

Geometry Calculations: Area and Length

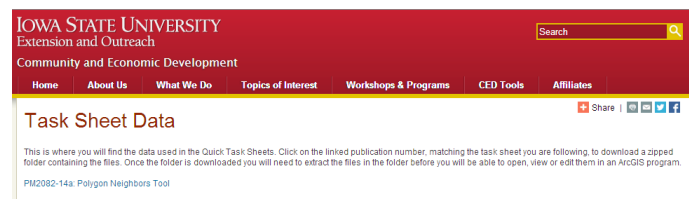
ArcGIS 10.2, 10.3

Welcome to the Essential ArcGIS Task Sheet Series. This series supplements the Iowa State University GIS Geospatial Technology Training Program short course series, “Essential ArcGIS Tutorial Series.” The task sheets are designed to provide quick, easy instructions for performing specific tasks in GIS.

Knowing the length or area of features within your GIS layers can be a very important part of spatial analysis. This task sheet will take you through the process of adding the area and length measurements to the attribute table of a polygon and a polyline shapefile. If you are interested in adding the X and Y coordinates to an attribute table of a point shapefile look for the previous publication: *Geometry Calculations: Coordinates* **PM2082-14m**.

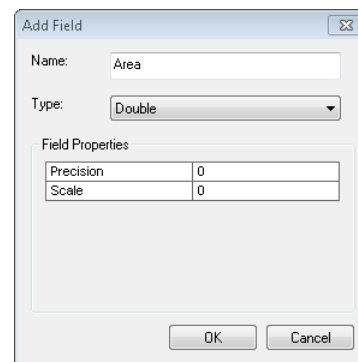
1. Download the Data

- a. To download the data used in this task sheet, navigate to www.extension.iastate.edu/communities/gis/quicktasksheets/data in a web browser. Click on the publication number that matches this task sheet. In this case, the publication number is **PM2082-15u**. The data for this task sheet originates from the NRGIS and can also be found at: <https://programs.iowadnr.gov/nrgislibx/>
- b. When the download is complete, you will need to unzip the folder or copy the files from the zipped folder to a different folder or directory in order to access the files in ArcGIS.



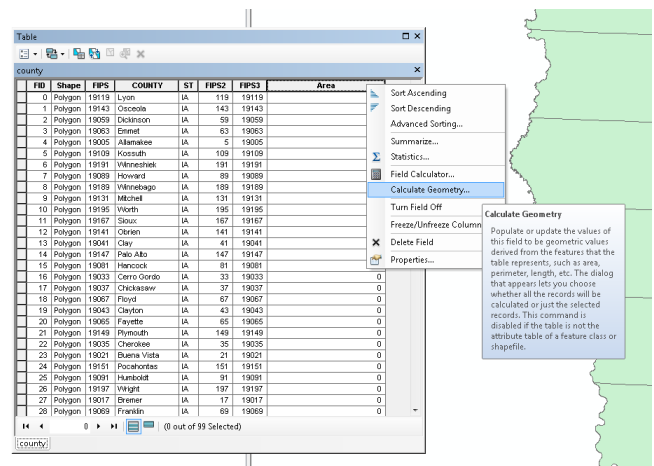
2. Add Area Field to Attribute Table

- a. Area can only be calculated for polygon shapefiles. In this demonstration you will be calculating the area in square mile for each county in Iowa.
- b. Right-click on the **county** shapefile in the **Table of Contents** and select **Open Attribute Table**.
- c. Click on the **Table Options** icon in the top left corner of the attribute table and select **Add Field**.
- d. Type **Area** in the **Name** box of the **Add Field** window and select the **Type** as **Double**. Click **OK**.
- e. An empty field named **Area** should be added to the end of the attribute table.

