ArcMap window…in this example, to 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.
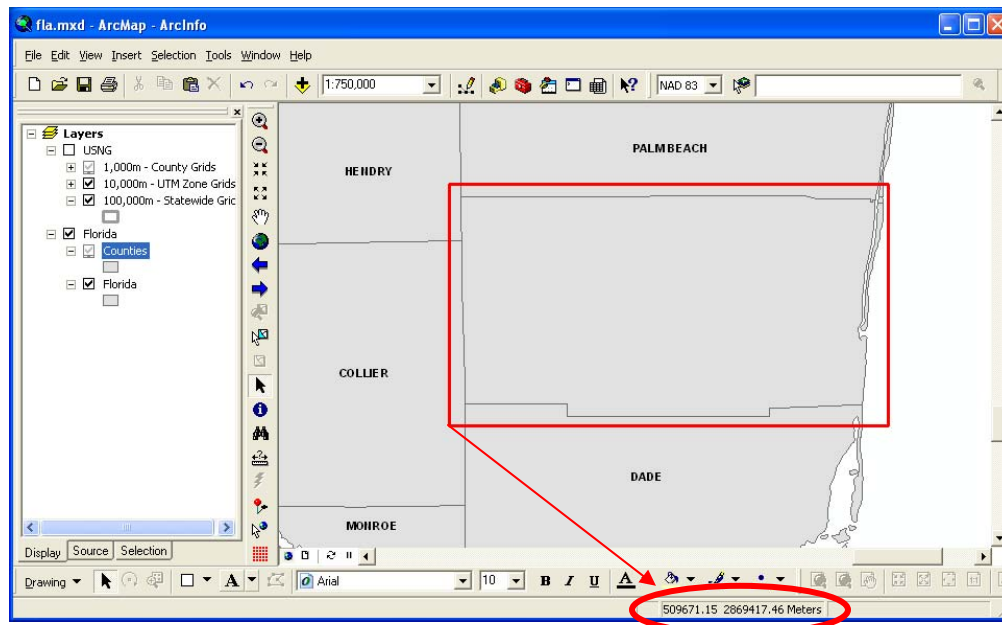
5. Also place the cursor on the upper, right corner of a bounding polygon for which you would like to create a grid, and make a note of these coordinates… in this example, to create a 1,000 meter grid, 593213.51 meters should