

1. What is Digitizing?
2. Details!
3. Adding Attribute Fields

The Digitizing Process

	Task	Challenge
Step 1	Create a new feature class or shapefile.	Define the correct coordinate system.
Step 2	Add what you created in Step 1 to map.	None!
Step 3	Digitize the spatial features.	Use the editing tools.
Step 4	Add the new fields to the attribute table.	Define the correct field types.
Step 5	Enter the attribute information.	Be consistent!

Need more details?

Have a look at [Digitizing - Creating New GIS Data – The Details](#)

Or watch [Getting Started with Editing in ArcMap](#).

Or start here: <http://www.screencast.com/t/vFEFz8Q3uX>

1) What is Digitizing?

Digitizing = Creating new and original geospatial data.

Or: Making reality (= the Earth) digital.

On-Screen Digitizing of Spatial Features

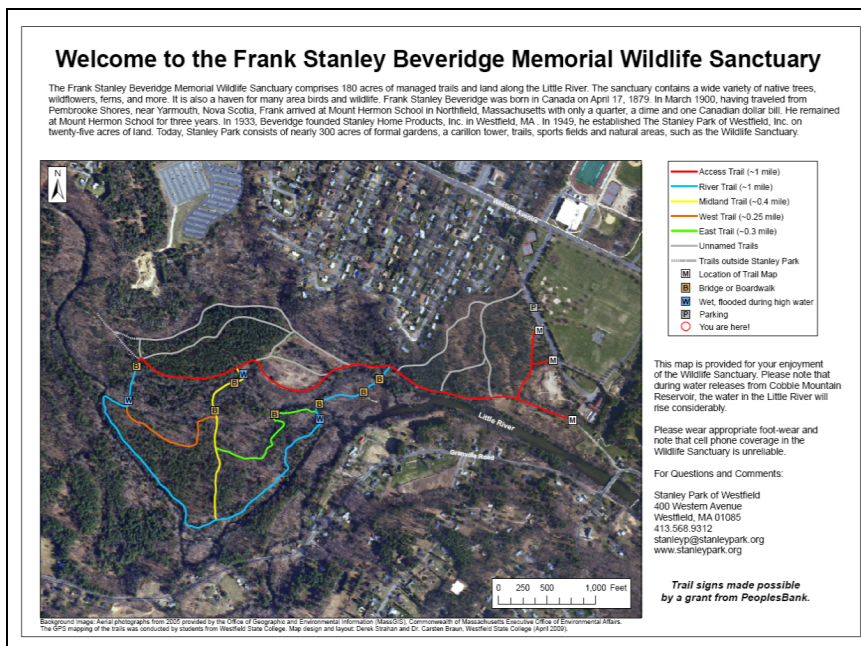
Here you digitize points/lines/polygons from existing geospatial data sets, such as aerial photographs, satellite images, topographic maps, digital elevation models, Google Earth, etc.

Points	Building locations, mountain summits, etc.
Lines	Streams, contour lines, roads, etc.
Polygons	Building footprints, wetlands, etc.

In-situ Digitizing of New Features

Here you go outside and digitize points/lines/polygons using a GPS receiver. The GPS receiver gives you latitude, longitude, and elevation. You make notes of feature types, feature attributes, etc. and add those attributes later into the attribute table in ArcGIS.

Points	Sampling locations along a stream, locations of trees, etc.
Lines	Hiking trails, edges of glaciers, mice trails, etc.
Polygons	Wetland boundaries, neighborhoods, etc.