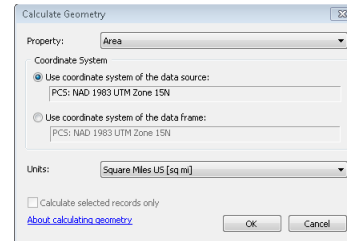


3. Calculate Area

- a. Right-click on the empty **Area** field in the attribute table and select **Calculate Geometry**. Under **Property** in the **Calculate Geometry** window select **Area**.

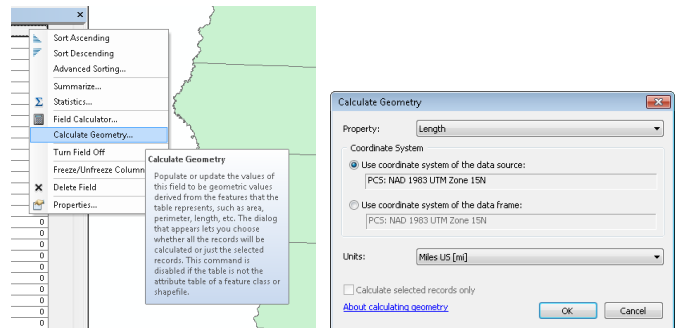
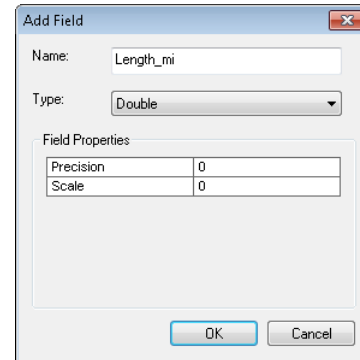


- b. Select **Square Miles** as the **Units** and click **OK**.
Note: Several other units are available for calculating area.
- c. Three other geometry calculations available to use with polygon shapes include: perimeter, X coordinate of the centroid, and Y coordinate of the centroid. Each of these will have different units available for calculation.



4. Add Length Field to Attribute Table

- a. Length can only be calculated for polyline shapefiles. In this demonstration you will be calculating the length in miles of the major rivers in Iowa. *Hint: When calculating length on this shapefile make sure you are aware that it is calculating the length of each feature and each river may be broken into many different features. If you want to find the length of an entire river you must first dissolve based on the river name or WBNAME field.*
- b. Right-click on the **major_rivers** shapefile in the **Table of Contents** and select **Open Attribute Table**.
- c. Click on the **Table Options** icon in the top left corner of the attribute table and select **Add Field**.
- d. Type **Length_mi** in the **Name** box of the **Add Field** window and select the **Type** as **Double**. Click **OK**.
- e. An empty field named **Length_mi** should be added to the end of the attribute table.



5. Calculate Length

- a. Right-click on the empty **Length_mi** field in the attribute table and select **Calculate Geometry**. Under **Property** in the **Calculate Geometry** window select **Length**.
- b. Select **Miles** as the **Units** and click **OK**. *Note: Several other units are available for calculating length.*
- c. Six other geometry calculations available to use with polyline shapes include: X and Y coordinate of line start, X and Y coordinate of line end, and X and Y coordinate of midpoint.

