

## Learning ArcGIS Desktop

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#### Introduction

ArcGIS Desktop is a suite of integrated applications including ArcMap, ArcCatalog, ArcToolbox, ModelBuilder, and ArcGlobe. It is used to create, import, edit, query, map, analyze, and publish geographic information.

This tutorial is intended to introduce you to the basic use of ArcGIS 9.1. We will concentrate on ArcMAP and ArcCatalog that describer some of the common operations a user may need to know in order to manipulate and/or analyze their spatial datasets.



- Getting Started with ArcGIS
- Displaying Map
- Querying Data
- Analyzing Spatial Data
- Making and Printing Maps



### **Getting Started with ArcGIS**

### Applications of ArcGIS: ArcCatalog and ArcMap

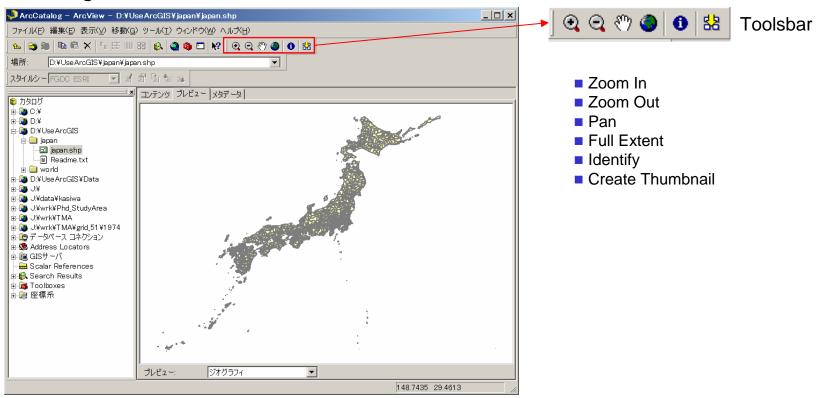
ArcCatalog™ allows the user to easily access and manage geographic data that is stored in folders on local disks or relational databases that are available on the user's network. Data can be copied, moved, deleted, and quickly viewed before it is added to a map. In addition, metadata can be either read or created using this ArcGIS application.

ArcMap allows the user to display and query maps, create quality hardcopy maps and perform many spatial analysis tasks. ArcMap provides an easy transition from viewing a map to editing its spatial features.

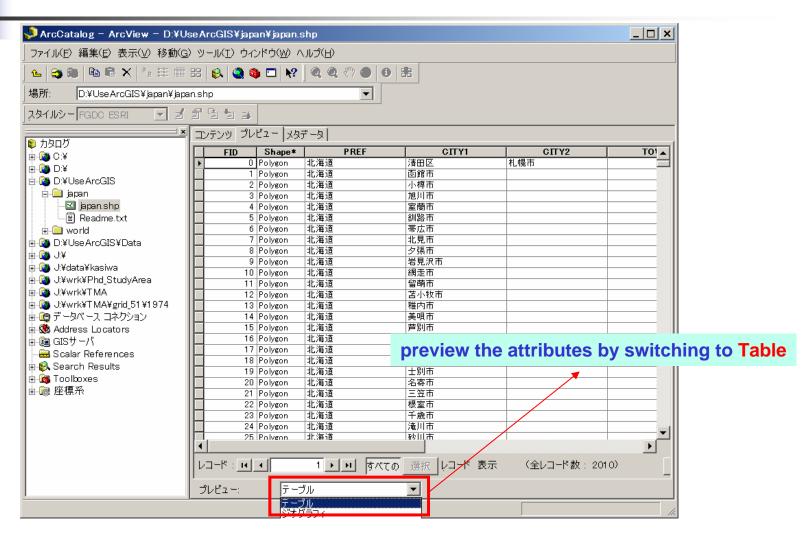
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### Viewing Data in ArcCatalog –(1)

The ArcCatalog application window includes the catalog display that allows you to preview data, either spatially or tabularly, a catalog tree for browsing the data, and several toolbars.

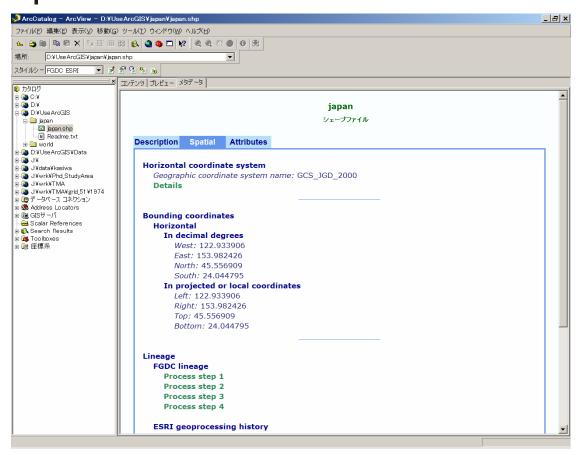


### Viewing Data in ArcCatalog –(2)





### Viewing Data in ArcCatalog –(3)



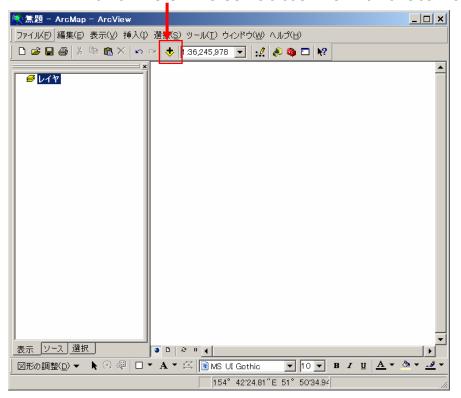
In addition to previewing the geography and the attribute table of a data layer, the user can view or create metadata. By clicking on the **Metadata** tab in the catalog display, technical information about the data set (such as its coordinate system, its spatial extent, description of its attributes, and descriptive information about when and how the data was created) can be obtained.



