

CHAPTER 6

Prospect Profiling

***Course: Marketing Research/eCommerce/
Internet Marketing***

This chapter teaches how to use demographic data for geodemographic profiling. World Treasures* is an online retailer specializing in traditional art objects from around the world. The firm wishes to develop a database marketing program to reach users who are interested in the firm's products but unwilling to buy online. It wishes to test this program in New York, where it has over 30,000 subscribers to its electronic newsletter. Specifically, the firm wishes to profile the demographic characteristics of these subscribers and concentrate its mailing on ZIP Codes that match that profile, thus improving response rates. Toward that end, you will use GIS tools to develop profiles of attractive prospects and focus marketing efforts on concentrations of those prospects.

* This is a fictional company and scenario, created for educational purposes only. Any resemblance to actual persons, events, or corporations is unintended.

Learning objectives

To conduct a prospect profiling market research project in an eCommerce context, you will learn how to use ArcGIS to:

1. Display population demographic information on a map
2. Assign market segment values to ZIP Codes based on the number of subscribers they contain
3. Create demographic profiles of ZIP Code segments and use them to identify attractive prospects
4. Target ZIP Codes that match the profile of attractive prospects
5. Design maps to communicate your customer profiling recommendations

Marketing scenario

World Treasures, Inc. is an electronic retailer specializing in craft products from around the world. It offers items produced by traditional craft masters, primarily in developing countries, through its Web site and eBay store. Though these crafts have long been recognized for their quality and workmanship, the people creating them have not benefited fully from their popularity. The craft masters have typically sold their work to local traders at relatively low prices. The traders then sell the items to distributors and retailers, who offer them to final consumers. Each intermediary added significant price markups as the items moved through the distribution channel. Thus, the craft masters have received a relatively small share of the final price paid by consumers. Further, given their often remote locations and lack of direct access to established distribution channels, they have not had the opportunity to assume more control and reap higher prices from the marketing of their products.

World Treasures offers an electronic alternative to this system. It buys directly from traditional craft masters and sells directly to final consumers through its two electronic outlets. World Treasures provides links to Web sites documenting the quality and value of the items it sells, thus increasing the knowledge base of its customers and, as a result, their willingness to invest in traditional art. By purchasing items directly from craft masters and local craft collectives, World Treasures is able to pass on more of the final price to traditional artists, while still enjoying a reasonable level of return on their operations.

World Treasures wishes to build upon its success and is considering a database marketing program using direct mail to expand its customer base. However, the firm does not wish to invest in a mass mailing effort, which it believes will result in a low response rate and poor net margins on any resulting sales. The firm would rather focus the campaign at specifically targeted prospects in order to increase response rates and sales while lowering the costs of the direct-mail effort. It believes that the subscribers to its electronic newsletter are ideal prospects for this effort. These users often visit the World Treasures Web site and receive weekly information about new offerings. When a subscriber places an order, his or her name is transferred from the subscribers list to a customers list, to which a different monthly electronic newsletter is sent. Thus, the subscribers list includes users who are interested in the firm's products, but have yet to place an order. World Treasures believes that a direct-mail offering might stimulate these users, and other prospects that fit their profile, to make their first purchase. The firm wishes to implement a trial campaign in one of its largest state markets, New York, to test the feasibility and result of this approach with a mailing to about 2,000,000 households.

To summarize, World Treasures wishes to design a demographic profile of its electronic newsletter subscribers and use it to target selected prospects in New York with a direct-mail campaign. However, the firm has no demographic information on subscribers, as the only address information that subscribers provide is their ZIP Code. The pilot project requires that the firm (1) use a geodemographic overlay process to estimate the socioeconomic and demographic profile of its subscribers based on their ZIP Code, (2) use the resulting profile to select geographic areas (in this case ZIP Codes) with similar characteristics, and (3) focus the direct-mail campaign on these areas. A geodemographic overlay assigns demographic values to household records (customers, prospects, or in this case, subscribers) based on their location. In this case, subscribers will be assigned the values for the ZIP Code in which they live.

You have been tasked with carrying this plan out. World Treasures has purchased ESRI demographic data on measures it believes are relevant for its products. In addition to population and household information, these measures include age, household size, disposable income, education, and home ownership. You also have access to a list of the 33,060 electronic newsletter subscribers in New York and their ZIP Codes.

In the following exercises, you will use ArcGIS tools to execute this project for World Treasures and make recommendations for their trial direct-marketing campaign in New York.

Background information

Marketing research encompasses a wide range of tools designed to help firms learn more about their customers. Though many of these tools involve primary research, innovative use of secondary data is also a valuable part of the field. As this data is more readily available, it offers both time and cost advantages that market researchers should exploit. For example, they can analyze demographic information about customers to produce customer profiles. Businesses can use address fields in customer records to attach such information to those records. Even if customer addresses are not available, businesses can use a simple ZIP Code field, as in this exercise, for the same purpose. This might be the case when a business has a subscriber list for an electronic newsletter.

