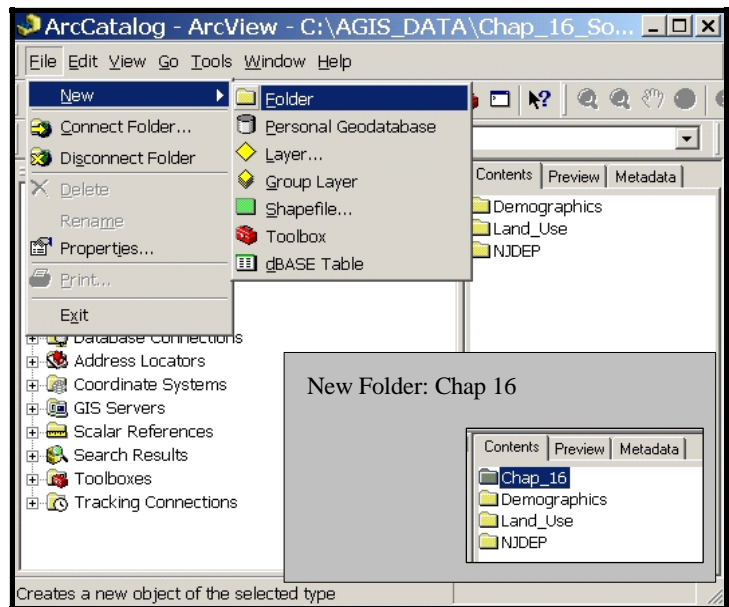


# Chapter 16 Creating and Migrating Data into Geodatabases

The geodatabase model is the new ESRI standard that will replace / is replacing the coverage model. Geodatabases come in two broad categories: personal geodatabases and enterprise [Arc Spatial Database Engine] databases. We will work with and create a personal geodatabase. By the time you have completed this chapter you will be able to use Arc Catalog to:

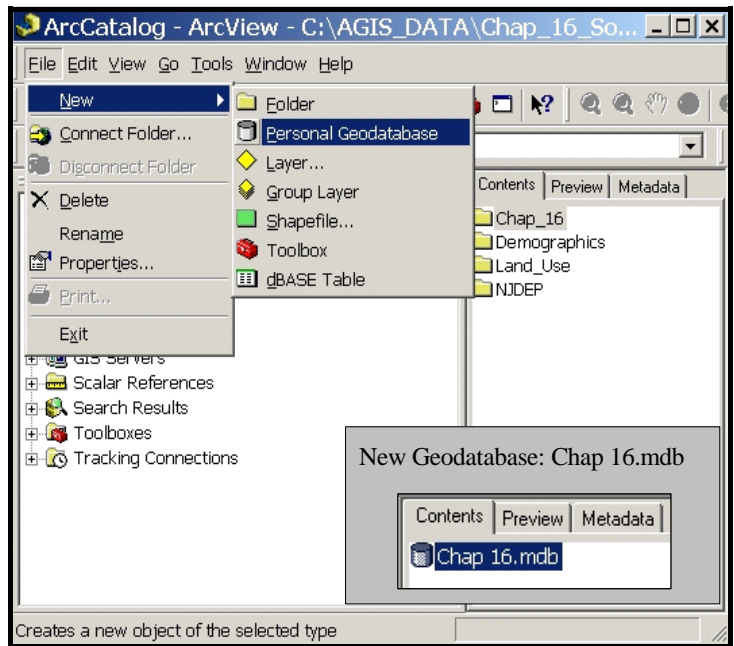
1. Create a new geodatabase.
2. Export a shapefile to the geodatabase converting it to a feature class and placing it in a new or existing feature dataset.
3. Export an Arc Info coverage to the geodatabase converting it to a feature class and placing it in a new or existing feature dataset.
4. Export grid layers to the geodatabase model.
4. Export an attribute table in dBase format and convert it to geodatabase format.

**Creating a folder in which to place your new geodatabase.** This step is not strictly necessary, but I believe that placing the geodatabase within a “parent” folder makes a certain amount of sense as it gives you a logical place to stash items that are related to the database, but are unable to reside within it. For example, individual and group layer files, which provide ArcMap with detailed instructions for drawing a raster or vector dataset, may not reside within the geodatabase, but you might wish to place them in a nearby location. To create a folder, click to select an item in the Arc Catalog tree. Next, either right click the item or right click in the larger window to open the popup menu from which you will point to New and then click to select Folder. You can also create a new folder by pointing to a drive or folder in the catalog tree, clicking File in the Main Menu, pointing to New in the drop down menu and clicking to select Folder in the slide out menu. The program will insert the new folder in the larger window. Type a name for the new folder and then press the Enter key. You are now ready to create the new geodatabase. In the illustration, I have created a folder named, Chap\_16.



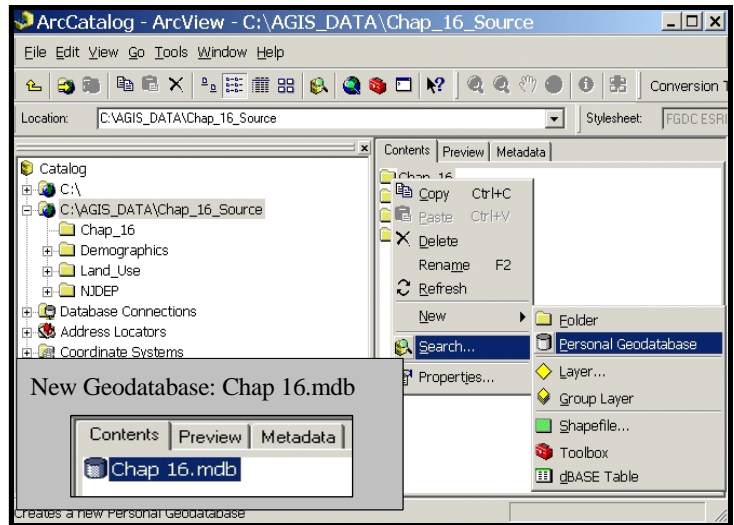
**Creating a Geodatabase.** To create a new personal geodatabase click in the catalog tree or in the larger window to select the location where you want to place the new database. Next, click File in the Main Menu to open the drop down menu. Point to New in the drop down menu and then click on Personal Geodatabase in the slide out menu. The program will create the new geodatabase with the default name, New Personal Geodatabase. Type the name you want for the database and then press the Enter key.

In the illustration, I have clicked to point to the Chap\_16 folder and then clicked File in the Main menu, pointed to New in the drop down menu and clicked on Personal Geodatabase on the slide out menu. The program created a new geodatabase within the Chap\_16\_Source folder. I named the database, Chap\_16.mdb.



An alternative approach is to right click on the location where you want to place the new geodatabase. The program will open a popup menu. Point to New and then select Personal Geodatabase from the slide out menu. Type the name you want for the new database and press the Enter key.

In the illustration, I have pointed to the Chap\_16\_Source folder, right clicked to open the popup menu pointed to New on that menu and clicked Personal Geodatabase. I then named the new personal geodatabase, Chap\_16.mdb



No matter which approach you use, you now have a new personal geodatabase. In the simplest terms, you can think of the geodatabase as a container that holds cartographic, attribute, and other types of data. Compared with earlier data models, this new format has many advantages and capabilities, not the least of which is improved processing time owing to employment of integer rather than floating point number formats for coordinate values. The next thing you need to learn is how to add data to the new database. We will begin with some very simple operations that enable you to import shapefiles, Arc Info coverages, grids and tables into your new database.

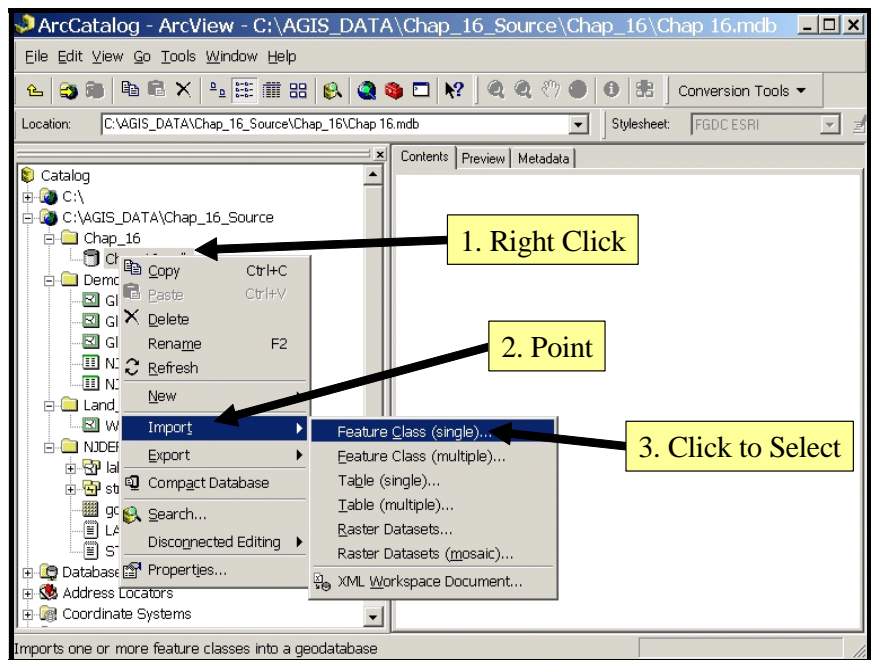
Before you begin adding data to your Personal Geodatabase, reviewing a bit of geodatabase specific terminology will help you see how things fit together. A geodatabase is a *relational database* designed to store, format, and assist in the analysis of spatial data. In the relational database model all data are stored in flat two dimensional tables in which each row represents a data record and each column contains a single attribute type. For instance, in the case of a dataset for the states of the United States, each row or record would contain data for a single state. Each column of the table would contain data on a single attribute of each state, population numbers or income for instance. In the case of spatial data, one attribute will always be a geographic identification code that provides a unique identifier for the record. This code is used in

performing joins between tables as in the case of joining a spatial layer to an attribute file in preparation to making thematic maps of the data contained in the attribute table. Relational databases possess several distinguishing characteristics:

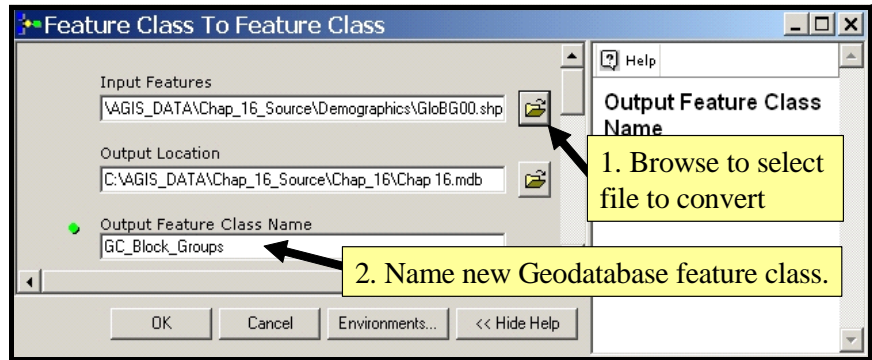
1. Data are stored in one or more files called a relation.
2. Within each file data are stored as a collection of values in simple rectangular fields [columns] and records [rows]. Each record [i.e., row] is called a tuple [rhymes with couple].
3. Each field [i.e., column] has a unique name and stores only one kind of information. For instance, a land\_use column would store codes describing the predominant use of the land for each record. An income field consists of a column of data describing the income level of the area represented by each record.
4. Each record must be unique. Having a unique geographic identification code for each geographic area guarantees this will be true.
5. Users can modify the database by adding records and fields or by altering existing data values.
6. Users can query the database with great flexibility.

You need to be familiar with some basic terminology used in the ArcGIS system. Geodatabases contain feature classes, feature datasets, and tables. A *feature class* is more or less the geodatabase equivalent of the GIS layer in that it stores geographic features in the form of points, lines, and areas. An example of a feature class is a layer consisting of polygons depicting the locations of lakes within Gloucester County, New Jersey. Feature classes can exist by themselves or they can be a part of a feature dataset. A *feature dataset* consists of a group of feature classes all with the same *spatial reference*. Spatial reference refers to a set of information describing the coordinate system used to project the spatial objects within feature classes in the feature dataset, the range of permissible values for those coordinates [i.e., X min and max, Y min and max], the range of permissible values for the z coordinate, if it exists and the domain of measure values. All feature classes in a feature dataset must have the same coordinate system and must share the same permissible ranges for x, y, and z values. Geodatabases also contain *object classes*, which are tables that store nonspatial data.