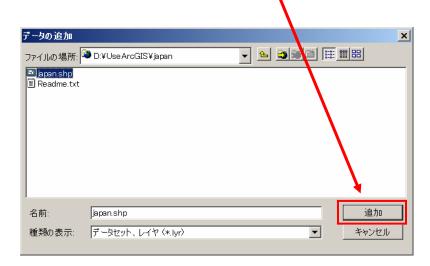
### Viewing Data in ArcMap – Add map(1)

There are two ways to add data layers to the map display:

1. Go to File / Add Data... on the main menu toolbar OR click on the **Add Data** button on the standard toolbar.



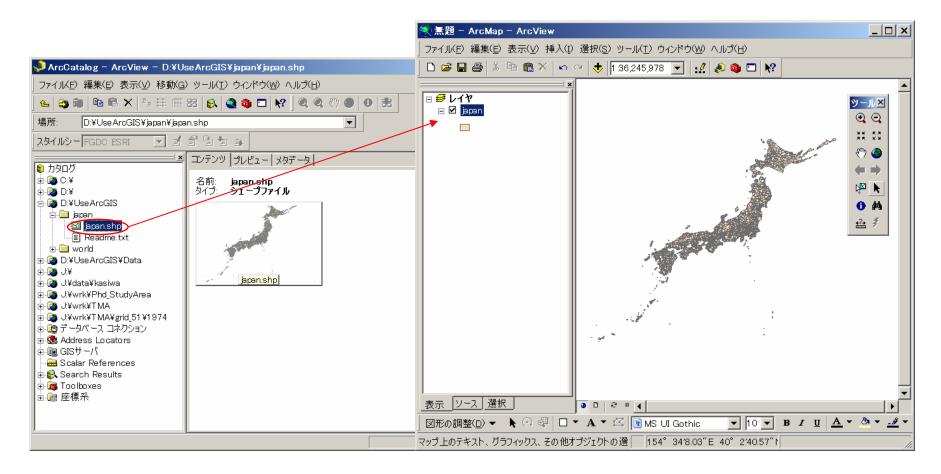
Navigate to the data layer of interest. Select it, and click the **Add** button.





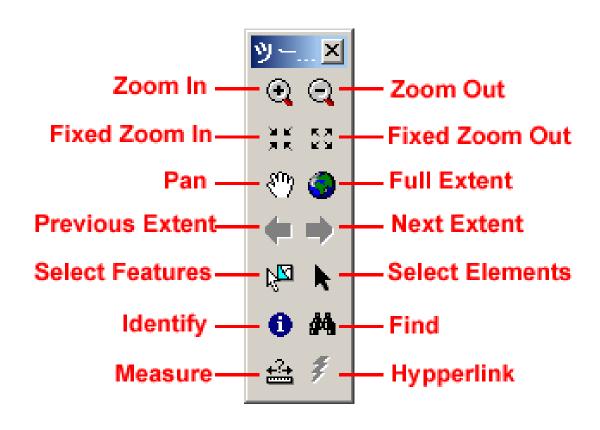
### Viewing Data in ArcMap – Add map(2)

2. Simply click the name of the data layer from the ArcCatalog data tree, and drag it anywhere within the ArcMap display.