LENGTH	RIVERNO	RIVERNO_I	WVID	WBNAME	AREA	PERIMETER	CO_NUMBER	CO_NAME	Length_mi
1923.6846	1	1	IA 04-BLU-0010	WEST FK BLUE EARTH R	2.522190e+099	208206.3	55	KOSSUTH	0.573943
3749.676	2	2	IA 01-LJA-0130	HOLLOW CR	1.707000e+099	172890.3	3	ALLAMAKEE	2.329931
1271.568	3	3	IA 01-LJA-0120	UPPER KOWA R	1.228170e+099	149843.2	45	HOWARD	0.780111
1333.471	4	4	IA 01-LJA-0200	MIDDLE BEAR CR	1.785200e+099	170177.5	96	WINNEBESH	0.82857
4675.19	5	5	IA 01-LJA-0150	CLEAR CR	1.707000e+099	172890.3	3	ALLAMAKEE	2.955018
4379.388	6	6	IA 01-LJA-0160	NORTH BEAR CR	1.785200e+099	170177.5	96	WINNEBESH	2.726594
1247.741	7	7	IA 01-LJA-0200	MIDDLE BEAR CR	1.785200e+099	170177.5	96	WINNEBESH	2.939415
2435.18	8	8	IA 01-LJA-0120	UPPER KOWA R	1.228170e+099	149843.2	45	HOWARD	1.513134
89.8911	9	9	IA 01-LJA-0120	UPPER KOWA R	1.228170e+099	149843.2	45	HOWARD	0.043426
657.8389	10	9	IA 01-LJA-0120	UPPER KOWA R	1.785200e+099	170177.5	96	WINNEBESH	0.485769
780.576	11	17	IA 01-LJA-0410	NICHOLS CR	1.785200e+099	170177.5	96	WINNEBESH	0.485029
3287.72	12	11	IA 01-LJA-0030	WAPSIPNOC R	1.215610e+099	140886.6	66	MITCHELL	2.030443
9168.046	13	10009	IA 01-HEA-0040	MESSESPRIVE	1.707000e+099	172890.3	3	ALLAMAKEE	2.305016
8254.126	14	12	IA 01-LJA-0090	UPPER KOWA R	1.707000e+099	172890.3	3	ALLAMAKEE	5.128864
3569.707	15	13	IA 01-LJA-0130	HOLLOW CR	1.707000e+099	172890.3	3	ALLAMAKEE	2.217471
14026.42	16	14	IA 01-LJA-0120	UPPER KOWA R	1.228170e+099	149843.2	45	HOWARD	6.715628
10447.14	17	15	IA 01-LJA-0120	UPPER KOWA R	1.228170e+099	149843.2	45	HOWARD	6.491515
3691.293	18	16	IA 01-LJA-0090	SILVER CR	1.785200e+099	170177.5	96	WINNEBESH	2.293659
6508.566	19	17	IA 01-LJA-0410	NICHOLS CR	1.228170e+099	149843.2	45	HOWARD	3.465057
6653.674	20	18	IA 02-CED-0550	OTTER CR	1.215610e+099	140886.6	66	MITCHELL	4.134426
5898.502	21	19	IA 02-CED-0110	CEDAR R	1.215610e+099	140886.6	66	MITCHELL	3.695104
291.12326	22	27	IA 01-LJA-0110	BEAR CR	1.785200e+099	170177.5	96	WINNEBESH	0.055381
3529.287	23	20	IA 01-LJA-0190	NORTH BEAR CR	1.785200e+099	170177.5	96	WINNEBESH	3.435713
10245.15	24	21	IA 01-LJA-0370	FINE CR	1.785200e+099	170177.5	96	WINNEBESH	6.366588
6509.171	25	22	IA 01-LJA-0110	BEAR CR	1.785200e+099	170177.5	96	WINNEBESH	4.038967
8666.3	26	23	IA 01-LJA-0360	EAST FINE CR	1.785200e+099	170177.5	96	WINNEBESH	5.347722
8742.023	27	24	IA 01-LJA-0390	COLD WATER CR	1.785200e+099	170177.5	96	WINNEBESH	5.432021
10474.63	28	25	IA 01-LJA-0430	STAFF CR	1.228170e+099	149843.2	45	HOWARD	6.508226

Contact:

Bailey Hanson bahanson@iastate.edu, 515-520-1436 or Associate Professor Christopher J. Seeger, ASLA, GISP cjseeger@iastate.edu, 515-509-0651 for more information about the Geospatial Technology Program. This task sheet and more are available at www.extension.iastate.edu/communities/gis

...and justice for all

The US Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue SW, Washington, DC 20250-9410, or call 800-795-3272 (voice) or 202-720-6382 (TDD).

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the US Department of Agriculture. Cathann Kress, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.