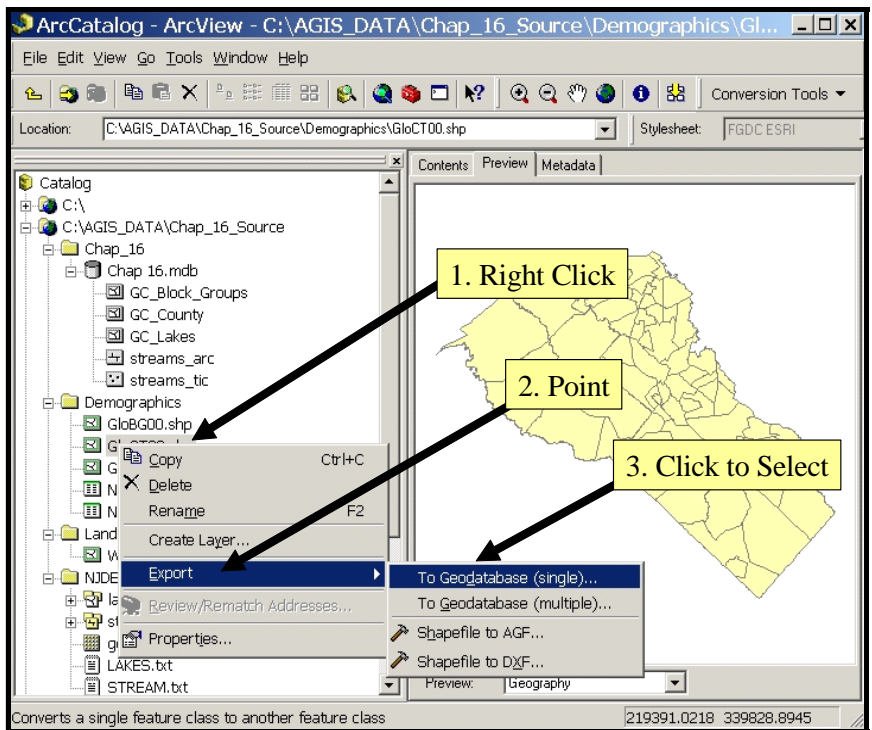
**Importing Shapefiles.** As is often the case with Arc Catalog, there is more than one way to complete an operation. So it is with converting a shapefile into a geodatabase. If you want to import a shapefile into a geodatabase, then in the Arc Catalog tree, right click on the geodatabase into which you wish to import the shapefile to open a popup menu. Point to Import and then click to select Feature Class (single) on the slide out menu. The program will open the Feature Class to Feature Class dialog.



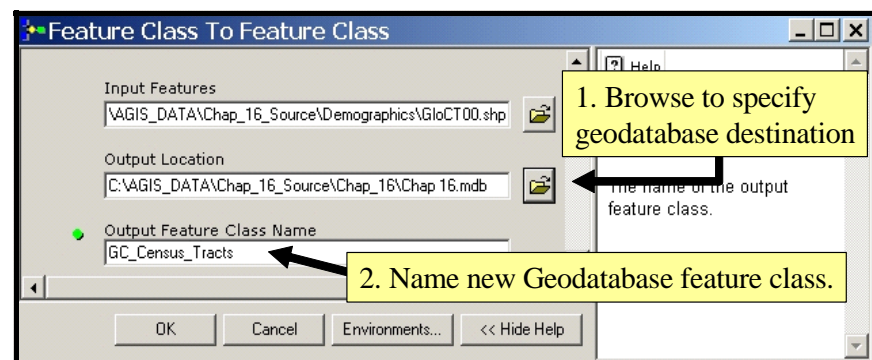
In the dialog use the Input features field to specify the location and name of the file to convert. Generally, the easiest way to do this is to use the browse button to navigate to the location of the file. Next, use the Output Location field to specify the location where you wish to save the file. By default, the program inserts the location of the geodatabase on which you right clicked. If that location is satisfactory, then there is no need to do anything with this field. Finally, use the Output Feature Class Name field to supply a name for the file. In the illustration, I have selected a Gloucester County US Census 2000 block group shapefile for input [Arrow 1]. In the Output Feature field I have given the new feature class the name, GC\_Block\_Groups.



**Exporting a shapefile to a Geodatabase.** This is simply another approach to migrating data to the geodatabase. In this case you will use Arc Catalog to navigate to the location of the shapefile that you wish to export to the geodatabase. Once there, right click on the shapefile to open the popup menu, point to Export, and then click to select To Geodatabase (single).



In the Feature Class to Feature class dialog you will see the shapefile on which you right clicked listed in the Input Features field. No need to change this. In the Output Location field, use the browse button to move focus to the location of the geodatabase in which you wish to store the new feature class. Finally, use the Output Feature Class Name field to assign a name to the new file. I have specified that the location for the new feature class should be the Chap 16 geodatabase and that the

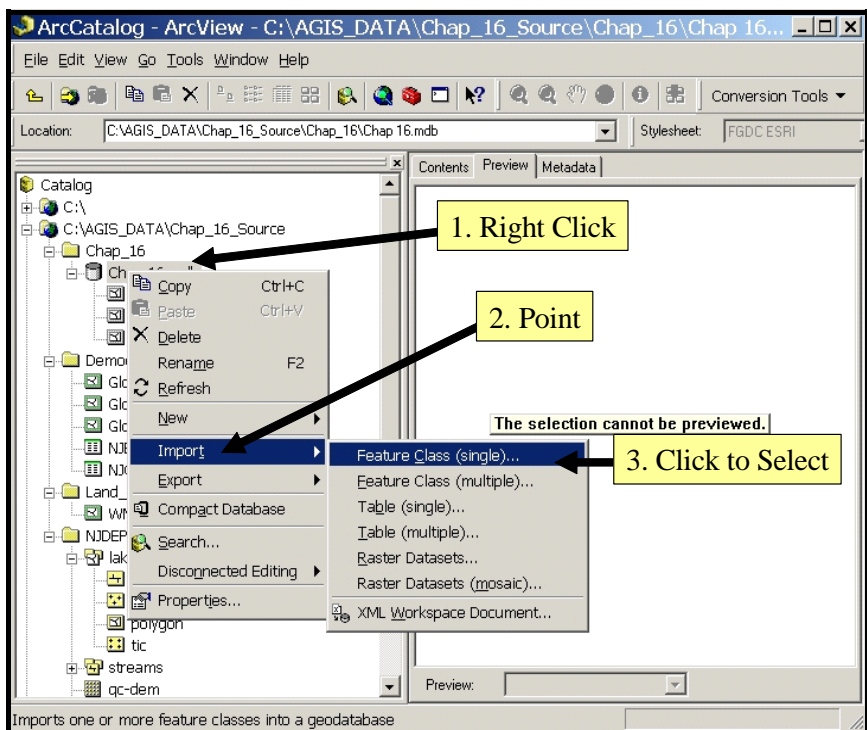


name should be GC\_Census\_Tracts. Note that geodatabase feature class names can have no spaces.

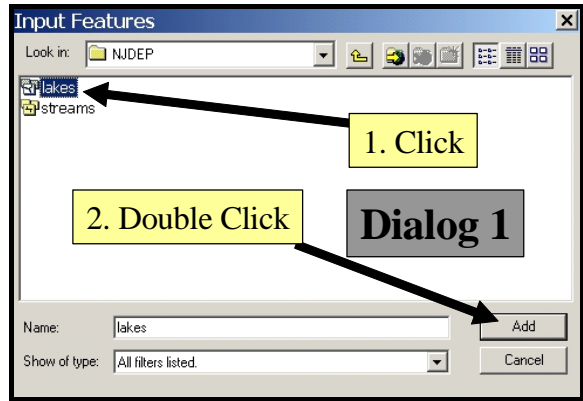
**Importing an Arc Info Coverage to Geodatabase.** The procedure for making this conversion is very much like that for converting shapefile, the primary difference being alterations required by the higher level of complexity of the coverage data model. For instance, a polygon [area] coverage has multiple files associated with it. In the following table I outline the components of an Arc / Info coverage. When you convert a coverage to a geodatabase you can convert some or all of the components. Here we will convert the polygon component for a polygon coverage such as Lakes. In the case of a linear coverage, we will convert the arcs.

Coverage	Components	Content/ Function
Lakes		The name of the coverage. You would see this in Table of Contents
	arc	Contains the arcs comprising the polygons
	label	Contains attribute information identifying geometric features.
	polygon	Contains polygon definitions
	tic	Used in georeferencing. Ties coverage to Earth space.

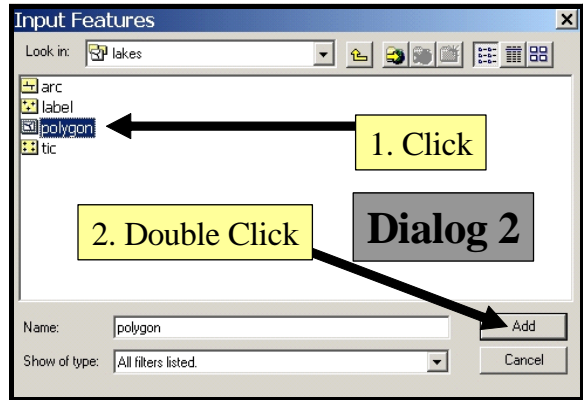
To begin, right click on the geodatabase into which you wish to migrate the coverage. The program will open a popup menu. On the menu, point to Import and then click to select Feature Class (single) on the slide out menu. The program will open the first of a series of dialogs in which you specify the coverage and which of its components you wish to migrate to the geodatabase.



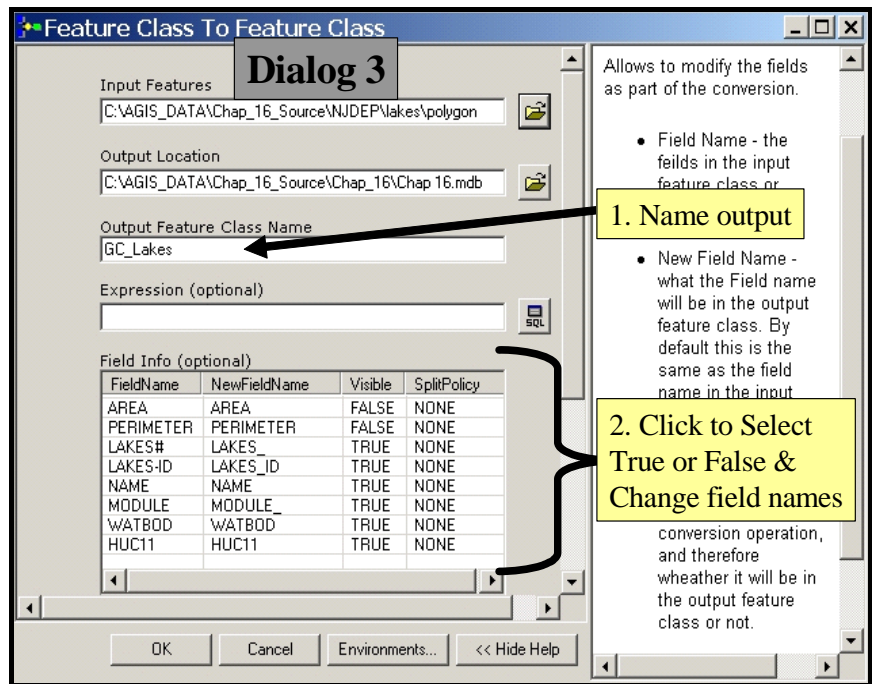
In Dialog 1 you see the Input Features dialog to which I have navigated. The NJDEP folder contains two coverages, one called Lakes and a second called Streams. As I want to migrate the Lakes coverage to the geodatabase, I have clicked on it and will dismiss the dialog by double clicking the Add button.



The program will now display a second Input Features dialog, Dialog 2. In the dialog you can see the files that comprise the Lakes coverage. I want to be able to display the lakes polygons and attributes. To do this I select the polygon file and then double click the Add button. The program will open the Feature Class To Feature Class dialog.



In Dialog 3, use the Output Feature Class Name to give the new feature class a name. In the illustration I have named the new file, GC\_Lakes. In the dialog you can see the Field Info (optional) sub-box. In some cases a field name that the coverage data model uses is unacceptable in Access, the database program used by the personal geodatabase. In these cases, the conversion process assigns a NewFieldName to make the name "Access legal." In the dialog notice that the program has changed "LAKES-ID" to "LAKES\_ID" and has changed "MODULE" to "MODULE\_". These changes ensure that no invalid Access characters are used in field names or that no Access keywords are used as field names. If you wish you can replace the names in the NewFieldName column with names you prefer.



Notice the column named, Visible. The values for entries in the column are either TRUE or FALSE. By default all entries are TRUE. If there are any fields in the migrating file that you do not wish to be a part of the new geodatabase feature class, click in the TRUE entry to open a drop down list and select FALSE. In

the illustration I have set AREA and PERIMETER equal to FALSE as the geodatabase conversion calculates its own values for these items.