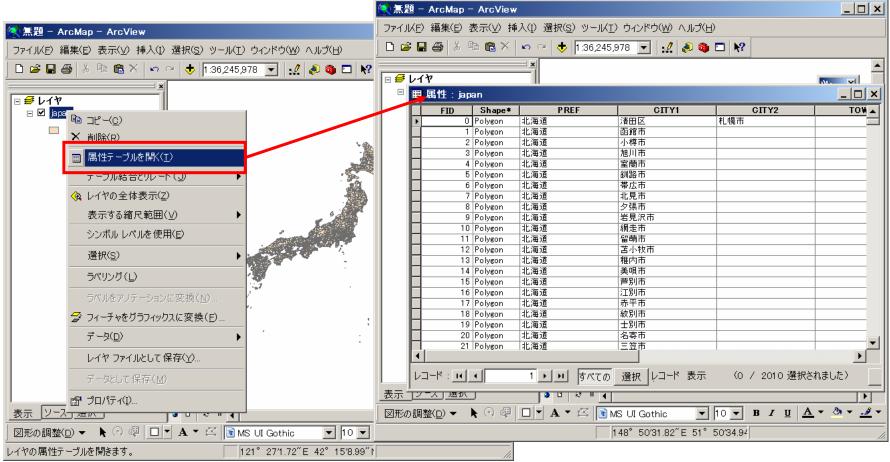


### Viewing Data in ArcMap – ToolsBar



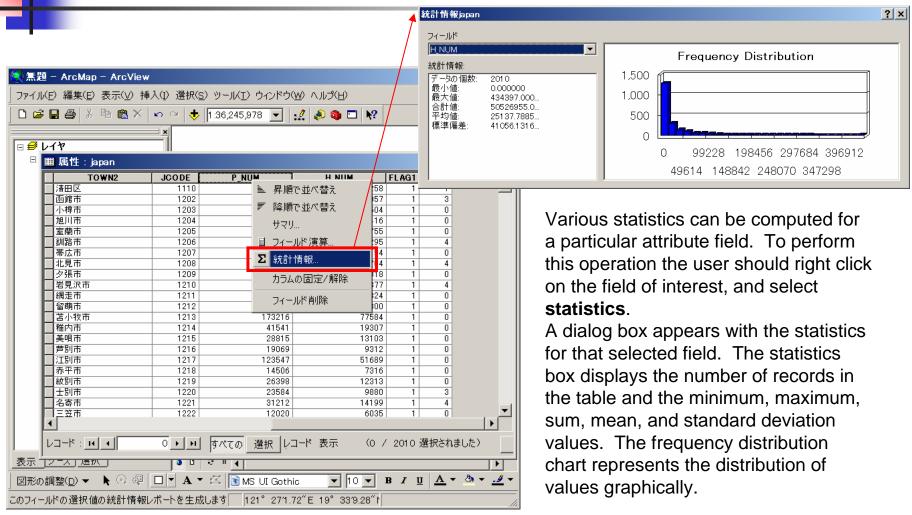


### Viewing Data in ArcMap – View Attribute





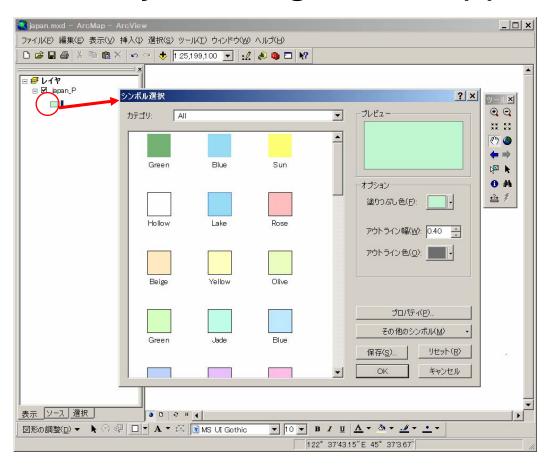
### Viewing Data in ArcMap – Statistics





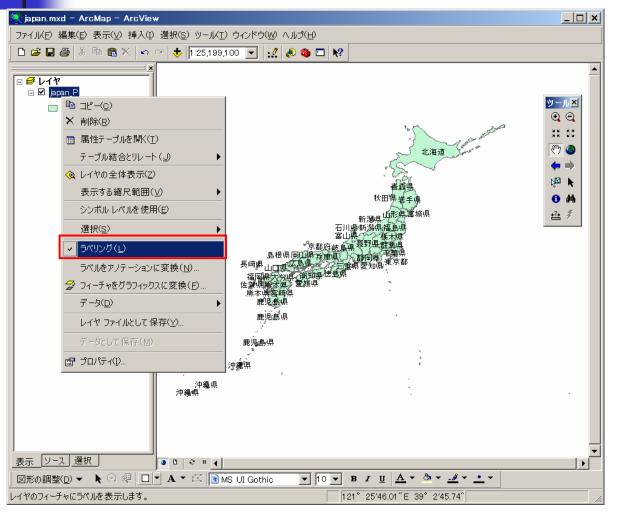
### **Displaying Map**

Symbolizing Features (1)



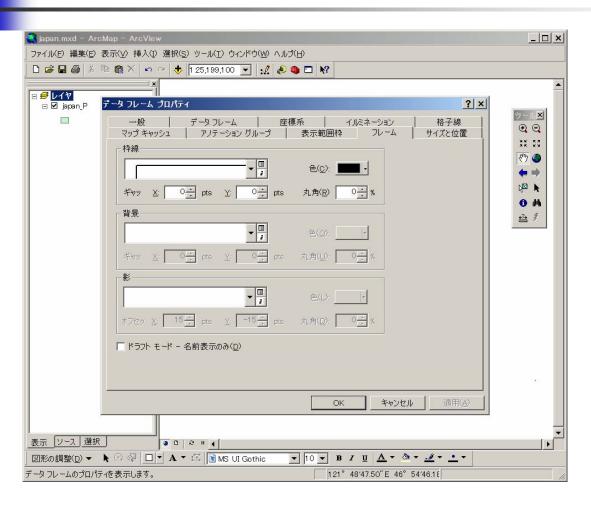
To change the color or width of the outline, the user can click on the symbol for the desired data layer in the table of contents. The **Symbol Selector** dialog box opens. The left side of the dialog box contains predefined symbols. The options frame on the right allows the user to select a color and set an outline width.

### Symbolizing Features(2)



The user can also have features within the map display to be labeled. The user can do this by right-clicking on the LAYER of interest in the table of contents (NOTE: click on the layer name and NOT the symbol) and selecting the *Label Features* option.

### Symbolizing Features(3)

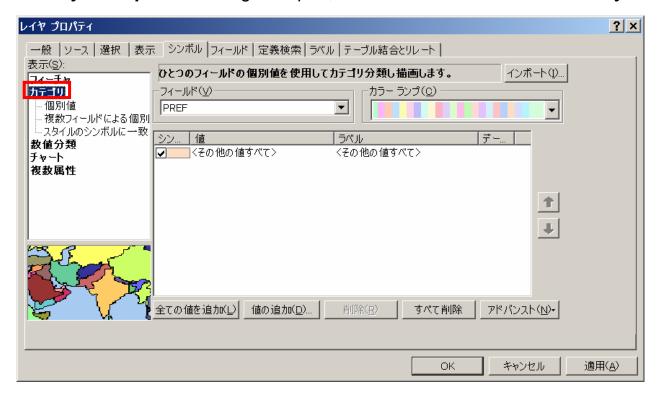


The user may also change the background of the map display. This can be done by right-clicking on the data frame and clicking *Properties*. The *Data Frame Properties* dialog box opens. The user should click on the *Frame Tab*, click on the *Background* drop down arrow, select the desired color, and click **OK**. The background color will then be applied to the map display.

### Symbolizing Features(4)

The user can change a feature's symbology to make it more informative by assigning a different symbol to each unique value, or to distinct ranges of values, in the layer's attribute table.

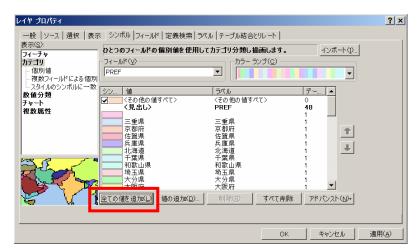
If the user wishes to assign a unique color to a particular class or name within the attribute table, the user can right-click on the desired layer and click *Properties*. The *Layer Properties* dialog will open, and the user should choose the *symbology* tab.



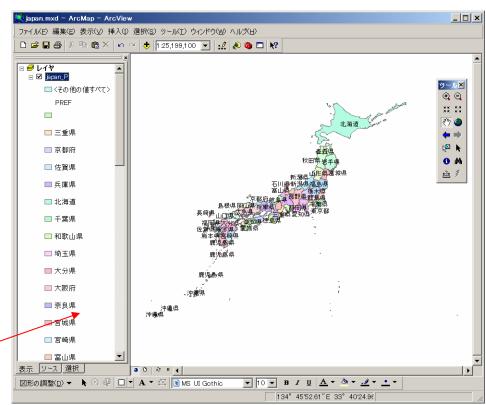
By default, the features are symbolized with a single symbol (meaning all of the prefectures in a Japan map will have the same color). If the user wishes to change the representation to a categorical one (where each prefectures has a unique symbol), the user should click *Categories* in the *Show* box of the *Layer Properties* Dialog.