be rounded **UP** 594000 and 2915058.18 meters should be rounded **UP** to 2916000.
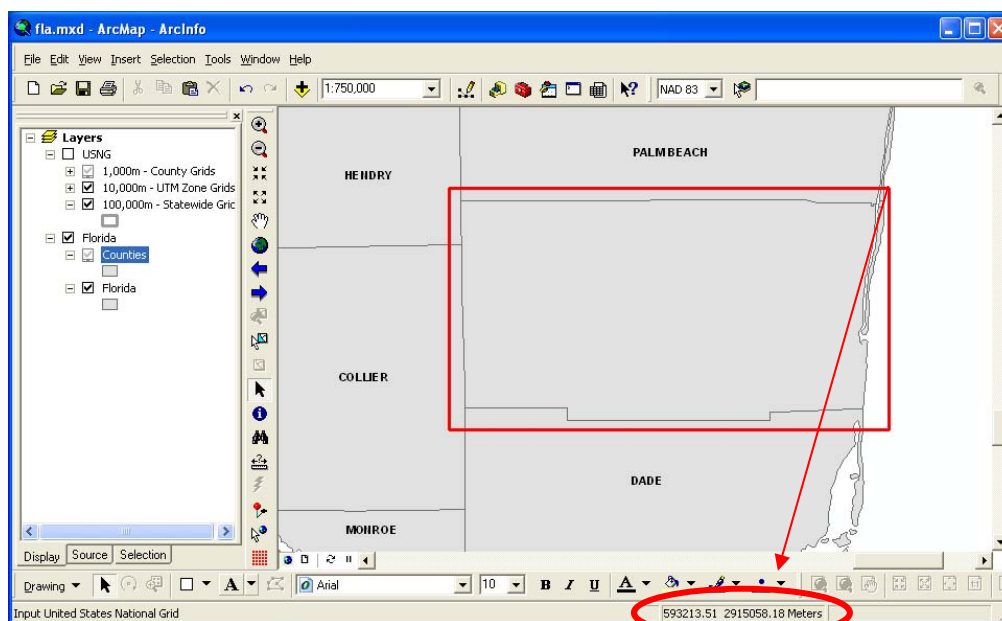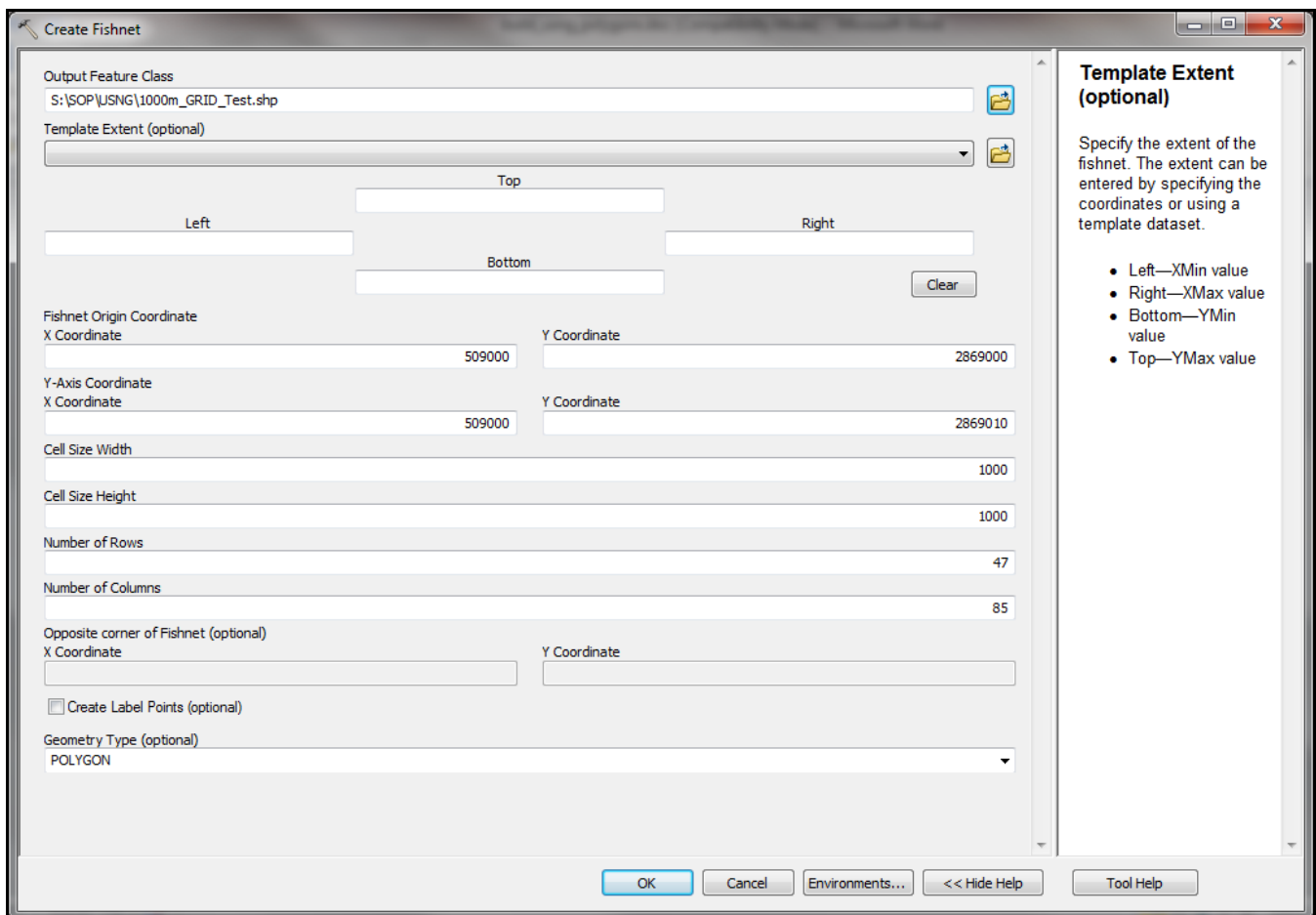
6. Subtract the lower, left coordinates from the upper, right coordinates, and divide by the units of your proposed grid to determine the number of rows and columns required for the grid.