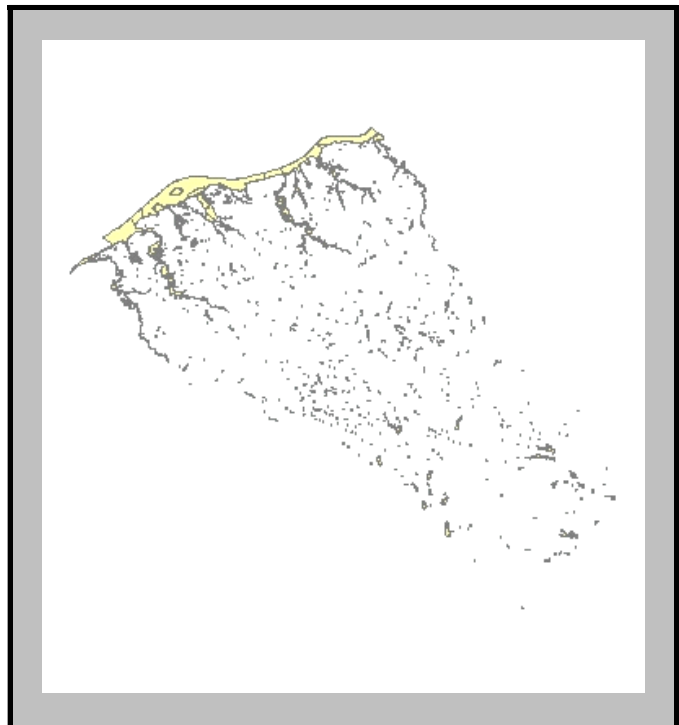
If, in the initial dialog [page 5], you had selected Feature Class (multiple), then you would have had the option of migrating more than one of the coverage components or all of them. If you had selected this option, then you would have selected the coverage you wish to input to the geodatabase and then selected the coverage feature classes you wished to convert. Remember, unlike shapefiles, coverages can have multiple feature sets. In the geodatabase each Arc Info coverage feature class will exist as a separate feature class.

**Creating a feature dataset.** A feature dataset consists of a group of features classes that share the same spatial reference. This means that members of the a feature dataset must share the same coordinate system, the same X and Y minimum and maximum values, the same range of permissible z values [if they exist] and the same measurement domain. A personal geodatabase can house multiple feature datasets. Typically, you will place related items in a feature dataset. For instance, you might want to create a feature dataset that consists of feature classes depicting various levels of U.S. Census geography. You might have a second feature dataset that contains planning related data such as land use patterns and the zoning map of the area.

Before you can create a feature dataset you must have previously created a geodatabase, as that is where your feature dataset will reside. Before you create the feature dataset, you should know the list of feature classes that you will place into the dataset. These feature classes need not be created or imported into the geodatabase prior to the creation of the feature dataset in which they will reside. Creating the feature dataset and then importing the feature classes into the geodatabase later is permissible. However, if you wish, you can create the feature classes, then create the feature dataset and import the feature classes into the feature dataset.

Before you create the feature dataset, you need to determine the values you will specify for the spatial domain of the feature dataset you are creating. The spatial domain specifies the permissible limits of the coordinate values for the feature classes that comprise the feature dataset. If you attempt to import a feature class that has a set of coordinate values that exceed any of the domain limits, you will create an error condition and will be unable to display or work with that feature class. The spatial domain includes the following items:

1. Minimum value for X coordinates. The feature dataset minimum coordinate value can be smaller than the actual minimum X value in the feature classes you will include in the dataset.
2. Maximum X value. This coordinate value can be larger than the actual maximum X value in the feature classes you will include in the dataset.
3. Minimum Y value. This coordinate value can be smaller than the actual minimum Y value in the feature classes you will include in the dataset.
4. Maximum Y value. This coordinate value can be larger than the actual maximum Y value in the



feature classes you will include in the dataset.

5. Minimum and maximum permissible values for the Z coordinate. In many cases this co-ordinate does not exist, so there is no need to worry about it.
6. Range of permissible values for m, a measurement unit range that you can assign to point, line, and area features. Not required.
7. Resolution of the feature dataset.

In order to increase processing speed and to permit data compression, the geodatabase uses integer rather than floating point values to carry out all calculations involving coordinates. Doing this speeds calculations by several orders of magnitude. The program stores these integer coordinate values as four byte binary numbers. The maximum coordinate value in binary is 1000 0000 0000 0000, which in the decimal system translates to 2,147,484,648. The program translates between floating point decimal coordinates, which is the native format of the coordinate systems in which you store your data, and these integer values “on the fly.”

While you are using Arc Map Arc Info you will never need to worry or think about this translation. Everything you see with respect to coordinate values will appear in the native format that you used when you created the database. However, when setting up your geodatabase and its feature datasets, you do need to give some consideration to the range of permissible coordinate values and dataset resolution.

Because the geodatabase “limits” us to a maximum integer value of 2,147,483,648, it follows that there are finite limits to the size of the study area extent you can specify when providing the permissible values for the minimum and maximum X and Y values. The maximum size of the study area is a function of the level of precision you require in your database. If you can be satisfied with lower precision or if, as is more likely the case, your data warrant lower precision, then the study area extent can be larger. If you need more precision, then each of the 2 billion plus integers will represent a smaller amount of linear Earth space and the maximum size of your study area will be smaller. In short, the higher the level of precision, the smaller the maximum size of the database extent. From this it follows that when you specify the resolution of the database, you control how large the maximum permissible size of the study area will be.

I think that an example might help make this clear. Suppose that we are dealing with mini-geodatabase and the maximum integer range is 1,000 rather than 2 billion plus. If the native metric of the database is feet and I set the precision to 1, then each of my 1,000 integers has to represent one foot. The maximum coordinate resolution of my database is one foot and my study area can have an extent of 1,000 by 1,000 feet. If I need more precision, I can let each integer represent, for example, one tenth of a foot. In this case I can position features more precisely within my study area, which is a good thing, but my study area extent is now only 100 feet on a side. The following table might help you see this relationship more clearly.

**Mini-Geodatabase**

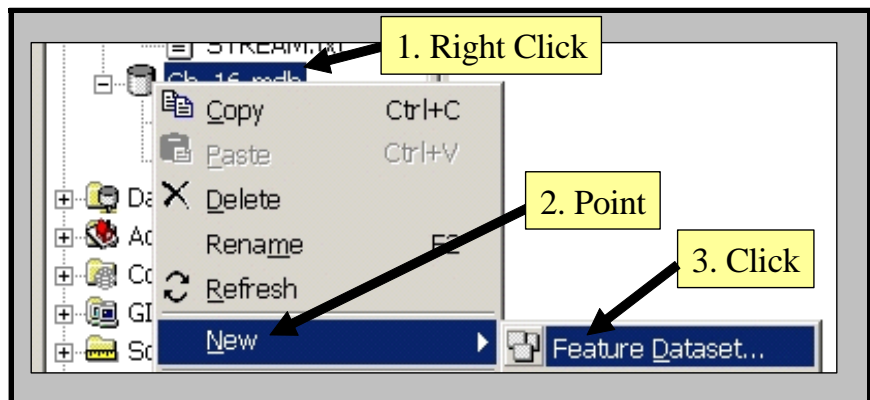
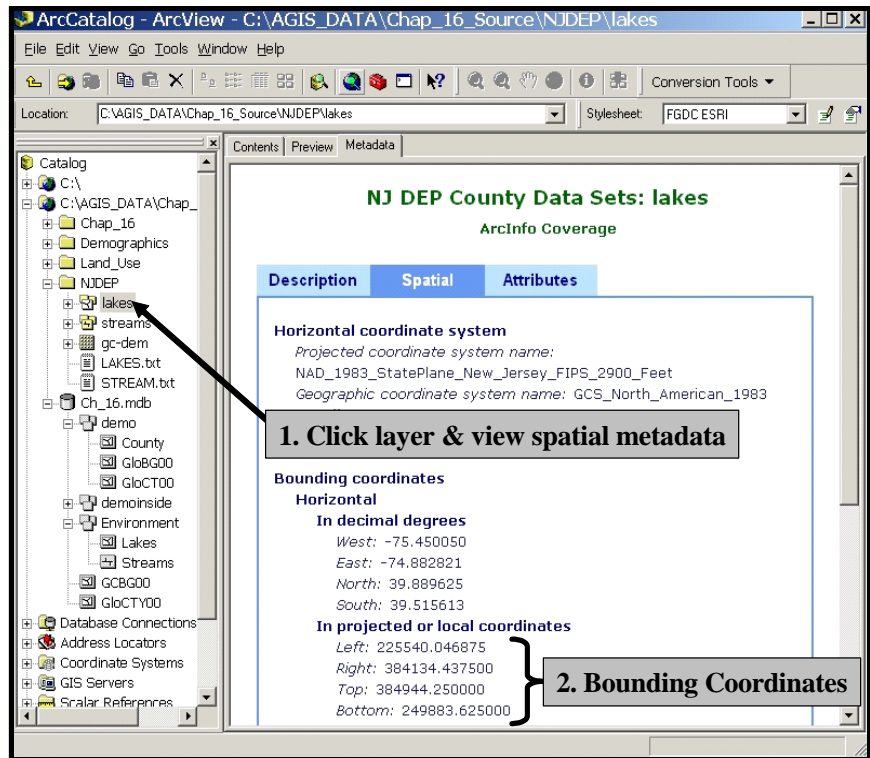
Storage Units	Coordinate System Units	Precision	Max Extent in Coordinate System Units
1 foot	Feet	1	1000 x 1000 feet
1 tenth foot	Feet	10	100 x 100 feet
1 centimeter	Meters	100	10 x 10 meters

In ArcMap Arc Info you have many more than 1,000 units with which to work, but the same principles apply. The higher the precision you specify, the more precisely you will be able to specify position. However as you increase resolution, you reduce the maximum extent of the study area.

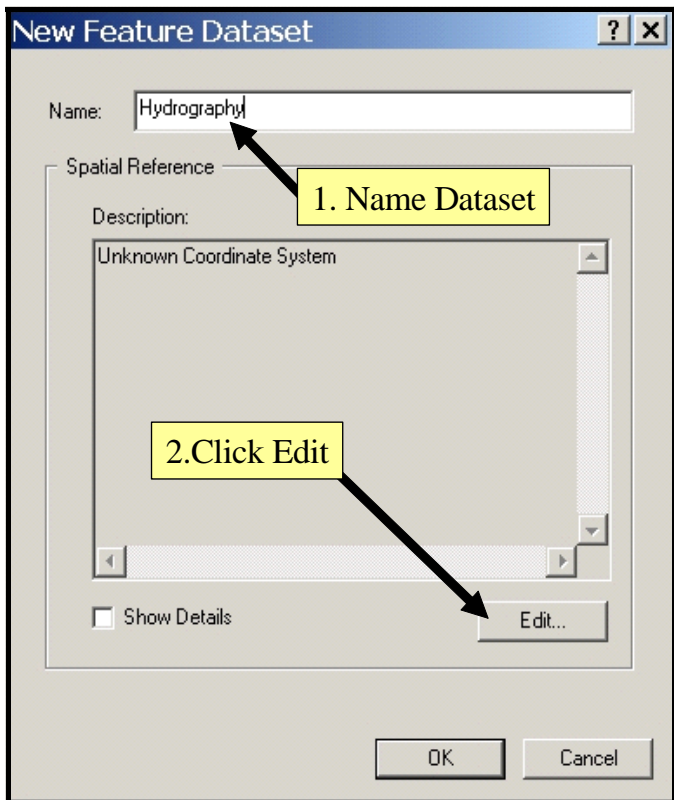
You can find an extensive discussion of all of these issues in the Arc Map help file. If you want to read about these issues in more detail, follow the instructions in the appendix to get directly to the discussion. If you read the help file, you will be able to understand a variety of approaches for setting the minimum and maximum X and Y values and precision. If you just want to be able to specify acceptable values for coordinate ranges and precision, read on here.

Before you create the new feature dataset, you should examine the minimum and maximum X and Y coordinate values for all of the layers or feature classes you wish to include in the dataset. You will use this information in setting the minimum and maximum values for the extent. To determine these values simply go into Arc Catalog and open the data layers you wish to include in the feature dataset. In the table of contents, click on each layer you wish to examine and then use the Metadata tab to view the spatial characteristics of the data layer. In creating the feature dataset, you will use these bounding coordinate values as a guide in deciding on the minimum and maximum X and Y coordinate values. Specifically, you will want to set the bounds of the dataset so as to include all of the minimum and maximum X and Y values in the layers that will comprise the dataset.

To create the feature dataset right click the geodatabase into which you wish to place the dataset. The program will open a popup menu. On the menu point to New and then click Feature Dataset in the slide out menu. Arc Catalog will open the Feature Dataset dialog.