### Symbolizing Features(5)



A Value Field from the attribute table should be selected. In this case PREF was selected in order to show a different symbol for each state. The color scheme of choice may also be selected. Once these parameters are set, the user should press the *Add All Values* button to get a listing of all the categories and their associated unique symbol. Once the user is satisfied with the symbology, the user can press OK.





### Classifying Features

#### ArcGIS™ has four ways to apply scaled symbology:

#### Graduated Color

These symbols are more commonly used. It displays features as shades in a range of colors that change gradually (also called a color ramp). This symbology is best used with polygon layers.

#### Graduated Symbol

These symbols are used to represent features using different marker sizes. Normally used with point layers.

#### Proportional Symbol

These symbols vary in size proportionally to the value symbolized.

#### Dot Density

These symbols should only be used with polygon layers. They represent quantities by a random pattern of dots. The greater the value, the more dots.

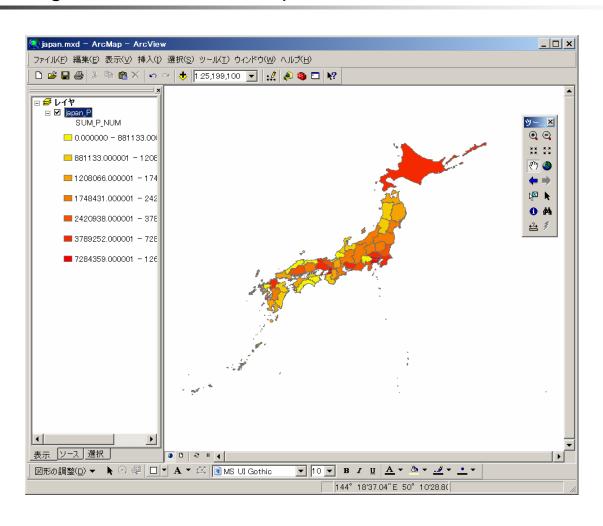


#### Creating Graduated Color Map (1)



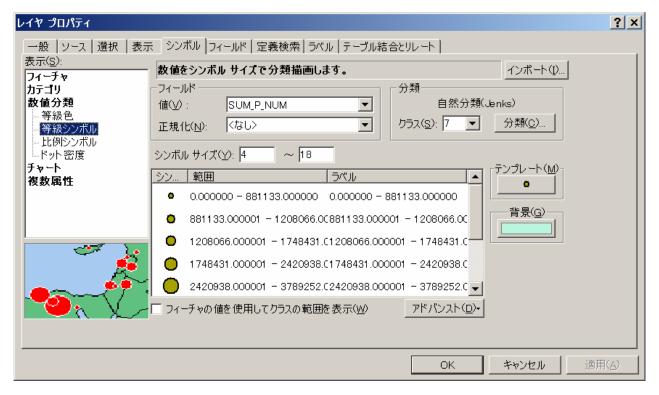
To create a graduated color, the user must double click on the data layer name in the table of contents. The *Layer* **Properties** dialog will open. The **symbology** tab should be activated. In the **show** box, the user should click Quantities and select the **Graduated** Colors option. Within the value field, the drop down arrow should be clicked, and the attribute field of interest should be selected. In this case the Population field was selected for the Japan data layer.

### Creating Graduated Color Map (2)



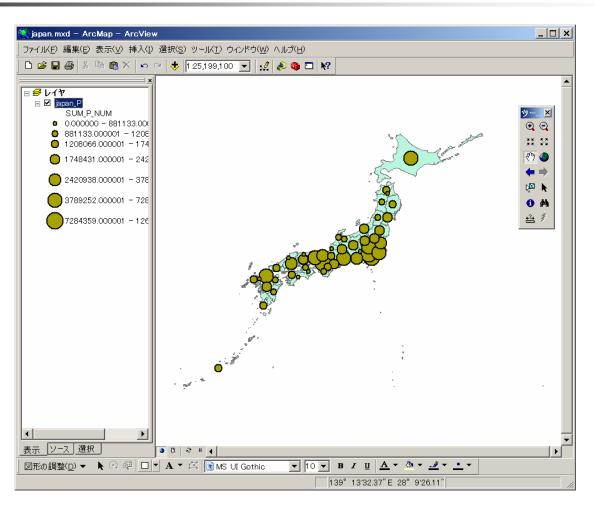


#### Creating Graduated Symbol Map (1)



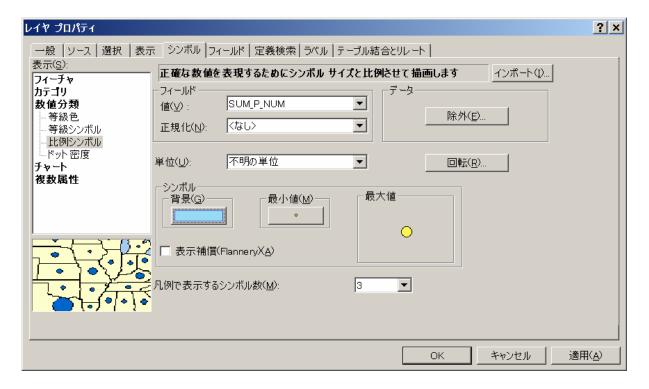
To create a graduated symbol, the user must double click on the data layer of interest in the table of contents. The *Layer* **Properties** dialog box will open, and the **symbology** tab should be selected. In the show box, the user should click **Quantities**, and then select Graduated **Symbols**. Within the value field, the drop down arrow should be clicked, and the attribute field of interest should be selected. The normalization method and the number of classes can then be selected.