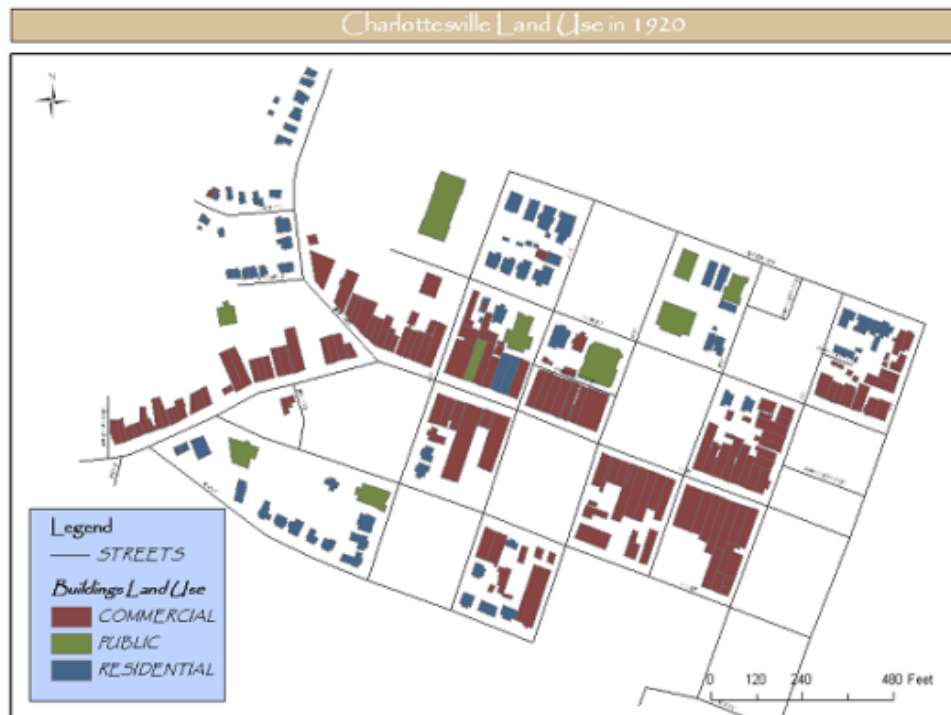


The trail map for Stanley Park. The trails were digitized by walking along carrying a GPS receiver. Then, we created a polyline shapefile from the GPS data and added two attributes: a unique name for each trail and a unique code for each trail. That unique code is used in the Symbology to show the different trails in different colors.

The Basic Digitizing Process

1. Create a new empty feature class or shapefile. This serves as the 'shell' into which you digitize your spatial features.
2. Open this empty feature class or shapefile in ArcMap.
3. Digitize the spatial features = the spatial data.
4. Add the appropriate fields to the attribute table. (Step 3 and 4 can be reversed)
5. Enter the attribute information = the attribute data.

Now you have new geospatial data!



This map above is a nice example: the streets are digitized as polylines and the buildings as individual polygons. Then, an attribute field was added and the building land use entered into attribute table (e.g. 1 = commercial, 2 = public, 3 = residential). This allows you to show the buildings as a choropleth map where the building color indicates its land use.

2) Details!

Let's start here: <http://www.screencast.com/t/vFEFz8Q3uX>

2.1) Creating a new feature class or shapefile

Creating a new feature class:

1. If needed: create a new file geodatabase.
2. Right click on the file geodatabase, New, Feature Class
3. Use a simple yet meaningful name (no caps, no blanks, select the proper feature type, and click Next.
4. Define the coordinate system. Select Geographic Coordinate Systems, World, WGS 84, and click Next a few times.
5. In the last dialog box you can define your attribute fields, but that can be done later.
6. Click Finish to create the feature class.

The new feature class now appears inside your geodatabase. It is still empty = it does not contain any spatial or attribute data. Now you can add the feature class to your map and digitize the spatial data and enter the attribute data.

Creating a new shapefile:

1. Right-click on the folder where you want to create the new shapefile and select New, Shapefile...
2. Use a simple yet meaningful name (no caps, no blanks, select the proper feature type.
3. Click Edit to define the Coordinate System and select Geographic Coordinate Systems, World, WGS 84, and click OK.

The new shapefile now appears inside your folder. It is still empty = it does not contain any spatial or attribute data. Now you can add the shapefile to your map and digitize the spatial data and enter the attribute data.