In the New Feature Dataset dialog, type in the Name field to give the dataset a name. Notice that in the larger window, Spatial Reference, the program describes the coordinate system as unknown. You need to specify the spatial reference properties of the dataset including the coordinate system and the domain values [e.g., minimum and maximum X and Y]. To do this click on the Edit button to open the Spatial Reference Properties dialog.



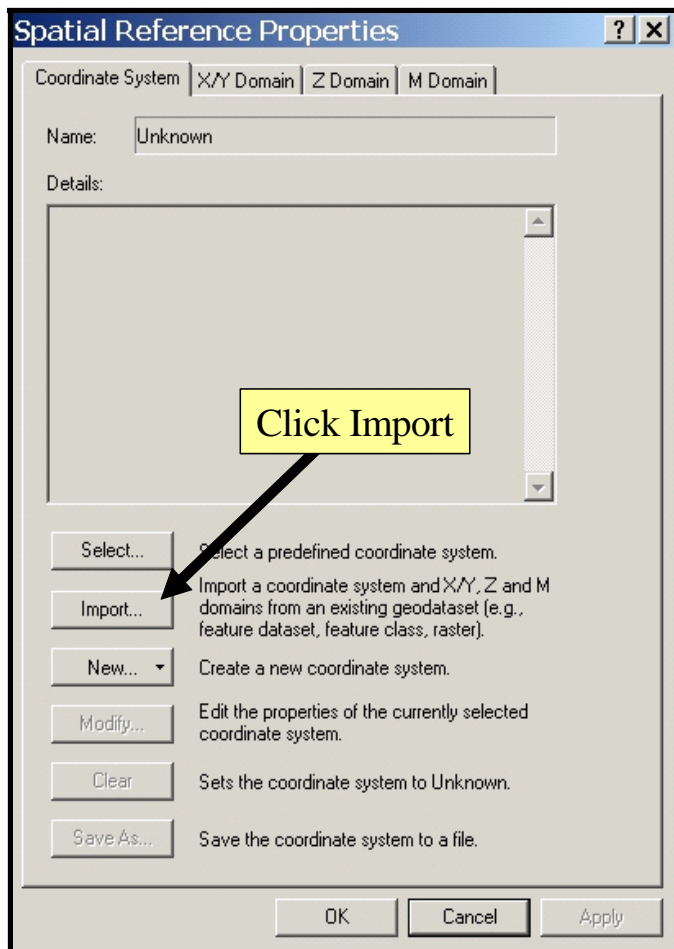
Take a moment to examine the Spatial Reference Properties dialog. Across the top portion of the dialog you can see a number of tabs. Each of these provides access to a dialog that enables you to specify a different category of spatial reference information. Using the Coordinate System tab you can:

1. Select a coordinate system for the dataset. To do this click the select button. The program will take you to a by now familiar sequence of dialogs that enable you to specify the projection or coordinate system you wish to use for the feature dataset you are creating.

2. Import spatial reference information from an existing dataset. To do this click the Import button and navigate to an existing feature dataset for which you have already specified the spatial reference information. We will do this.

3. Create a new coordinate system or modify an existing system. [New and Modify buttons]. We will not be doing this.

4. Clear the spatial reference information. If you have already specified information and wish to return to unknown as the coordinate system, click the Clear



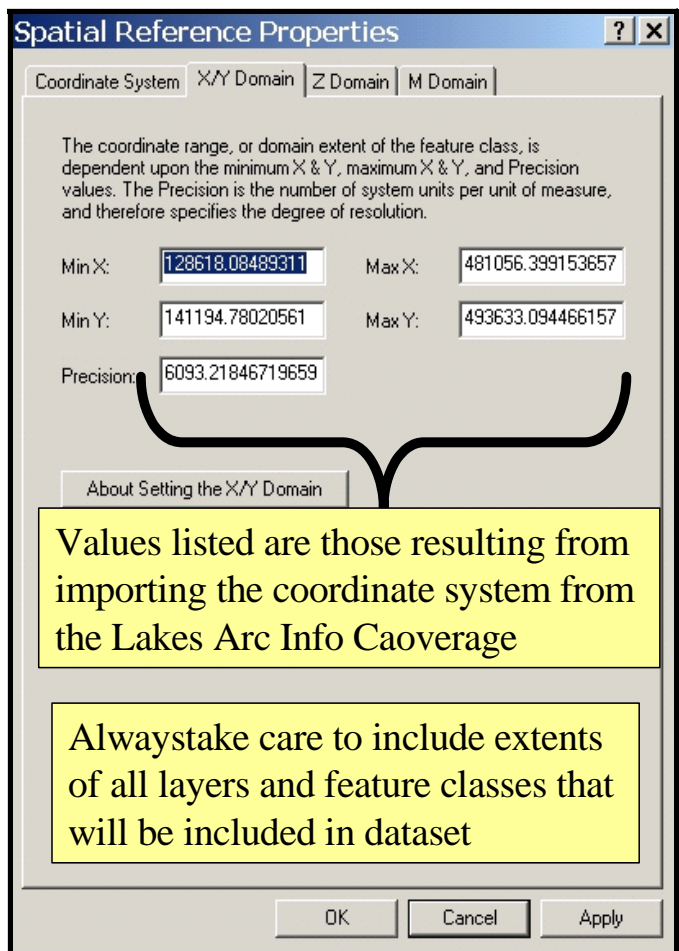
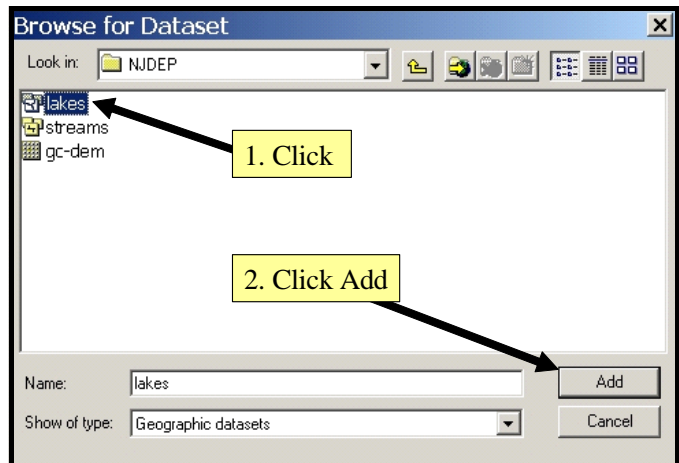
button.

Here I am going to show you how to specify the Spatial Reference properties of the new feature dataset by importing the coordinate system definition from an existing Arc Info coverage and the modifying the bounds a bit to expand the study area.

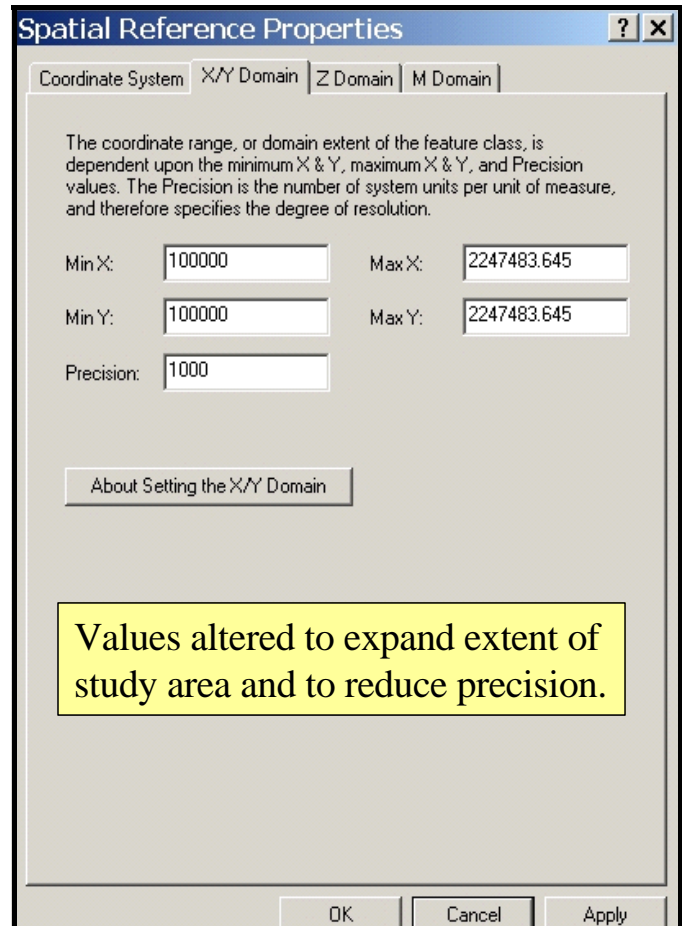
To begin, click the Import button on the Spatial Reference Properties dialog. The program will open the Browse for Dataset dialog. Navigate to one of the feature classes that you plan to bring into the feature dataset. Ideally, you should pick a dataset that has an extent that is larger or as large as any other of the layers you plan to include in the feature dataset [ this is why you examined extents before you began this process]. If there is no such layer, don't worry, we can fix things another way. When you get to the layer:

1. Click it and then
2. Click the Add button.

The program will return to the Spatial Reference Properties dialog. In the dialog, click the XY Domain tab to see the values the program created from the imported coordinate system. The values you see for the MinX, MaxX, MinY and MaxY will not match those in the source coordinate system of the layer from which you imported the coordinate system. The reason for this is that by default the program expands the study area a bit. If you are satisfied with the minimum and maximum values for X and Y and with the resolution, then click OK. If not, then this is your chance to alter these values. Note the precision level. The value of 6093.21846 tells you that of the over 2 billion integer units available you are using 6093.21846 for each unit of the coordinate system. As the coordinate system is New Jersey State Plane and the unit used is the foot, this means that we are claiming a precision that divides each foot into 6093.21846 segments. Our precision is fine enough that we can discriminate at the level of .0000164 of an inch. Not likely, even for a surveyor or an engineer!

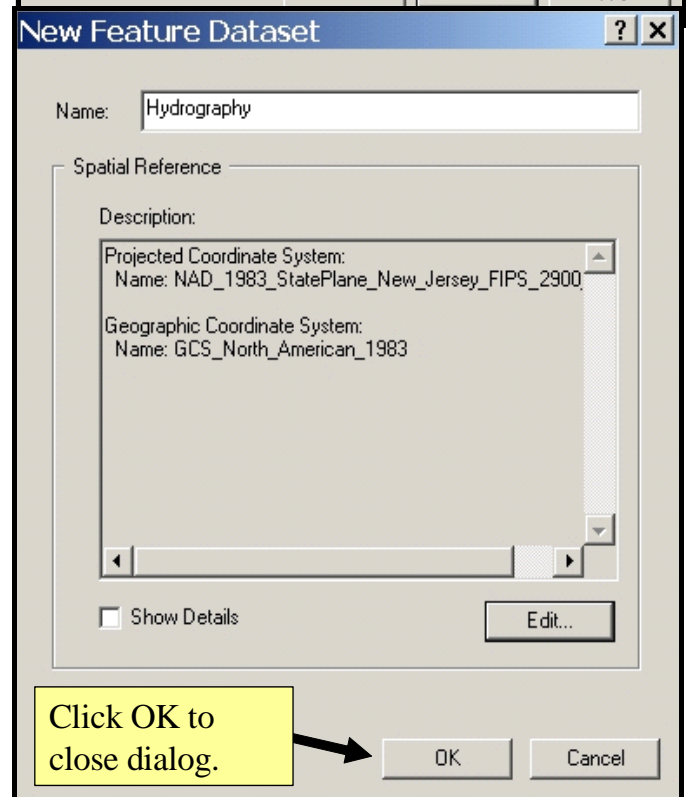


You decide that you would like a bit of leeway in the study area definition. To make sure that you can include a bit of the neighborhood of your study area, you decide to move the minimum X to the west and the minimum Y to the south. You also decide to change the precision to 1000. To do this click in the MinX field and type 100000, click in the MinY field and type 100000. Double click in the Precision field and then type 1000 in the field. Double click in the Max X and Max Y field to update the values. When you are finished, your dialog should look like the one in the illustration. Click OK to close the dialog.



In the New Feature Dataset dialog you can see a summary of your specifications for the dataset displayed in the Spatial Reference description window. If you wish to change anything prior to creating the dataset, click the Edit button. Otherwise, click OK to create the dataset.