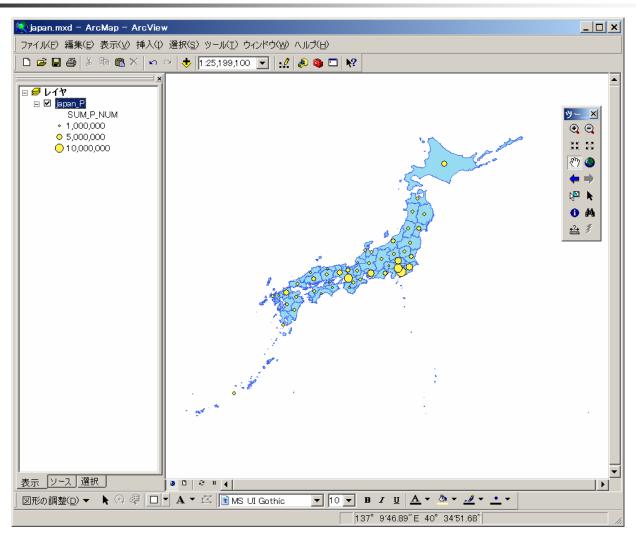


#### Creating Proportional Symbol Map (1)



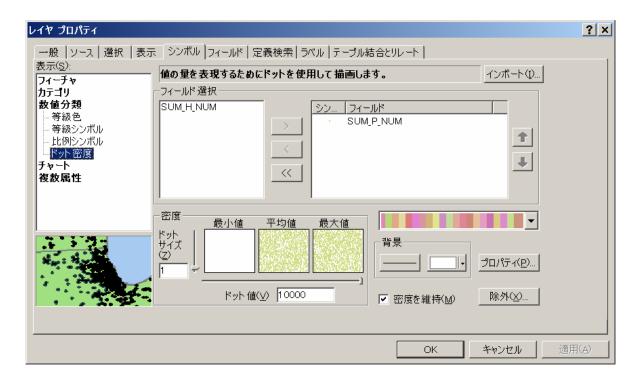
To create a proportional symbol, the user must double click on the data layer of interest in the table of contents. The *Layer Properties* dialog box will open, and the *symbology* tab should be selected. In the *show* box, the user should click *Quantities*, and then select *Proportional Symbols*.

### Creating Proportional Symbol Map (2)



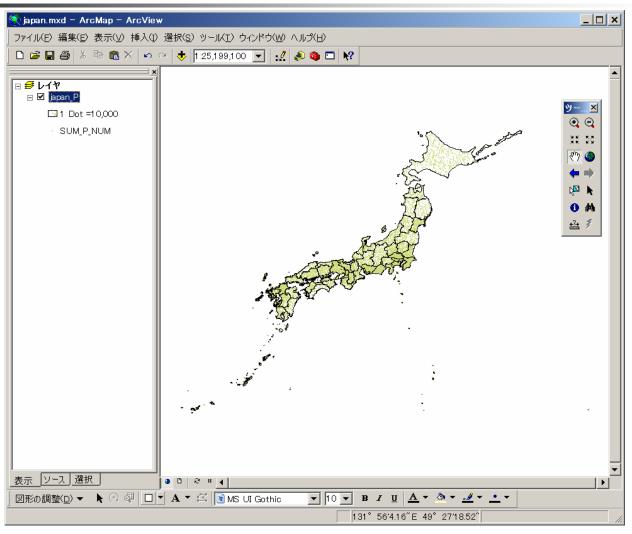


#### Creating Dot Density Map (1)



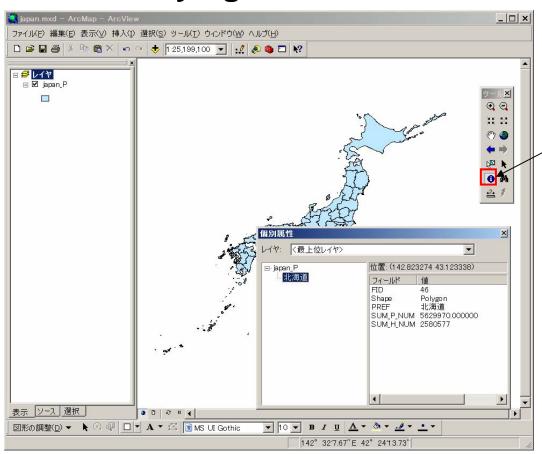
To create a dot density, the user must double click on the data layer of interest in the table of contents. The *Layer Properties* dialog box will open, and the *symbology* tab should be selected. In the *show* box, the user should click *Quantities*, and then select *Dot Density*.

### Creating Dot Density Map (2)



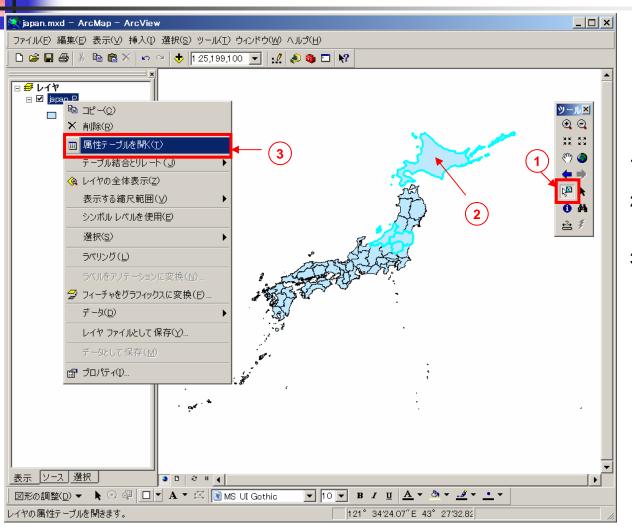
### **Querying Data**

### Identifying Features



To use the *Identify* tool, the user must select it from the *Tools* Toolbar. Within the map, the user must click on the feature of interest in order to view the attribute information for that particular feature.