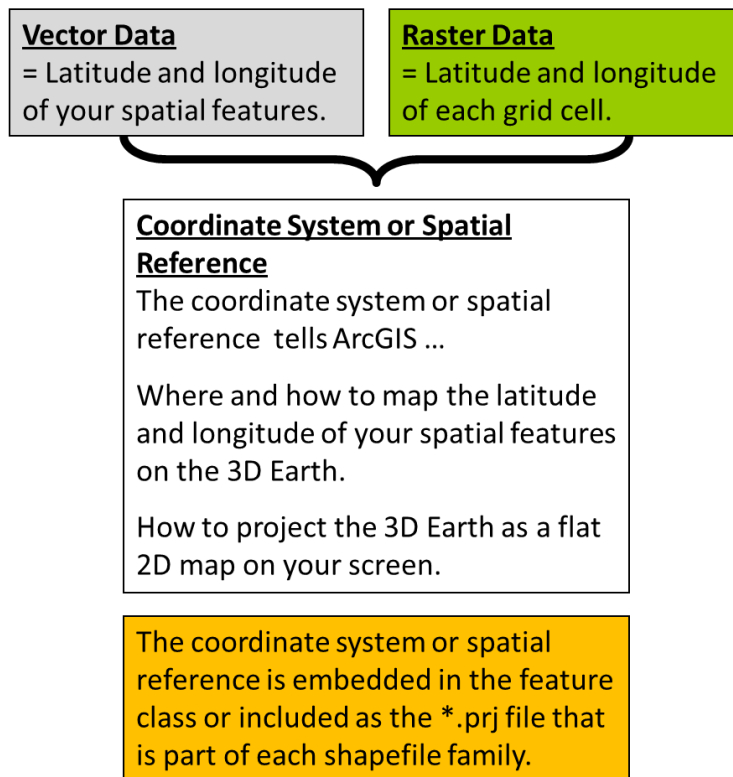
Critical Step: Define the correct coordinate system - see below. You have to define the coordinate system and using WGS 84 is a good choice in many circumstances. See Section 2.2 for details and additional information.

2.2) The Coordinate System / Spatial Reference

The Spatial Reference or Coordinate System tells ArcGIS two things:

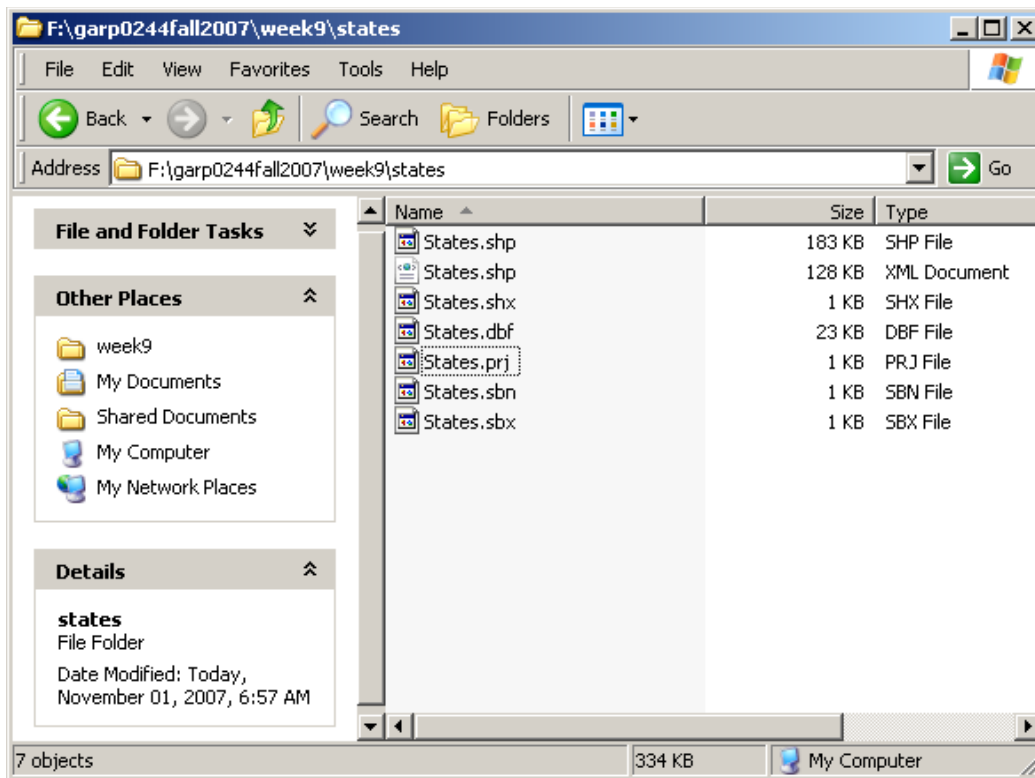
1. Where on Earth to map a geospatial data set.
2. How to convert the 3D shape of the Earth into the 2D shape displayed on your computer screen and vice-versa.