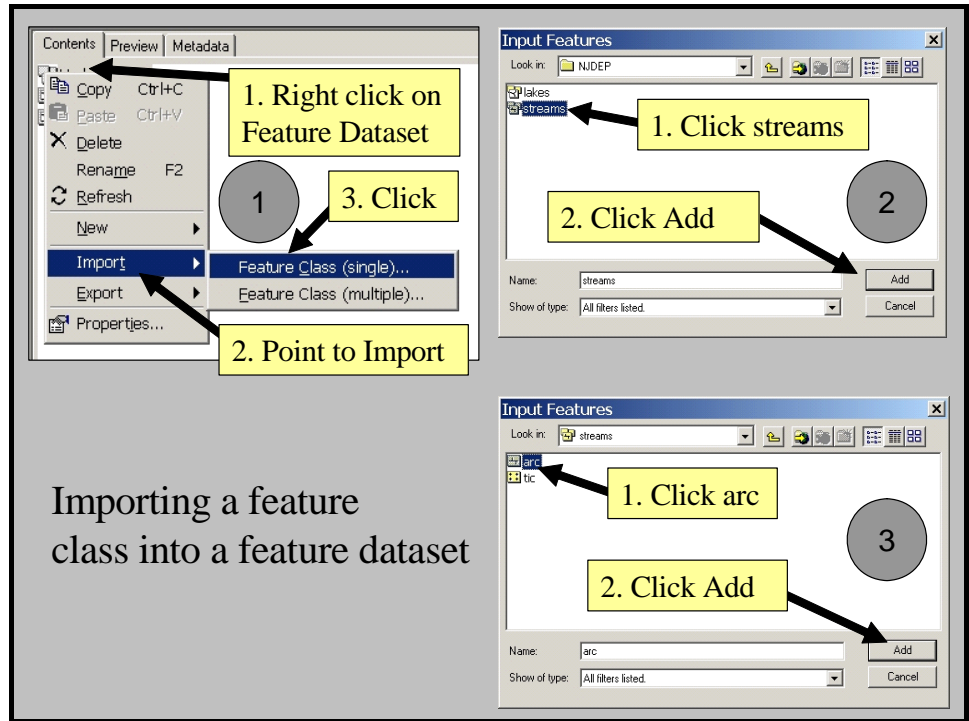
You have just created a “container” into which you can place one or more feature classes. How to do this.



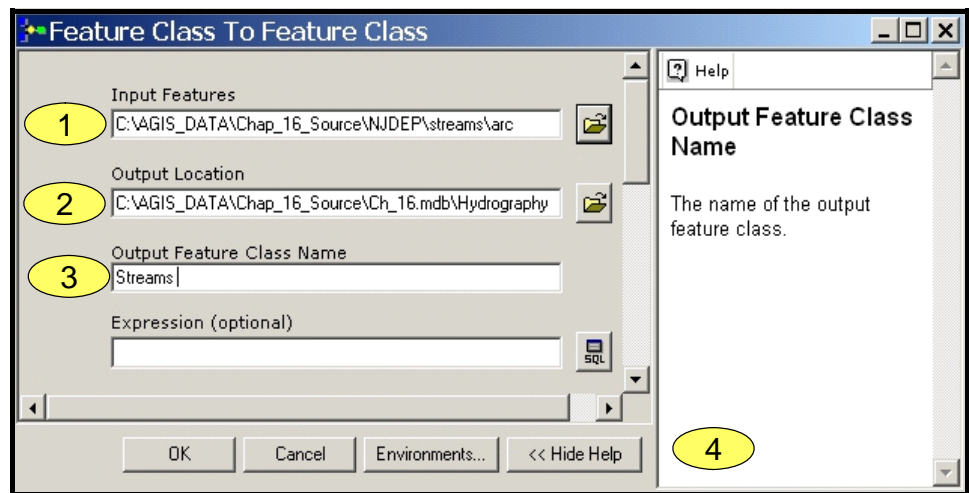
**Importing data into a feature dataset.** You can add feature classes to a feature dataset by directly importing shapefiles, coverages and other types of data into it. To do this begin by right clicking on the feature dataset [Number 1 in panel 1] into which you wish to import data. Point to Import in the popup menu [Number 2 in Panel 1] and then click on Feature Class (single) [Number 3 in Panel 1]. The program will open an Input Features dialog [ Panel 2]. Use the dialog to navigate to the file you wish to import. In the illustration I have selected an

Arc Info coverage called streams. As you know, coverages have several sub-components, so when I click the Add button [Number 2 in Panel 2] the program takes me to the listing of those components [arc and tic in Panel 3]. In Panel 3, I select arc and then click the Add button. The program opens the Feature Class to Feature Class dialog.

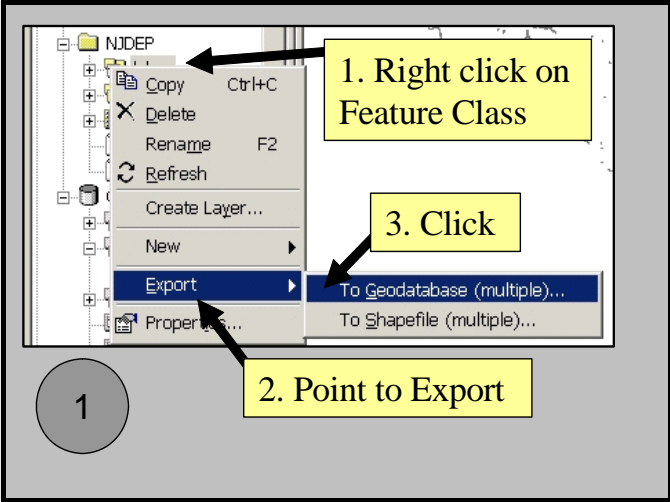
In the Feature Class to Feature Class dialog you can see the source of the features listed in the Input Features field [ Number1]. In Field 2 you can see the default output location for the new feature class you will be creating. Because you began this process by right clicking on a feature data set, the program assumes that this feature dataset is your intended destination for the feature class. There is nothing to add or alter in the fields numbered 1 and 2. In the Output Feature Class Name field [Number 3] you must supply a name for the new file. In the illustration I have called the new field, streams. Notice item number 4 in the illustration. If you click in any field of the dialog, the program will provide a help message in the Help area. In the illustration, I have clicked in the Output Feature Class Name field and the program has provided a short explanation of the required contents of that field. As you become more expert, you can hide the help information by clicking the Hide Help button.



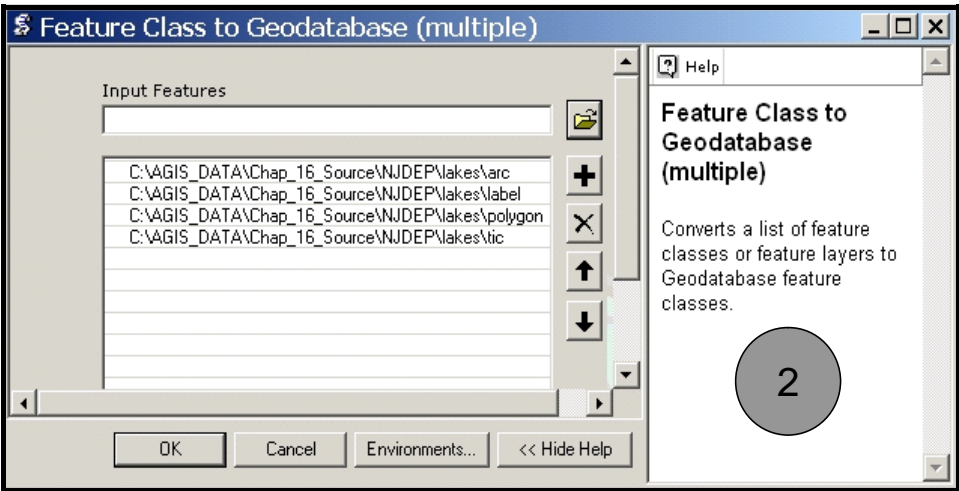
Importing a feature class into a feature dataset



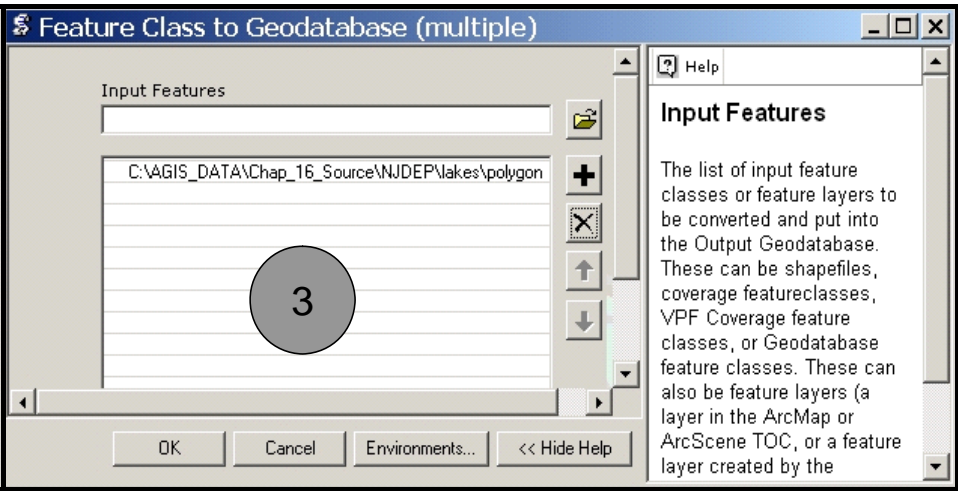
**Exporting a coverage or shapefile to a feature dataset.** To begin the process open Arc Catalog and navigate to the location of the coverage or shapefile that you wish to convert to a feature class within a feature dataset of an existing geodatabase. Right click on the file to open the popup menu, point to Export and then click to select To Geodatabase (multiple). The program will open the Feature class to Geodatabase dialog. In the illustration I have right clicked a coverage called Lakes.



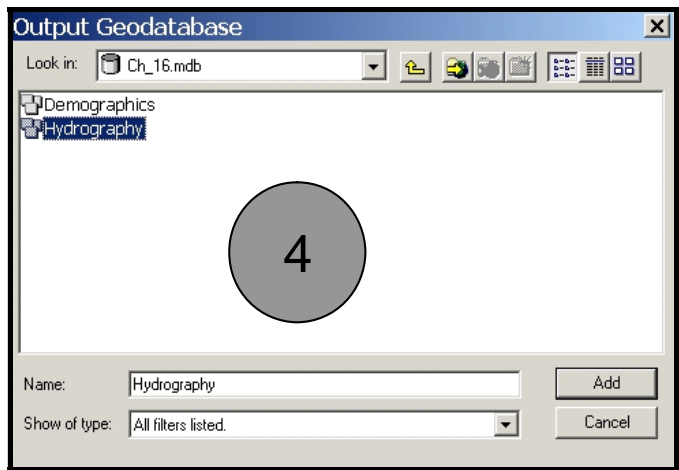
In the Feature Class to Geodatabase (multiple) dialog [Number 2], the program displays all of the components of the Lakes coverage in the Input Features field. For this operation I only need to import the polygon features, so I want to remove the others from the listing. To do this, hold the Control key and click the arc, label, and tic features and then click the X button to the right of the field. The program removes those features. If you wish to add additional features, you can do so by clicking the plus button.



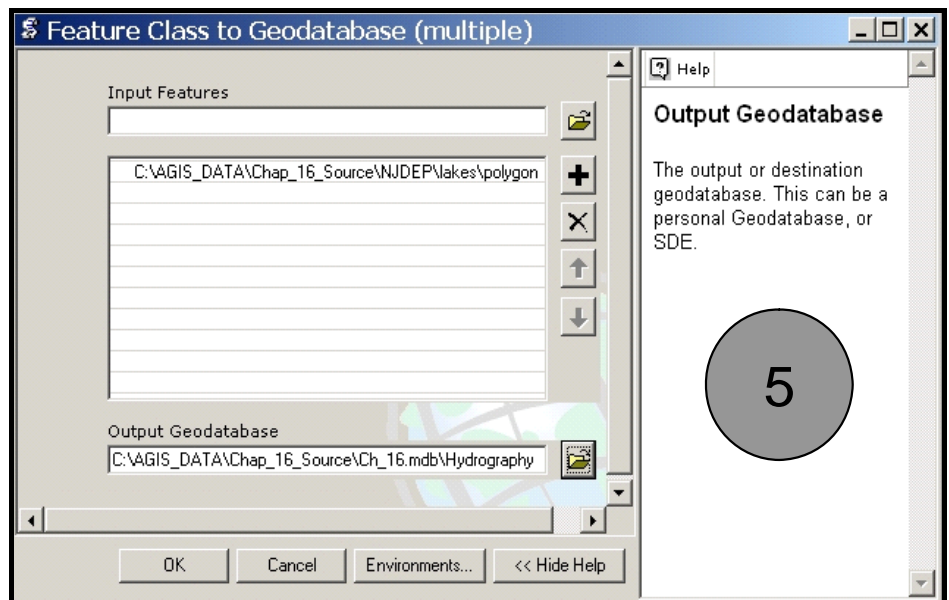
The illustration shows the listing after removal of the unneeded features [Number 3]. To complete the export operation, scroll down to the Output Geodatabase field and click the browse button. The program will display the Output Geodatabase dialog. Use the dialog to navigate to the geodatabase in which you wish to store the feature class and to the feature dataset where the feature class will reside.