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

7. Open **Create Fishnet** tool located here: Toolboxes\System Toolboxes\Data Management Tools.tbx\Feature Class\Create Fishnet or simply use the Search button and type in Fishnet to find the tool.

8. Specify the output shapefile name. Enter the X and Y coordinates for the lower, left corner as the Fishnet Origin Coordinate. Copy the same Fishnet Origin Coordinate in for the Y-Axis Coordinate, but add 10 to the Y Coordinate. Specify the size of each grid cell. Enter the number of rows and columns based on your calculations. Select Polygon geometry type. Click **OK**.

9. Open the Attribute Table for the new grid, and add the following fields…
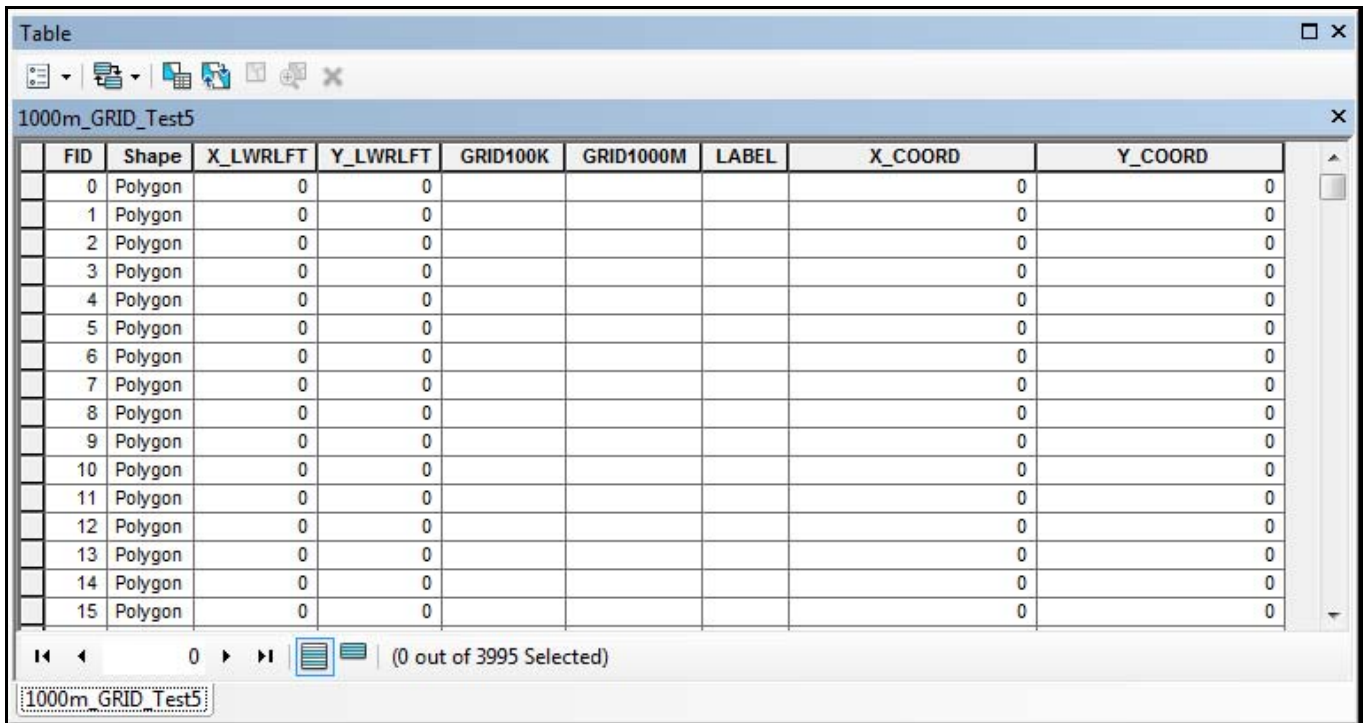
NAME	TYPE	LENGTH	PRECISION	SCALE
X_LWRLFT	Double		18	11
Y_LWRLFT	Double		18	11
GRID100K	Text	2		
GRID1000M*	Text	5**		
LABEL	Text	7***		
X_COORD	Double		0	0
Y_COORD	Double		0	0

* 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 10 meter grid.