### Selecting Features (1)

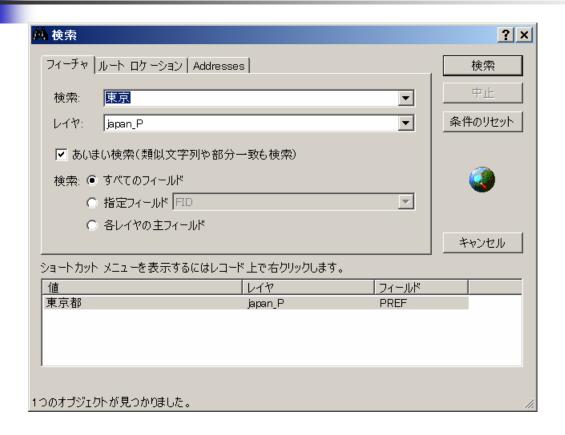


- 1.Click on Select Features Tool
- 2. Hold Shift Key and select features of interest
- 3. Open Attribute Table

### Selecting Features (2)

FID	Shape*	PREF	SUM_P_NUM	SUM_H_NUM	
25	Polygon	新潟県	2420938.000000	828842	
26	Polygon	神奈川県	8830460.000000	3642649	
27	Polygon	青森県	1458138.000000	562598	
28	Polygon	静岡県	3789252.000000	1364092	
29	Polygon	石川県	1171378.000000	428566	
30	Polygon	千葉県	6073246.000000	2356070	
31	Polygon	大阪府	8821761.000000	3689316	
32	Polygon	大分県	1206261.000000	472613	
33	Polygon	長崎県	1467859.000000	556842	
34	Polygon	長野県	2188492.000000	785990	
35	Polygon	鳥取県	604512.000000	214046	
36	Polygon	島根県	744677.000000	271033	
37	Polygon	東京都	12634440.000000	5955235	
38	Polygon	徳島県	806026.000000	301572	
39	Polygon	栃木県	2013744.000000	716889	
40	Polygon	奈良県	1417407.000000	545841	
41	Polygon	富山県	1109252.000000	375526	
42	Polygon	福井県	818737.000000	271020	
43	Polygon	福岡県	5052038.000000	2035286	
44	Polygon	福島県	2081012.000000	715426	
45	Polygon	兵庫県	5591650.000000	2171366	
46	Polygon	北海道	5629970.000000	2580577	
47	Polygon	和歌山県	1030326.000000	387421	

### Finding Features



The user can find a feature, by selecting the Find tool on the Tools toolbar. When the Find dialog Box appears, the **Features** tab should be selected. The known attribute information should be typed in the *Find* box. In the *In Layers* drop down box, the layer that the user wishes to find features in should be selected. In the **Search** options, the user should choose to either search all fields in the attribute table or a specific field. Once all parameters are set, the Find button should be clicked.

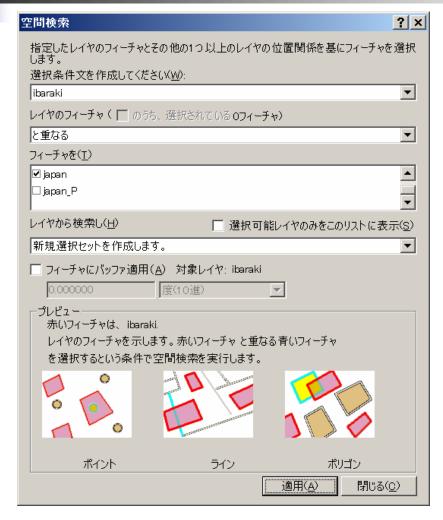




To create an attribute query, the user must click the *Selection* menu on the *Standard*Toolbar. The *Select by Attributes* option should be clicked. In the *Select by Attributes* dialog box, the *Layer* drop down arrow should be clicked and the data layer of interest should be selected.



### Selecting Features by Location



To begin selecting features by location, the user must click the **Selection** menu and click the **Select by Location** option. The **Select by Location** dialog box opens.



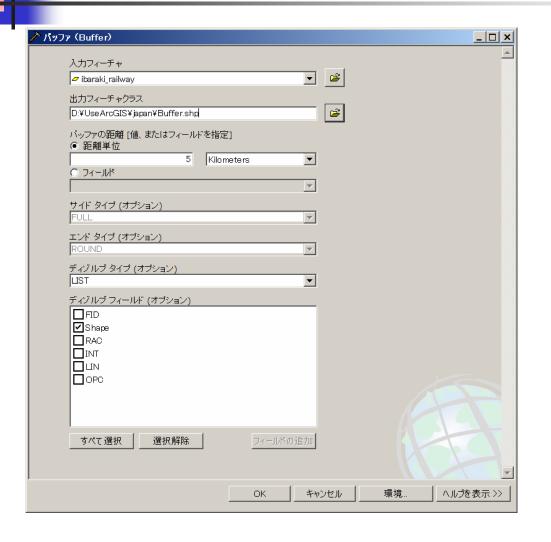
### **Analyzing Spatial Data**

### Buffering Features (1)

To use the ArcToolbox Buffer tool, the user must go to Analysis Tools and select Proximity. Buffer then appears in the list of tools.

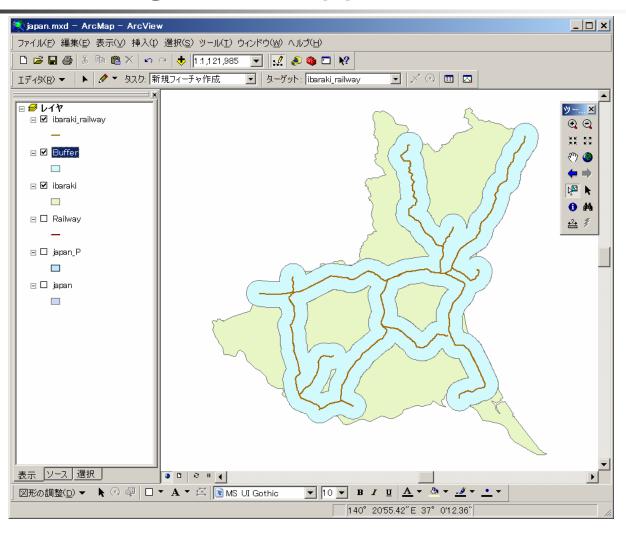


### Buffering Features (2)



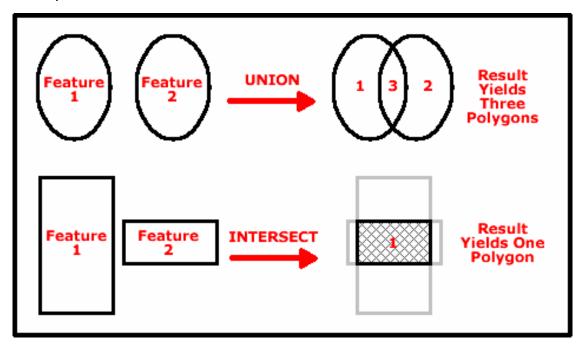
A double click on Buffer results in the appearance of the Buffer dialog box. The drop down arrow should be clicked, or the browse button used, to select the layer the user wishes to buffer. Then, the *Linear unit* radio button should be clicked and units and distance specified. If the user wishes to dissolve the barriers between any overlapping buffers he or she may do so by selecting LIST from the drop-down menu within Dissolve Type. Once the list of attribute fields appears with a white background the box next to Shape should be checked.