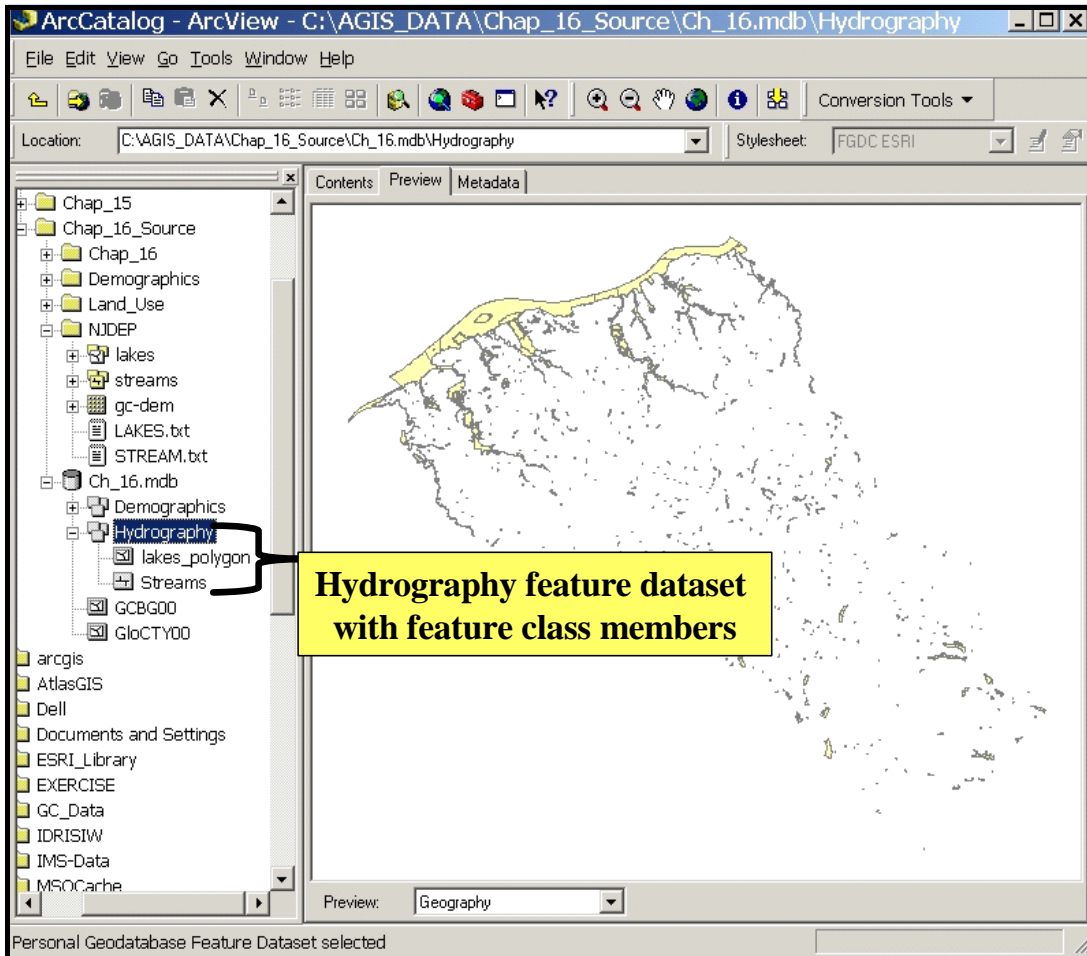
In the illustration [Number 4] I have navigated to the Ch\_16.mdb geodatabase and to the Hydrography feature dataset. Click the Add button to register your specification. The program returns to the Feature Class to Geodatabase (multiple) dialog.



In the dialog [Number5] the Input Features field lists the source of the layers to be included in the geodatabase. The Output Geodatabase field lists the destination of the new feature class. To complete the export operation, click the OK button.

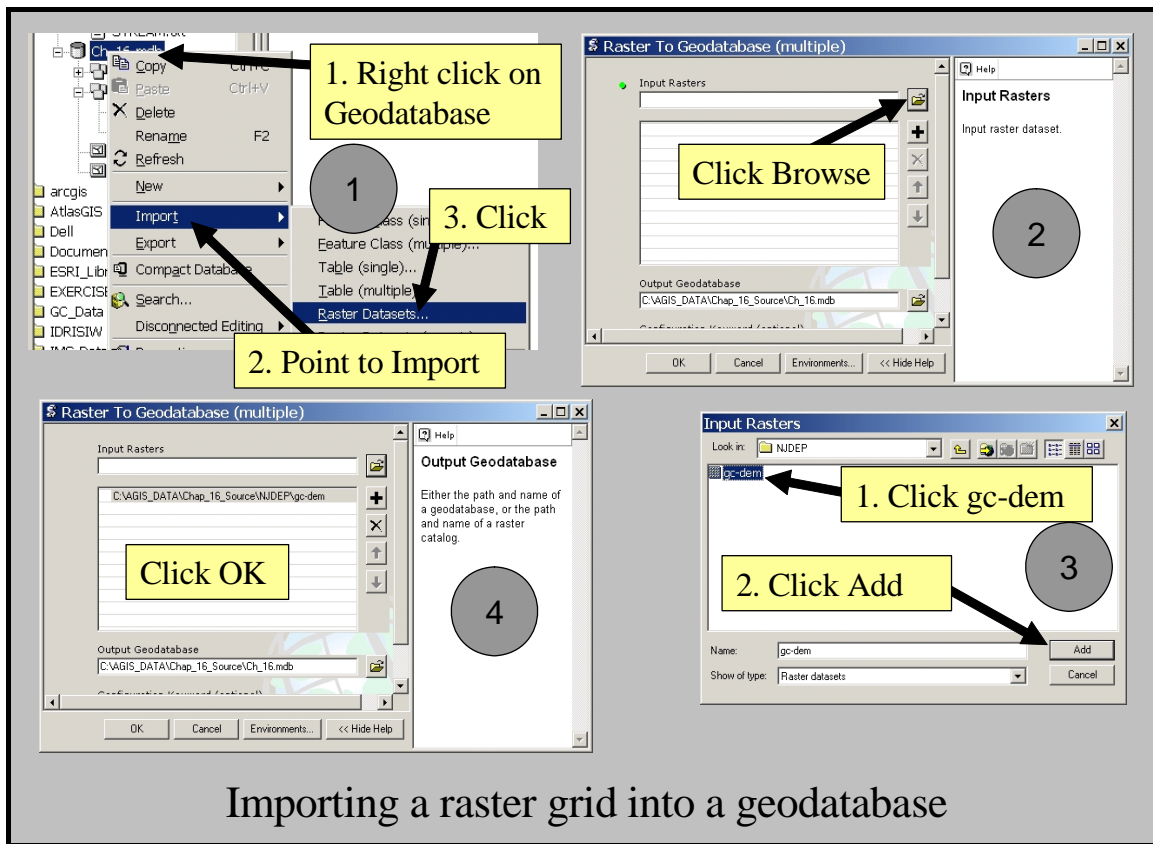


In the illustration you can see the result of the operation outlined here. In the table of contents the catalog lists the Hydrography feature dataset within the Ch\_16.mdb geodatabase. Within the Hydrography feature dataset are the two component feature classes, lakes\_polygon and Streams.



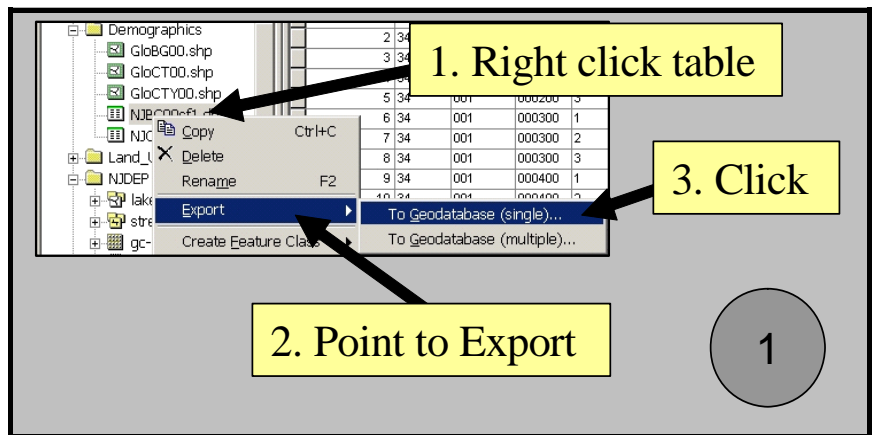
**Importing a Grid Layer into a Geodatabase.** By now this should be easy. To incorporate a grid into a geodatabase, just follow the steps outlined here and on the illustration on the next page:

1. In the catalog tree right click on the geodatabase. The program will open a popup menu. On that menu point to Import and then click to select Raster Dataset from the slide out menu.
2. The program will open the Raster to Geodatabase dialog. In the dialog use the browse button to the right side of the Input Raster field to navigate to the grid layer you wish to import.
3. When you click on the browse button the program will open the Input Rasters dialog. Navigate to the grid, click it to select, and then click the Add button. Note that you can import more than one grid at a time.
4. The program returns to the Raster to Geodatabase dialog. Click OK to import the grid.

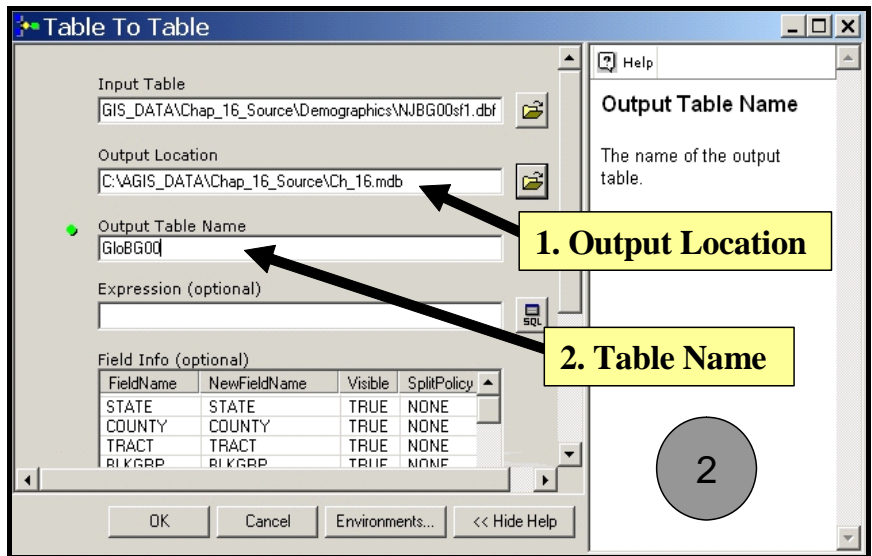


**Exporting foreign tables to a geodatabase.** In many, if not most cases, you will store attribute data in tables that are separate from your cartographic files. In order to make maps you will need to be able to access your tabular attribute data and join it to the cartographic files in your geodatabase. Because you are likely to have an extensive collection of attribute tables in formats compatible with Arc Info or Arc View 3.x, you need to be able to convert those tables into a format usable by the geodatabase. The native table format for Arc Info is the INFO table. For Arc View 3.x the native table format is dBase. Geodatabases use Access tables as the native format. Access is a Microsoft database product that runs on personal computers. As you will see exporting a table is a very simple process.

To begin the export operation, right click on the table you wish to export [Number 1]. In the illustration, I have right clicked on a dBase table, NJBG00sf1.dbf. As soon as you right click, Arc Catalog will open a popup menu. In the menu point to Export and then select To Geodatabase. Arc Catalog opens the Table to Table dialog.



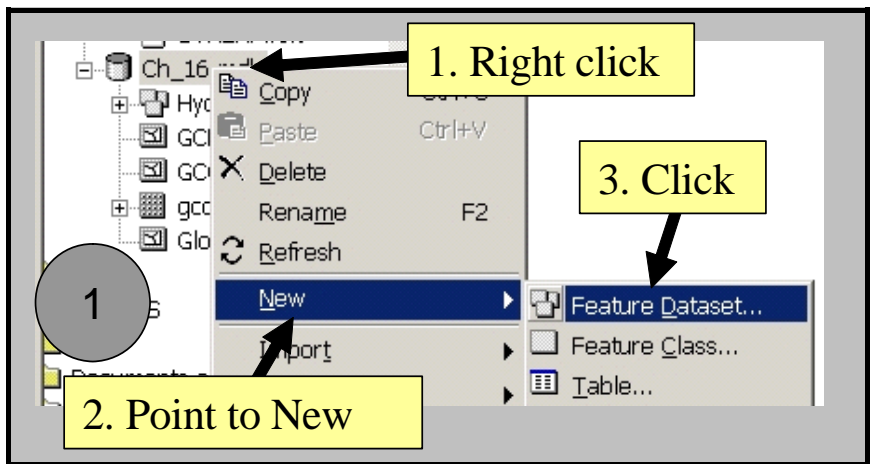
In the illustration [Number 2], the Input table field is filled in automatically. To complete the operation, you need to specify the Output Location and the name you want to assign the converted table. To specify the output geodatabase, click the browse button located to the right side of the Output Location field and navigate to the location of the geodatabase in which you wish to save the converted table. After you make the selection you want, the program displays the output location in the field [Number 1 in illustration 2]. Finally, type a name for the table in the Output Table Name field [Number 2 in illustration 2].