For the Id field, simply delete the field once you have added in the above fields. The resulting table should look as follows…
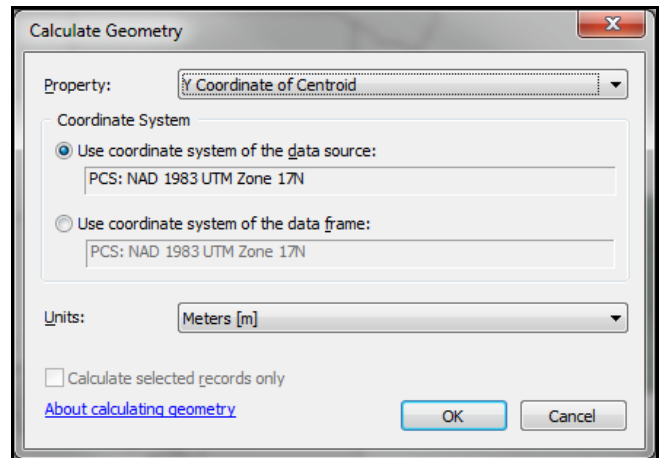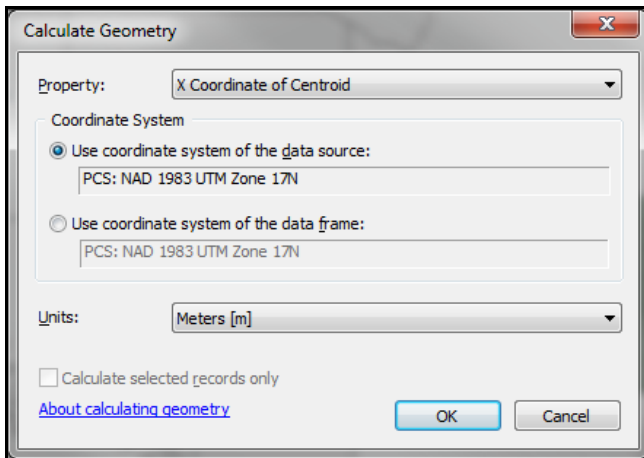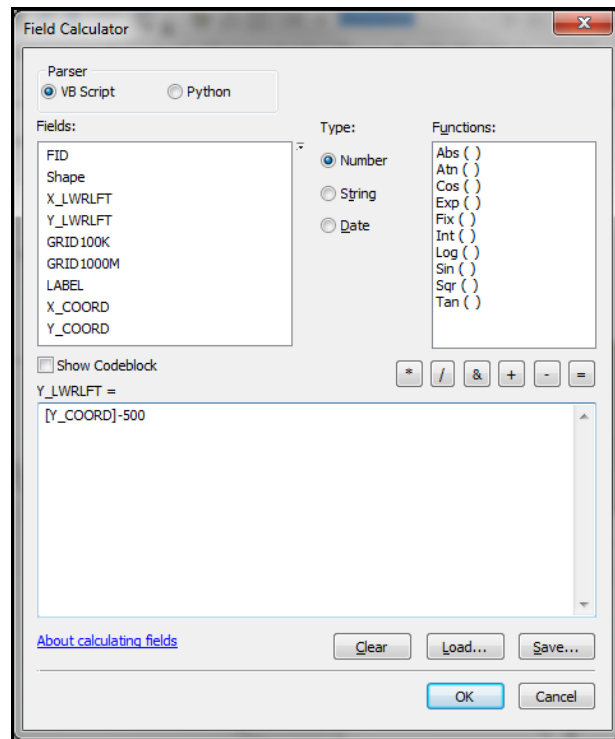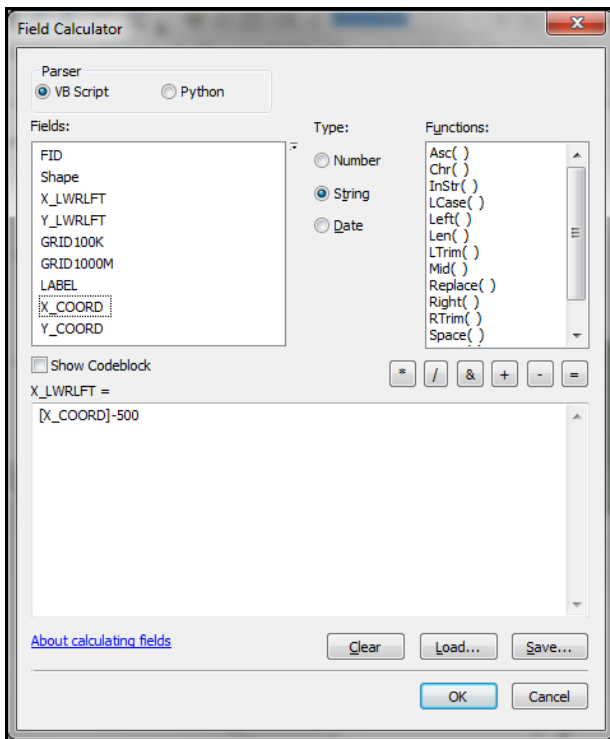
10. Calculate the **X_COORD** and **Y_COORD** fields. In the Attribute Table, right click on the **X_COORD** field and select **Calculate Geometry**. For **Property**, select **X Coordinate of Centroid. For Units**, select **Meters**. Make sure your coordinate system is correct for the UTM Zone where your grid is located. Repeat this step for the **Y_COORD** field where **Property** is **Y Coordinate of Centroid** and **Units** is **Meters.**