### Buffering Features (3)

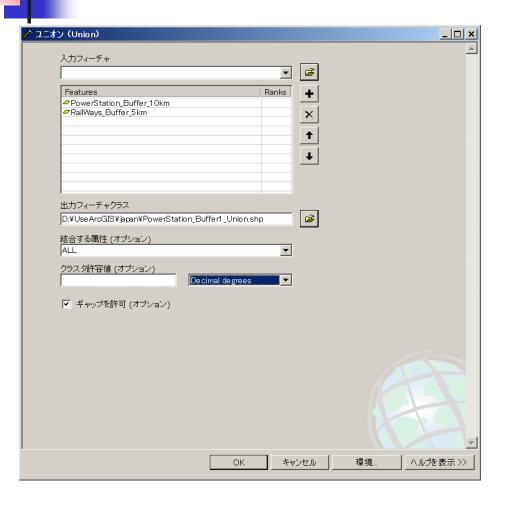


### Overlay Features

An overlay operation is also one of the most common spatial analysis tools. Overlays allow the user to identify areas where features in two layers overlap. A new data set is often created from these overlaps. In a *Union Overlay*, all features are included in the new data set but the features that overlap represent a new feature. In an *intersect overlay*, only the areas that overlap are contained in the new data set.



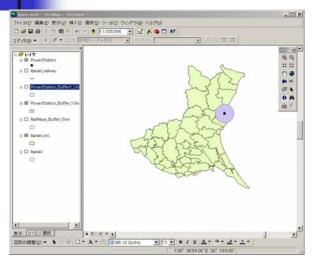
#### Overlay Features – Union (1)

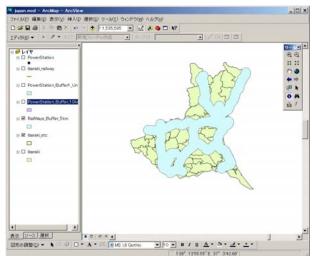


The union overlay option may be very useful if the user wishes to combine data layers into one layer.

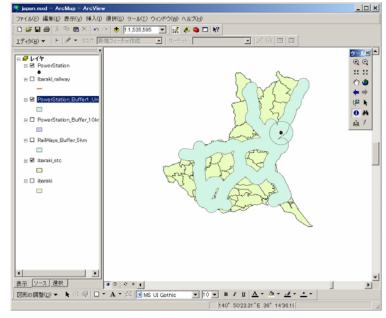
To perform a union overlay, the user must go to ArcToolbox's Analysis Tools, select Overlay, and then click *Union*. The user then specifies the input layers to union and a name for the output data set.

#### Overlay Features – Union (2)

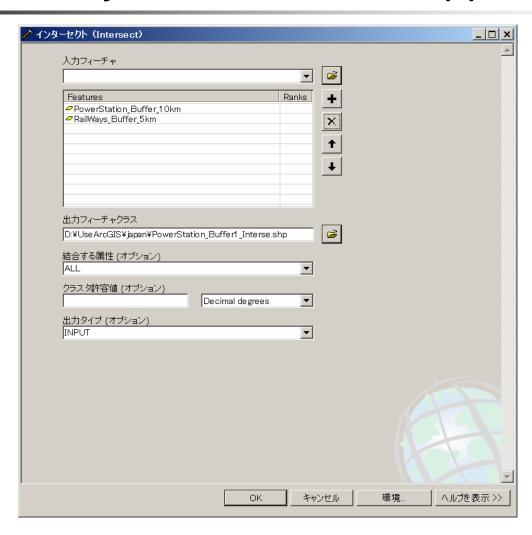




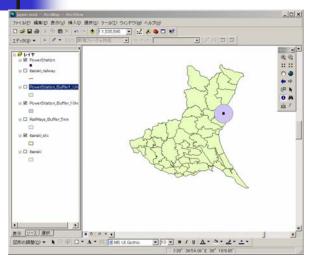


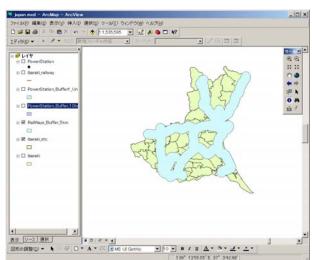


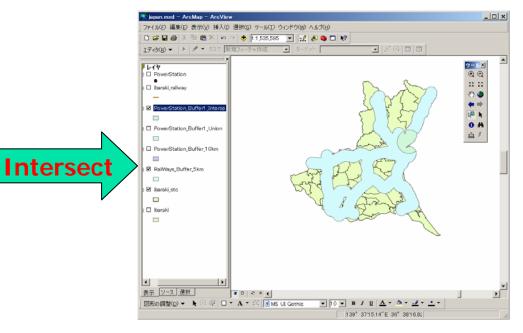
#### Overlay Features – Intersect (1)



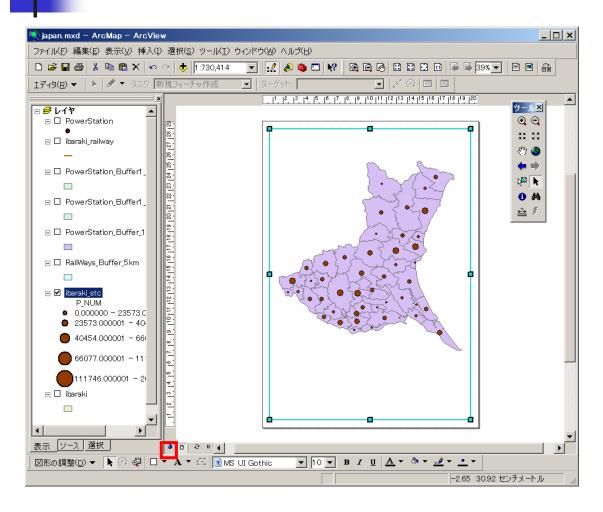
#### Overlay Features – Intersect (2)







# **Making and Printing Maps(1)**



If the data is already present within the data view, the user simply needs to switch to **Layout View and** select the **Map Template** button on the **Template** Toolbar.