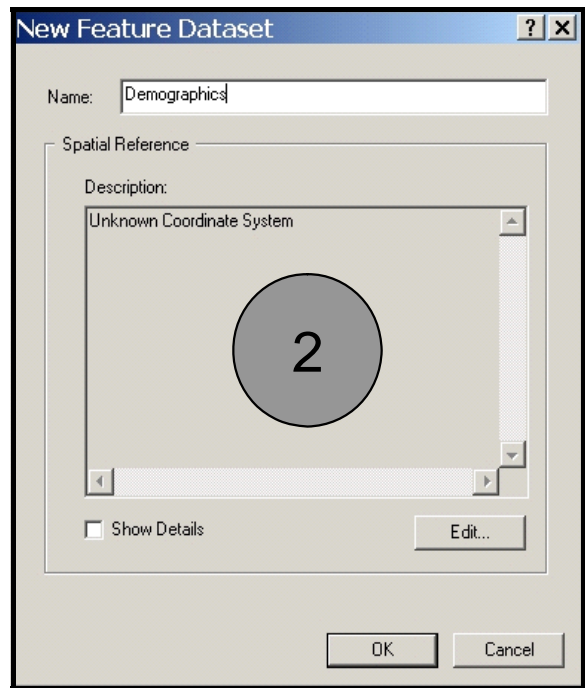
At this point you might want to examine the Field Info area to see if any of the field names in the input table were changed by the program to meet the requirements of Access. In the process of conversion Arc Catalog might have to change some of the dBase field names. This can occur if the name violates the Access field naming rules or if one of the field names in the dBase table has a name that is also a keyword in Access [e.g., True, False]. To complete the operation, click OK.

**Create Feature Dataset for Demographics.** We will want to have some appropriate feature classes to use in displaying attribute data we move into the geodatabase. Here I will outline the process of creating another feature dataset.

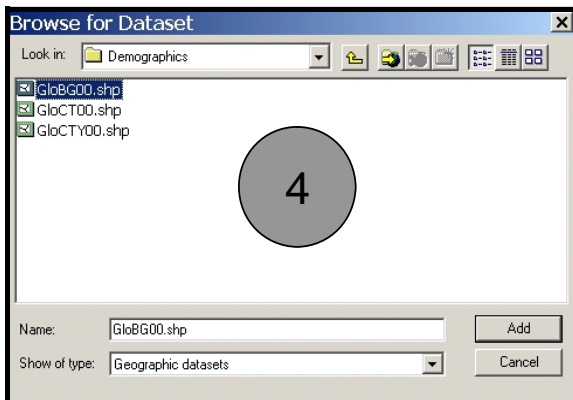
1. Use illustration 1 as a guide to begin creating a new feature dataset. To begin right click on the geodatabase in the catalog tree and follow the steps outlined.



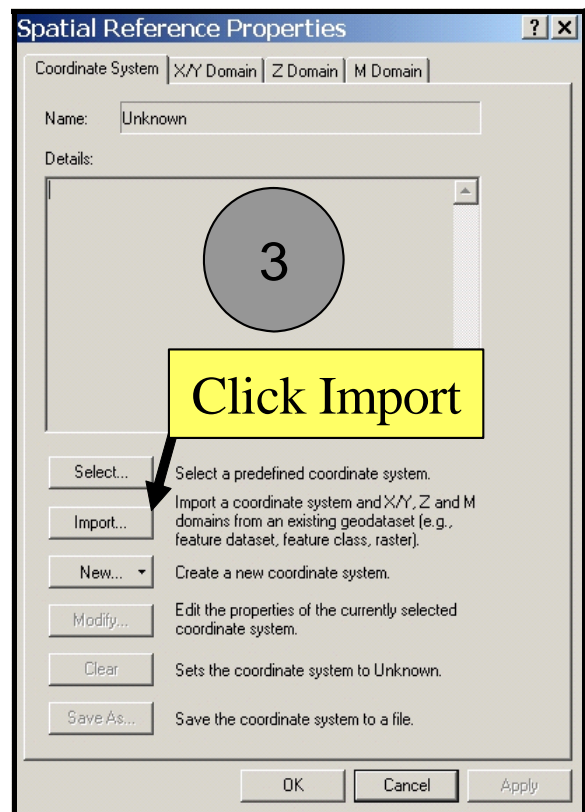
- In the New Feature Dataset dialog type a name for the new dataset in the Name field. Notice that the coordinate system is listed as unknown. Click the Edit button to continue.



- In the Spatial Reference Properties click the Import button. You are going to navigate to a shapefile that has New Jersey State Plane coordinates. You will use this file as a model for defining the spatial reference for the feature dataset.

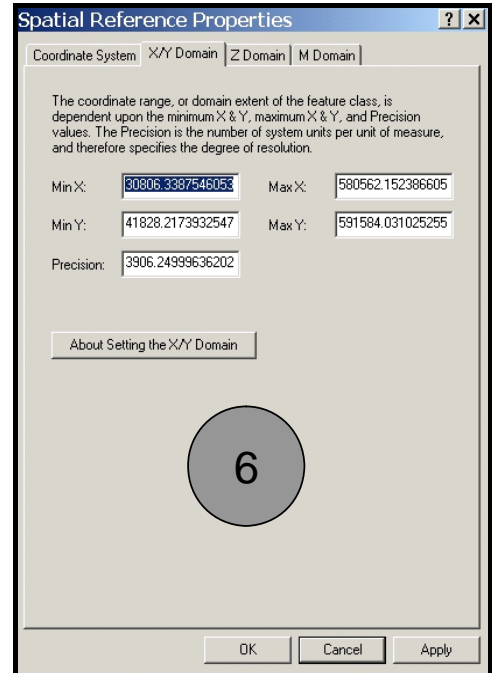
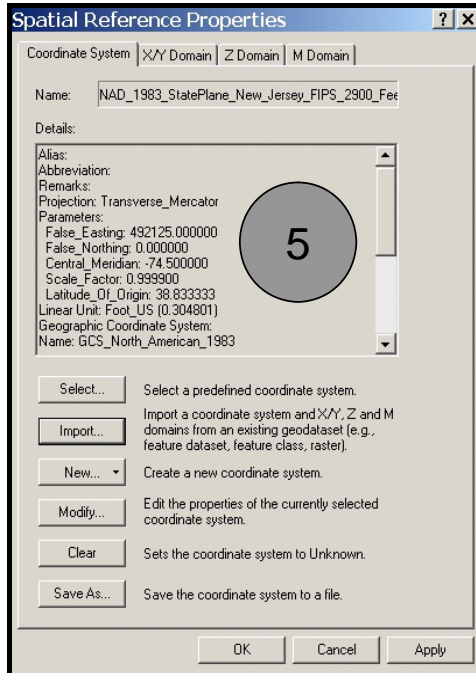


- The file you want is in the Demographics folder of the chapter database, Chap\_16\_Source. In the Browse for Dataset dialog, click on the GloBG00.shp shapefile and then click the Add button. The program returns to the Spatial Reference Properties dialog.

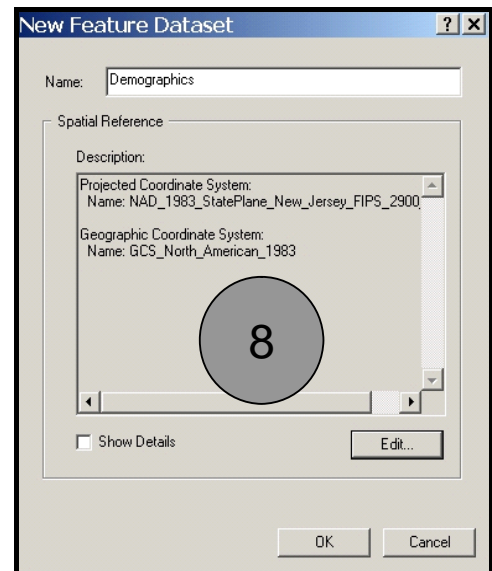
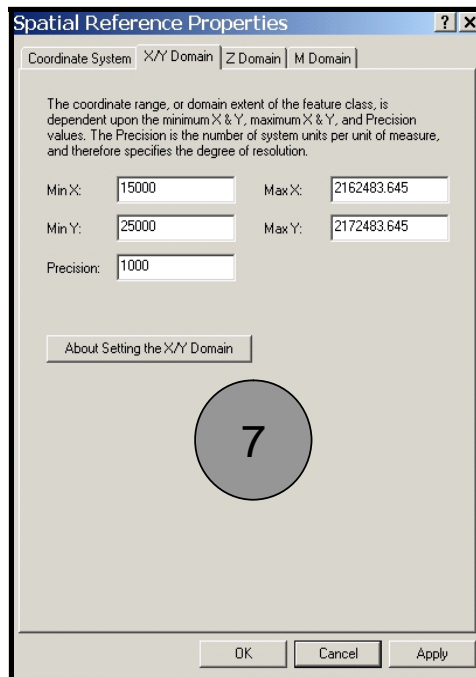


5. In the Spatial Reference Properties dialog you can see the imported coordinate system information. You are going to alter the default X/Y Domain values slightly. To examine the values the program assigned when you imported the coordinates, click the X/Y Domain tab.

6. Notice the values for the Min X, Max X, Min Y, and Max Y displayed in Number 6. Also notice the precision value of 3906.2499. We are going to change these values to reduce the resolution and expand the study area size.



7. In illustration 7 I have changed the Min X and Min Y values as indicated in the dialog. To change these values, delete the existing values and type the new values. After you change the min X and Y, click in the Precision field and type 1000 to lower the precision. Finally double click in the Max X and Max Y fields to update those values to reflect your changes. Close the dialog by clicking OK.



8. In the illustration you can see some summary information about your feature dataset. To create the dataset, click OK.

### Populating the Feature Dataset.

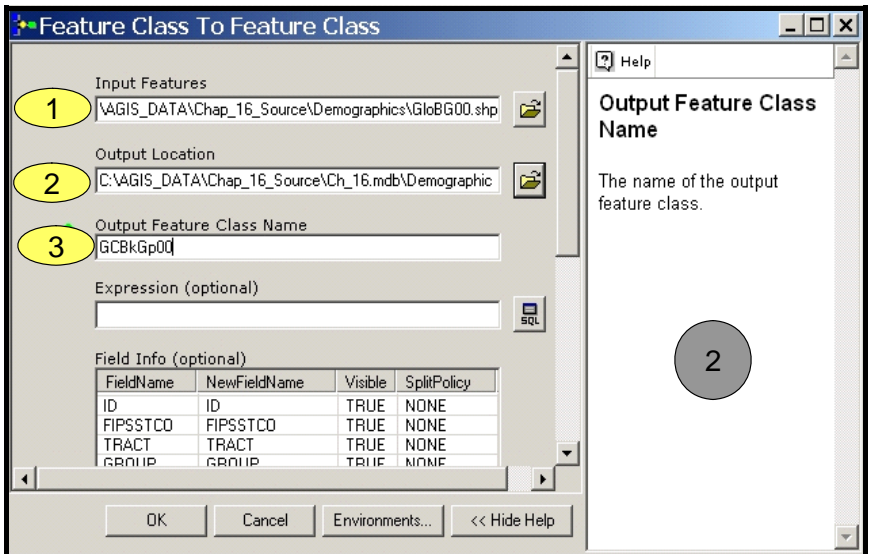
Now that you have a new feature dataset, you will want to add some feature classes to it. Here I will demonstrate how to add a shapefile to the dataset.

1. In the catalog tree point to the shapefile you want to export to the feature dataset. In the illustration I have pointed to one of the shapefiles in the Demographics folder of the Chap\_16\_Source database.



After you point, right click, point to Export on the drop down menu and then click To Geodatabase (single) on the slide out menu. The program opens Feature Class to Feature Class dialog.