ArcGIS needs to know both things to accurately place and map a feature class or a shapefile onto your map.



The Coordinate System / Spatial Reference for a shapefile

The coordinate system or spatial reference is a small file that is/should be part of each shapefile (*.prj). In the example below you see a shapefile called States and States.prj is the projection file for this shapefile. If this file is missing...ArcMap will try to perform an “on-the-fly projection”...which may/may not work. When creating a new shapefile (i.e. when you digitize) you need to define the projection or spatial reference yourself.



The Coordinate System / Spatial Reference for a feature class

The situation for a feature class is identical – except a feature class has its coordinate system / spatial reference embedded, rather than contained in a separate file.

Regardless, you can always confirm the coordinate system / spatial reference of a map layer in ArcGIS by looking at the Source Tab in the Layer Properties.

2.3) The Coordinate System / Spatial Reference for ArcGIS Online

ArcGIS Online is common base layer source for digitizing new feature classes or shapefiles. In this case you simply import the coordinate system / spatial reference from the ArcGIS Online baselayer when you create a new feature class or shapefile.

1. Add the imagery base layer from ArcGIS Online to ArcMap and zoom-into the area where you want to digitize, for example the area around campus.
2. In the Table of Contents, click on Layers, Properties..., and select the Coordinate System tab. The coordinate system for all ArcGIS Online baselayer is WGS 1984 Web Mercator (auxiliary sphere).

3. Click the Star button with the + sign to add this coordinate system to your favorites and click OK.
4. Create a new point feature class in your file geodatabase called watersamples_2014 and select the WGS 1984 Web Mercator (auxiliary sphere) coordinate system from your Favorites and finish creating the feature class.
5. Now, zoom-in and digitize your water sample locations.

2.4) The Coordinate System / Spatial Reference for MassGIS

When working in Massachusetts with MassGIS data it makes sense to use the [same coordinate system / spatial reference as MassGIS](#):

The datum for the MassGIS database is North American Datum 1983 (NAD83). The data are registered to the Massachusetts State Plane Coordinate System, Mainland Zone (Fipszone 2001). Units are meters.

Plan A

Do the same as described in Section 3.3: add the base layer, add its coordinate system to your favs, and select it when creating your feature class or shapefile.

Plan B: Import a Coordinate System / Spatial Reference

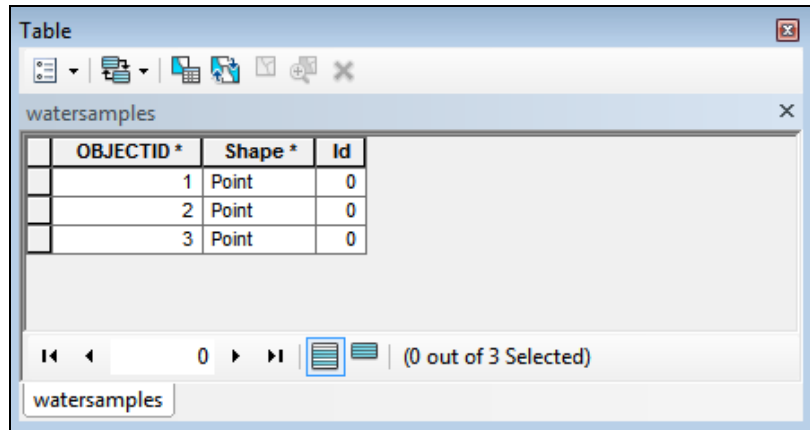
You can easily import the Coordinate system / Spatial Reference from any data layer you have previously downloaded from MassGIS.