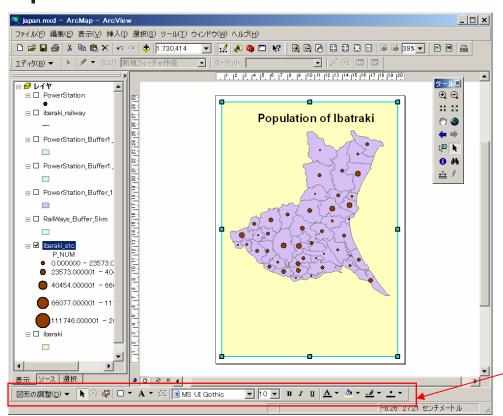
#### **Making and Printing Maps(2)**

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The map background color may be changed by selecting the data frame and clicking the down arrow next to the *Fill Color* button on the *Draw* Toolbar. When the user selects a desired color, the map background color will be updated.



# Making and Printing Maps(3)

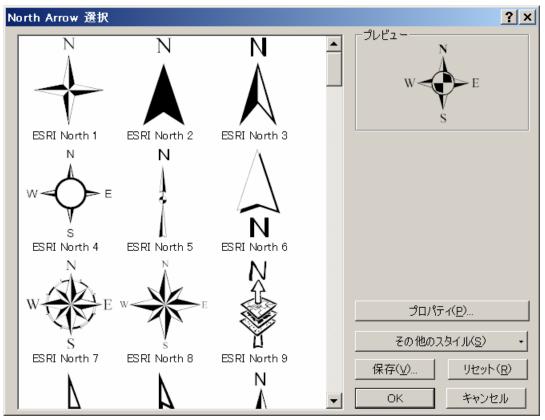


A map title may be added to the layout by clicking the *Insert menu* and selecting the *Title option*. A text box will be added to the page. Within this text box, a default title will be present. The user can type in a preferred title within the text box and press Enter. After the Enter key has been pressed, the user can go back and edit the title by double-clicking the on the title and editing its text properties.

The font, size, style, or color of the title may be changed using the *Draw Toolbar*.



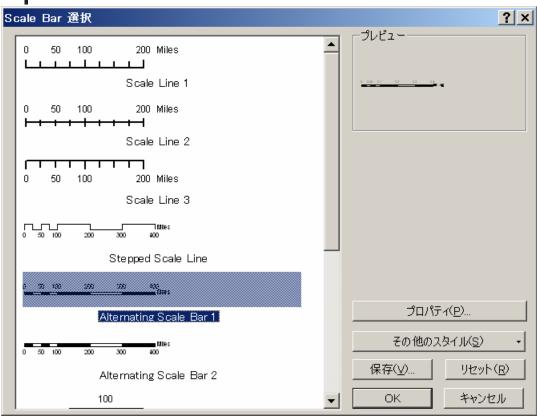
# **Making and Printing Maps(4)**



A North Arrow may be added by clicking the *Insert* menu and selecting the *North Arrow* option. In the *North Arrow Selector* dialog box that appears, the user may select from a variety of north arrows and change the properties of any selected arrow.

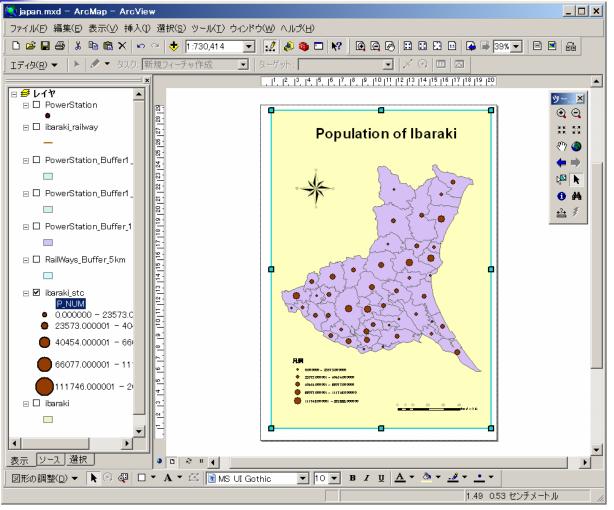


#### **Making and Printing Maps(5)**



A Scale Bar may be added by clicking the *Insert* menu and selecting the *Scale Bar* option. The desired scale bar style may be chosen and its properties my be edited within the *Scale Bar Selector* dialog box.

#### **Making and Printing Maps(6)**



A Legend may be added by clicking the *Insert* menu and selecting the *Legend* option.



# **Making and Printing Maps(7)**

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The user needs to make sure that the map size is the same as the printer page size. Once all parameters have been chosen, the OK button should be clicked. Before printing the map, the user should always preview their map. This can be done by clicking the File menu and selecting **Print Preview**. This allows the user to see if anything needs to be changed before the map is printed. If changes need to be made, the **Print Preview** should be closed (by clicking the *Close* button), and the appropriate changes should be made. If everything appears the way that it should, the user may click the **Print** button. Appropriate print parameters must be set, and the **OK** button should be clicked when the user is ready to print the map.



- 1. Getting to Know ArcGIS Desktop: The Basics of ArcView, ArcEditor, and ArcInfo Updated for ArcGIS 9
- 2. GIS Tutorial: Workbook for ArcView 9.0 (GIS Tutorial series)