2. In the Feature Class to Feature Class dialog the Input Features field is filled in [Number 1 in illustration 2]. Use the browse button to the right of field number 2, Output Location, to navigate to the destination, which in this case is the Ch\_16.mdb geodatabase and the Demographics feature dataset. In field 3, Output Feature Class Name, type the name you want for the feature class. Take a moment to examine the Field Info to see if any field names will change after the conversion.



Remember, if you wish, you can change the field names by typing in the NewFieldName field. To migrate the shapefile, click the OK button. To add additional shapefiles from the Demographic folder, just repeat this process for each shapefile.

**WORKSHOP:** In this workshop you will convert spatial datasets currently in coverage and shapefile format into geodatabase feature classes and feature datasets. You will also move a grid layer into the geodatabase and convert dBase attribute tables into geodatabase attribute tables. The data that you will convert is in a folder called Chap\_16\_Source. Before you can begin the workshop, you will need to copy this folder to your H: drive or to the C: drive.

You will find that all processing takes place much faster if you copy the Chap\_16\_Source folder to the local hard drive and carry out the required procedures there. After you finish the workshop, you can delete the Chap\_16\_Source from the local hard drive [C:] and from your network drive [H:] and then copy the completed workshop folder, Chap\_16 back to you network drive.

The following table provides a summary of the contents of the Chap\_16\_Source folder. This folder contains the shapefiles, Arc Info coverages, grids and dBase files that you will convert to geodatabase format.

Folder	File	File Type	Contents
Demographics	GloBG00.shp	Shapefile	Block group boundary polygons
Demographics	GloCT00.shp	Shapefile	Census tract boundary polygons
Demographics	GloCTY00.shp	Shapefile	County boundary
Demographics	NJBG00sf1.dbf	dBase	US Census Summary Tape File 1 Block Group data for New Jersey
Demographics	NJCT00sf1.dbf	dBase	US Census Summary Tape File 1 Census Tract data for New Jersey
Land_Use	WMA_Glo_LU.shp	shapefile	1995 Land use data for Gloucester County
NJDEP	Lakes	coverage	Lake polygons
NJDEP	streams	coverage	Stream arcs
NJDEP	gc-dem	grid	Gloucester County DEM

To complete the workshop carry our the operations outlined in the following table and then complete the assignment requirements listed at the end.

Use Arc Catalog to create folder called Chap_16	<p>This folder will serve as the container for the geodatabase you are creating. Its has two functions:</p> <ol style="list-style-type: none"> <li>1. It simply helps you keep your datasets organized on your network drive and</li> <li>2. Some kinds of data [e.g., layers] can not be converted to a geodatabase. Layers, which can not be a part of the geodatabase, should be stored nearby. The Chap_16 folder is a good place for this kind of stuff.</li> </ol>

Use Arc Catalog to create the geodatabase	<p>Create the geodatabase within the folder Chap_16.</p> <p>Call the geodatabase GC</p>

Create a feature dataset, Demographics, within the geodatabase.	<ol style="list-style-type: none"> <li>1. Point to the GC.mdb.</li> <li>2. Right click, point to New and select Feature Dataset.</li> <li>3. Name the feature dataset Demographics.</li> <li>4. Import coordinate system values from Chap_16_Source; Demographics; GloBG00.shp.</li> <li>5. Change the X / Y Domain: <ul style="list-style-type: none"> <li>Min X = 15000</li> <li>Min Y = 25000</li> <li>Precision = 1000</li> </ul> </li> </ol>

<p>Export a shapefile to create a new feature class for the census tract data and add it to the Demographics feature dataset.</p>	<ol style="list-style-type: none"> <li>1. Navigate to the Chap_16_Source folder and open the Demographics sub-folder .</li> <li>2. Right click on the shapefile GloBG00.shp, point to Export and select Geodatabase (single).</li> <li>3. In the Feature Class to Feature Class dialog specify the output geodatabase as GC.</li> <li>4. Specify the existing Feature Dataset, Demographics</li> <li>5. Call the new feature class, GCBG00</li> <li>6. Repeat this procedure for each of the two remaining shapefiles: GloCT00.shp and GloCTY00.shp</li> </ol>

<p>Create a new feature dataset called Hydrography</p>	<ol style="list-style-type: none"> <li>1. Point to the GC.mdb.</li> <li>2. Right click, point to New and select Feature Dataset.</li> <li>3. Name the feature dataset Hydrography.</li> <li>4. Import coordinate system values from Chap_16_Source; NJDEP; coverage called Lakes.</li> </ol>

<p>Populate the Hydrography feature dataset by exporting the Lakes and Streams coverages to the feature dataset</p>	<ol style="list-style-type: none"> <li>1. Navigate to the Chap_16_Source folder and open the NJDEP sub-folder.</li> <li>2. Export the polygon feature class of the lakes coverage to the Hydrography feature dataset in the GC geodatabase.</li> <li>3. Export the arc feature class of the Streams coverage to the Hydrography feature dataset in the GC geodatabase.</li> </ol>

Migrate the Chap_16_Source; Land_Use; WMA_Glo_LU.shp layer to the GC geodatabase	<ol style="list-style-type: none"> <li>1. Navigate to the Chap_16_Source folder and open the Land_Use sub-folder .</li> <li>2. Right click on the WMA_Glo_LU.shp, point to Export and select To Geodatabase (single)</li> <li>3. In the dialog specify the output geodatabase as GC.</li> <li>4. Specify an appropriate name for the land use feature class.</li> </ol>

Export an Arc Info coverage to create a new feature class for the Streams coverage and add it to the Physical dataset.	<ol style="list-style-type: none"> <li>1. Navigate to the Chap_16_Source folder and open the NJDEP sub-folder .</li> <li>2. Right click on the Arc Info coverage streams and select Coverage to Geodatabase.</li> <li>3. In the dialog specify the output geodatabase as GC.</li> <li>4. Specify the existing feature dataset, Physical.</li> <li>5. Accept the default feature class name</li> </ol>

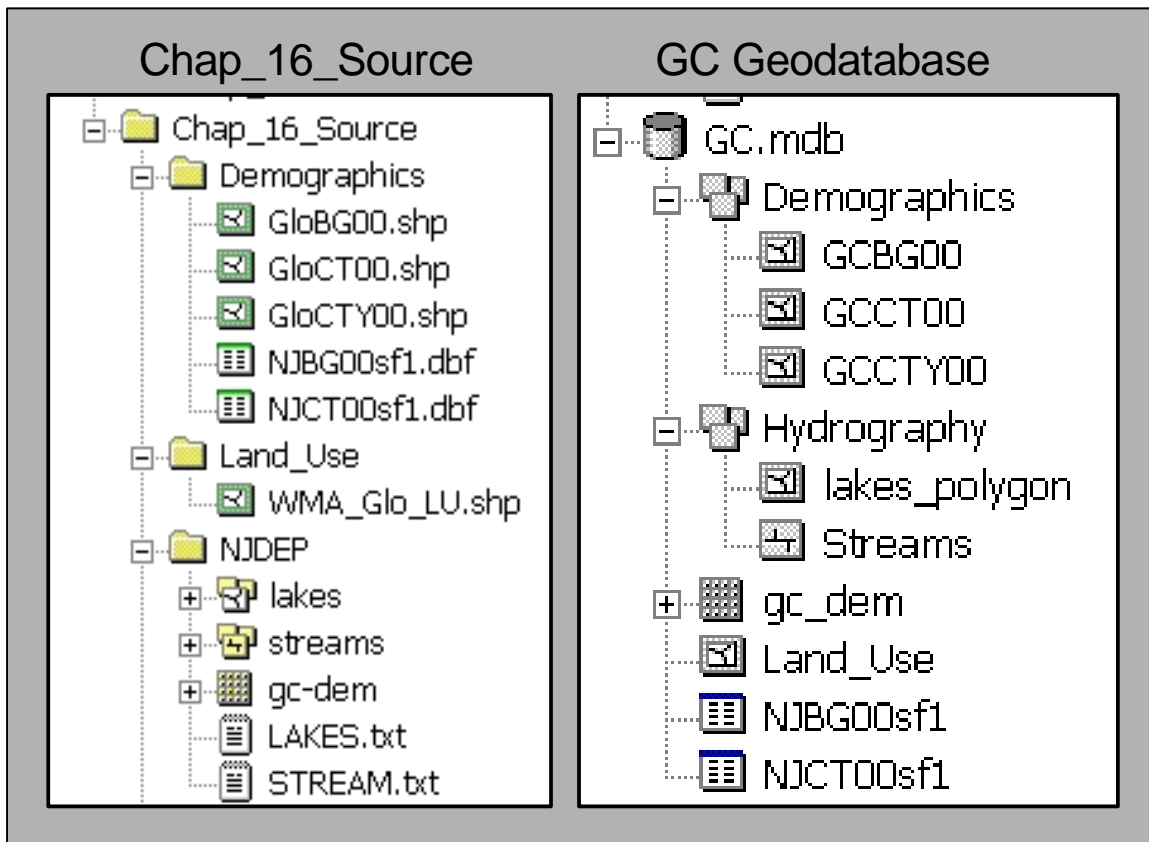
Export a dBase file to create a new geodatabase table.	<ol style="list-style-type: none"> <li>1. Navigate to the Chap_16_Source folder and open the Demographics sub-folder .</li> <li>2. Right click on the dBase file NJBG00sf1.dbf. Point to Export and select To Geodatabase (single).</li> <li>3. In the Table to Table dialog specify the output geodatabase as GC.</li> <li>4. Specify the Output Table Name</li> <li>5. Repeat this procedure for the table NJCT00sf1.dbf</li> </ol>

Import the grid, gc-dem, to the geodatabase.	<ol style="list-style-type: none"> <li>1. Point to the GC geodatabase, right click, point to Import and select Raster datasets.</li> <li>2. in the Raster to Geodatabase dialog use the Input Rasters browse button to navigate to the Chap_16_Source NJDEP sub-folder. In the folder select gc-dem.</li> </ol>

When you have completed the workshop, you will have created a geodatabase with the following structure and content for the geodatabase residing in the Chap\_16 folder and GC sub-folder.

Geodatabase	Object Type	Name of Feature Dataset	Example Feature Class Names [Yours may vary]
GC	Feature Class	Demographics	GCBG00
GC	Feature Class	Demographics	GCCT00
GC	Feature Class	Demographics	GCCTY00
GC	Feature Class	NA	Land_Use
GC	Feature Class	Hydrography	Lakes_polygon
GC	Feature Class	Hydrography	Streams
GC	Table	NA	NJBG00sf1
GC	Table	NA	NJCT00sf1
GC	Grid	NA	gc_dem

The illustration depicts the structure of the Chap\_16\_Source folder along with the geodatabase.



**Assign**

**ment:** To demonstrate that you have completed the workshop, display the expanded geodatabase in the catalog tree as in the illustration on the previous page and then create a screen shot of the database structure. To create a screen shot of a window, with the window active hold the Alternate key and the press the Print Screen key. Paste this screen shot into a Word document.

Additionally, create two layouts from the geodatabase:

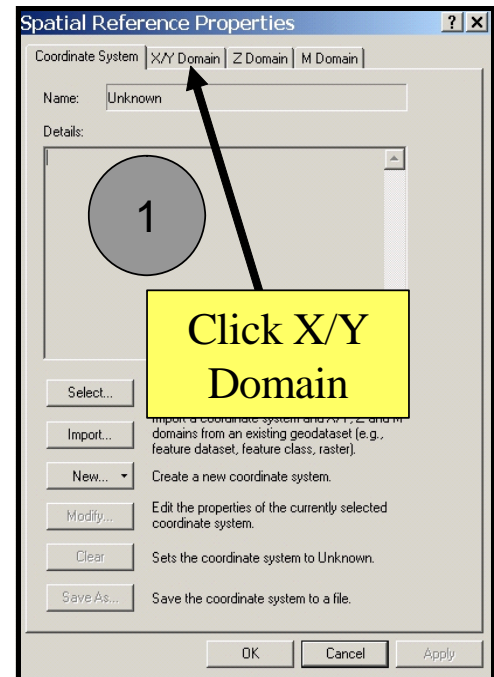
1. One layout depicting a graduated color map [choropleth] using either the census tract or the block group data. To do this you will have to join the cartographic layer to the appropriate attribute file. Remember the guidelines for a choropleth map:
  - a. Map summary or density measures rather than absolute values.
  - b. Use an appropriate color scheme and five to seven classes.
  - c. Include a legend, title, scale, and your name.

Use the county feature class to depict the county boundary.

2. A second layout depicting the contents of the Hydrography feature dataset. Create an appropriate legend for the map of streams and lakes. For background use the gc\_dem grid.

## Appendix

1. To read an extensive presentation on the X/Y Domain and precision values in the geodatabase, when in the Spatial Reference Properties dialog, click the X/Y Domain tab to see the contents of the sub-box.



2. In the sub-box, click the About Setting the X / Y Domain button and read the help file.