Calculate Geometry		Calculate Geometry
Property: X Coordinate of Centroid		Property: Y Coordinate of Centroid
Coordinate System		Coordinate System
● Use coordinate system of the data source: PCS: NAD 1983 UTM Zone 17N		● Use coordinate system of the data source: PCS: NAD 1983 UTM Zone 17N
○ Use coordinate system of the data frame: PCS: NAD 1983 UTM Zone 17N		○ Use coordinate system of the data frame: PCS: NAD 1983 UTM Zone 17N
Units: Meters [m]		Units: Meters [m]
☐ Calculate selected records only		☐ Calculate selected records only
About calculating geometry OK Cancel		About calculating geometry OK Cancel

Your Attribute Table should look as follows…

Table

1000m_GRID_Test5

FID	Shape	X_LWRLFT	Y_LWRLFT	GRID100K	GRID1000M	LABEL	X_COORD	Y_COORD
0	Polygon	0	0				509500	2869500
1	Polygon	0	0				510500	2869500
2	Polygon	0	0				511500	2869500
3	Polygon	0	0				512500	2869500
4	Polygon	0	0				513500	2869500
5	Polygon	0	0				514500	2869500
6	Polygon	0	0				515500	2869500
7	Polygon	0	0				516500	2869500
8	Polygon	0	0				517500	2869500
9	Polygon	0	0				518500	2869500
10	Polygon	0	0				519500	2869500
11	Polygon	0	0				520500	2869500
12	Polygon	0	0				521500	2869500
13	Polygon	0	0				522500	2869500
14	Polygon	0	0				523500	2869500
15	Polygon	0	0				524500	2869500

|◀ ◀   23   ▶ ▶| (0 out of 3995 Selected)

1000m_GRID_Test5

11. Calculate **X_LWRLFT** and **Y_LWRLFT** values as follows…

*1000m Grid -* **[XCOORD] - 500**   **[YCOORD] - 500**
*100m Grid -* **[XCOORD] - 50**   **[YCOORD] - 50**

12. After these calculations, the **XCOORD** and **YCOORD** fields may be deleted by right-clicking on each field and selecting **Delete Field**.