1. Create your feature class or shapefile.
2. When you get to the window where you need to define the Coordinate System / Spatial Reference: click on the Earth icon with the small downward-facing triangle and select Import...
3. Browse to your \data folder, select a data layer you previously downloaded from MassGIS, and click Add.
4. The MassGIS coordinate system is now selected and displayed in the coordinate system dialog box. Click OK and finish creating your feature class or shapefile.

3) Adding Attribute Fields

Adding new fields to an attribute table is easy! Let's assume you created a new point feature class (or shapefile) and digitized three points representing your water sample locations along the Westfield River.

If you open the attribute table you see three rows: one for each of the three points you have digitized. Otherwise, the attribute table is empty, since you have not yet added any attribute data into the attribute table. For that you first need to add fields to the attribute table by clicking on the Table Options (leftmost button in the tool bar) and select Add Field...

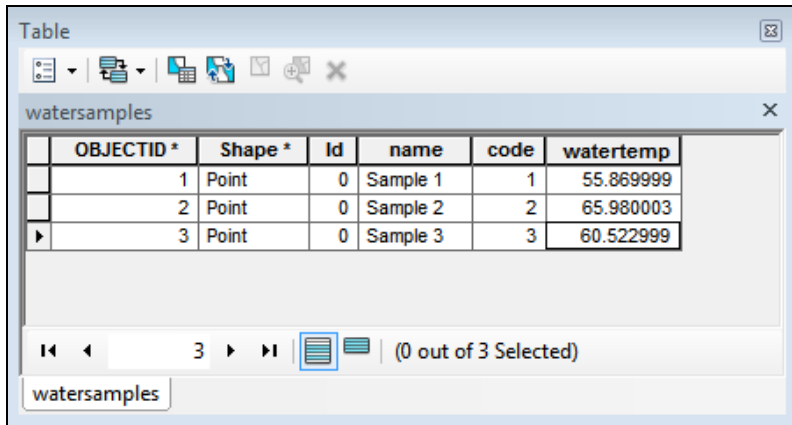


OBJECTID *	Shape *	Id
1	Point	0
2	Point	0
3	Point	0

Now you need to enter the Name and the Type of the new field you are adding to the attribute table.

Name	Name of the field in the attribute table (= the column heading)	
	Simple, no blanks, no weird characters, all lowercase	
Type	Short Integer	Use for small, even numbers (no decimal places) Example: 1, 2, 34, 102, 887, etc.
	Long Integer	Use for large, even numbers (no decimal places) Example: 997234, 12654897, etc.
	Float	Use for small numbers with decimal places Example: 52.23, 187.234, 0.23, etc.
	Double	As Float, but with lots of decimal places Example: 1.9875209765, 457.9999992352
	Text	Use for text (i.e. letters). Example: sample location, person who took the sample, owner, etc.
	Date	Use when entering a date

- name A short text field for the sample name.
Used later as a label in the map and the legend.
- code A short integer field to give each sample a unique identification number.
This field is used later in the symbology to determine the color or symbol.
- watertemp In this example I entered the water temperature measured at each sample site.
This field can be used to show the color of the symbols as a function of the water temperature (= choropleth map).



OBJECTID *	Shape *	Id	name	code	watertemp
1	Point	0	Sample 1	1	55.869999
2	Point	0	Sample 2	2	65.980003
3	Point	0	Sample 3	3	60.522999

The Big Picture. Creating your own new original geospatial data

1. You first need an empty file for your data, for example a feature class or a shapefile.
2. Now you need to add the spatial data for your features by digitizing.
3. You add the attribute data for your features by manually typing into the attribute table.

→ *Now you have geospatial data!*

- The spatial data show where your data are located on the map.
- The attribute data is used to label your features, to create choropleth maps, or to perform other quantitative analysis.

The spatial data alone are boring...just some points, lines, or polygons. The attribute data alone are boring...just a spreadsheet.

→ *But, combine them and you have something quite interesting!*