13. Calculate field **GRID100K** performing a selection using the 100,000 meter statewide grid can be downloaded at http://www.floridadisaster.org/gis/USNG**.**

    Do this for all tiles in the grid.
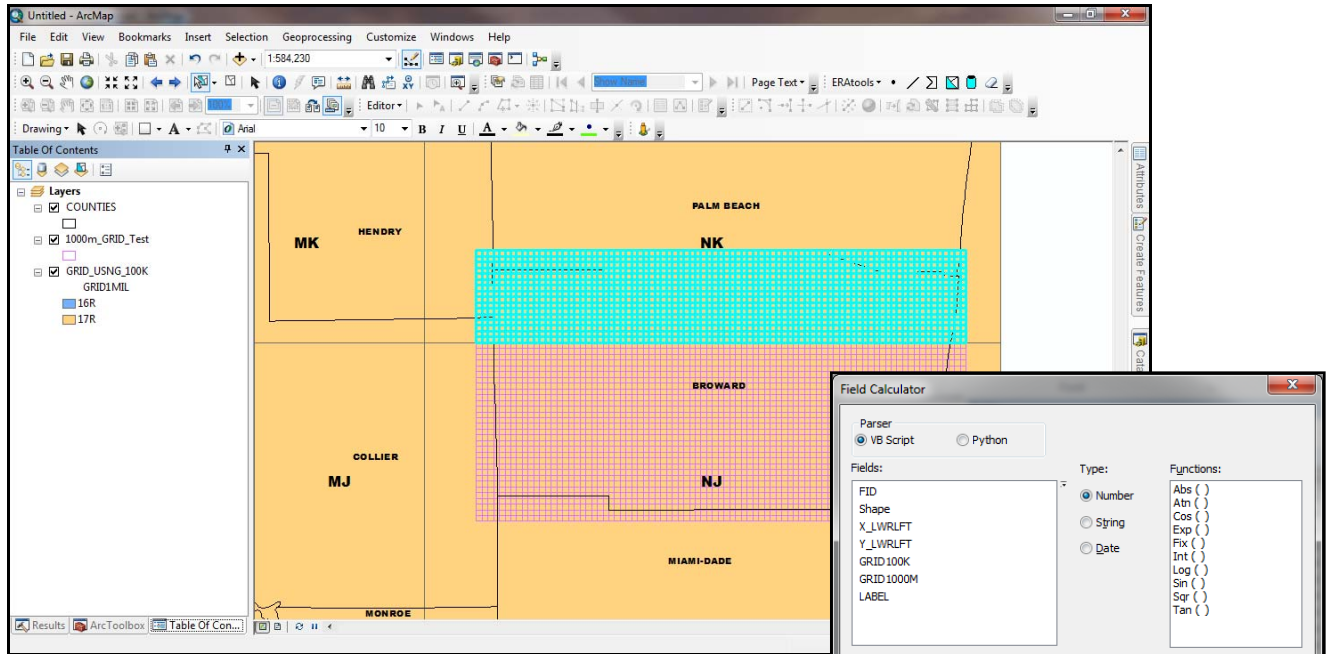
14. Calculate field **GRID1000M** or **GRID100M** as follows…
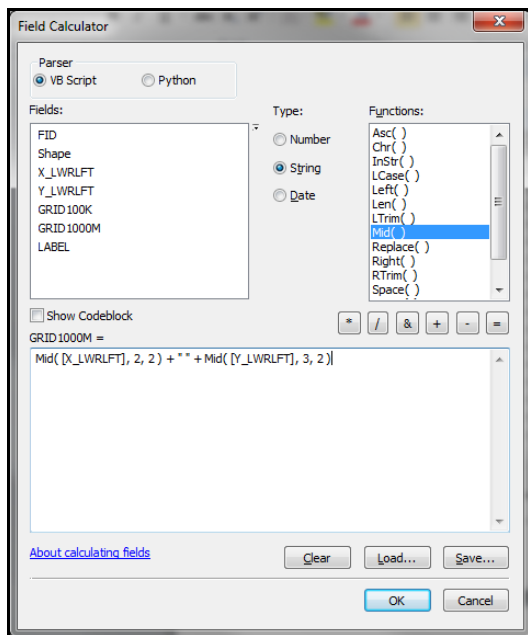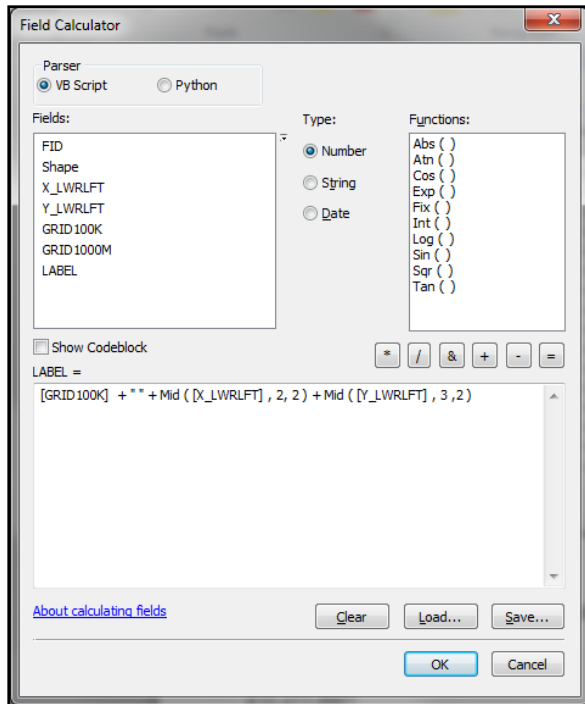

1000m Grid **- Mid ([X_LWRLFT] , 2, 2) + " " + Mid ([Y_LWRLFT] , 3 ,2)**
100m Grid **- Mid ([X_LWRLFT] , 2, 3) + " " + Mid ([Y_LWRLFT] , 3, 3)**
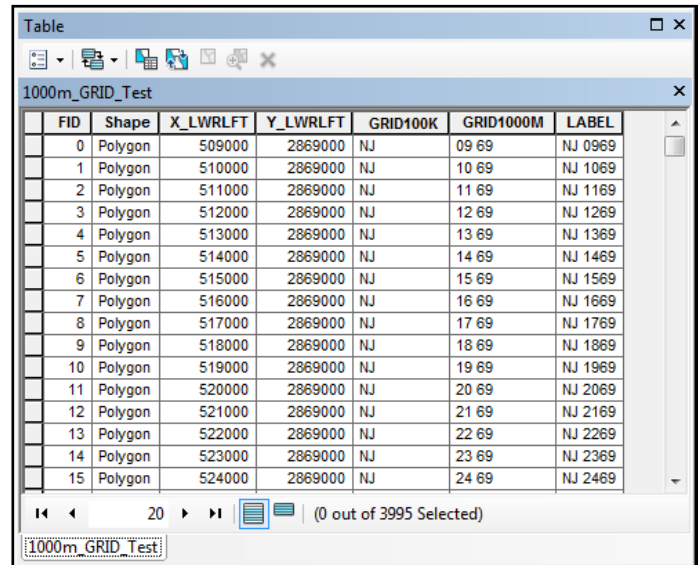
15. Calculate **LABEL** field as follows…

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)**

Your Attribute Table should look as follows…

FID	Shape	X_LWRLFT	Y_LWRLFT	GRID100K	GRID1000M	LABEL
0	Polygon	509000	2869000	NJ	09 69	NJ 0969
1	Polygon	510000	2869000	NJ	10 69	NJ 1069
2	Polygon	511000	2869000	NJ	11 69	NJ 1169
3	Polygon	512000	2869000	NJ	12 69	NJ 1269
4	Polygon	513000	2869000	NJ	13 69	NJ 1369
5	Polygon	514000	2869000	NJ	14 69	NJ 1469
6	Polygon	515000	2869000	NJ	15 69	NJ 1569
7	Polygon	516000	2869000	NJ	16 69	NJ 1669
8	Polygon	517000	2869000	NJ	17 69	NJ 1769
9	Polygon	518000	2869000	NJ	18 69	NJ 1869
10	Polygon	519000	2869000	NJ	19 69	NJ 1969
11	Polygon	520000	2869000	NJ	20 69	NJ 2069
12	Polygon	521000	2869000	NJ	21 69	NJ 2169
13	Polygon	522000	2869000	NJ	22 69	NJ 2269
14	Polygon	523000	2869000	NJ	23 69	NJ 2369
15	Polygon	524000	2869000	NJ	24 69	NJ 2469

(0 out of 3995 Selected)

16. Create metadata, zip, and ship!

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

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