Customer profiles refer to collections of data on the socioeconomic and demographic characteristics of a group of people. Marketers create profiles for current customers, prospective customers, or general market segments to support the development of responsive marketing strategies. Virtually every element of the marketing strategy must take customer characteristics into account. The marketing team designs products to meet the needs of specific groups, creates promotional messages to appeal to customers' values, selects retail sites to match their shopping patterns, and sets prices that reflect their economic situation. Thus, knowledge about the characteristics of target customers is the cornerstone of the marketing effort.

Marketers should draw socioeconomic and demographic information from direct sources whenever possible to ensure the accuracy and currency of data. However, direct access to such information is often not possible. People are hesitant to provide extensive demographic information in response to consumer surveys, and commercial household demographic information is often either unavailable or quite expensive. As a result, marketers seek out alternative methods for acquiring this information. One such method is geodemographic profiling.

Geodemographic profiling is a method for inferring socioeconomic and demographic characteristics of people based on where they live. The technique is based on the premise that populations tend to cluster geographically into groups with relatively similar socioeconomic, demographic, and lifestyle

characteristics. The analyst uses the demographic characteristics of the block group, census tract, or ZIP Code in which a household resides as an estimate of the demographic characteristics of that household.

The following exercises illustrate the value of geodemographic profiling. World Treasures is an online retailer that interacts with its subscribers electronically. While it doesn't collect personal information about subscribers, World Treasures seeks some understanding of the socioeconomic and demographic profile of subscribers in order to tailor a direct-mail campaign to them. Though its user base is not limited geographically because they access World Treasures through its Web site, spatial analysis still has potential value for the firm. In this exercise, geodemographic profiling is performed on subscribers' ZIP Codes, the sole piece of spatial information users provide in the subscription process. World Treasures purchased ZIP Code demographic data and assigned values to subscribers living within each ZIP Code. The subscriber profile, in turn, is derived from summary statistics of these values. Finally, the resulting profile allows the firm to selectively target ZIP Codes for its direct-mail campaign.

While geodemographic profiling can be a valuable tool, it has limitations. First and most obvious, it is a technique for demographic estimation, not precise measurement. Assigning a size of 2.49 to a household because that is the average household size of the ZIP Code in which it lies is clearly erroneous. However, when replicated over several households in a list of prospective customers, it can provide a general indication that households tend to be larger or smaller in one ZIP Code than in another. To personalize this dynamic, visit <http://www.esribis.com/reports/ziplookup.html> and enter your ZIP Code to view some summary demographics of your area. How well do these statistics reflect your situation? (Note: You will also view the major Community Tapestry lifestyle segments for the ZIP Code. This segmentation system classifies United States households into 65 distinct lifestyle clusters, each of which has similar demographics, values, and purchasing patterns. This system is a very useful segmentation tool. For additional information, you should complete chapter 2, which provides an orientation to the Community Tapestry system.)

Second, the accuracy of geodemographic profiling estimates increase as the geographic unit employed decreases in size. That is, the degree of homogeneity among households in a compressed census block group of 500 households is likely to be higher than in a census tract of 1,400 households or a ZIP Code of 12,000 households. However, census tracts and block groups are not part of postal addresses. Most people don't know the numbers of the census tract or block group in which they live.

For this reason, marketers must spatially assign household records in a firm's database to their respective census tracts or block groups. This process uses a tool called geocoding. Geocoding uses standard address information to assign each address in a database a pair of latitude and longitude coordinates. Marketers can place this latitude-longitude point within the boundaries of the appropriate census tract or block group. With this link in place, they can attach the demographic values of the census tract or block group to each household contained therein. Though this may sound simple, geocoding involves using extensive collections of street data that marketers must match accurately to the addresses in household records to be successful.

Finally, calculating summary statistics from values assigned by spatial location can create additional inaccuracies. For example, in this exercise, calculating the average percentage of homeownership for a group of ZIP Codes produces an inaccurate result as it does not adjust for differing numbers of households in each ZIP. The calculation for average age also has weaknesses as it is the average of a field that reports median values. These difficulties reemphasize the point that marketers should interpret the values obtained in geodemographic profiling as broad indicators of similarities and differences rather than precise measures of population characteristics.

Given its substantial limitations, how can geodemographic profiling add value to marketing analysis? The answer is that marketing offers targeted on the basis of geodemographic profiling, though imprecise, are more effective than mass random distribution of similar offers. World Treasures's direct mailing to 2,000,000 households is more likely to reach households interested in their products than would a mailing to 2,000,000 random New York households. If the average initial World Treasures order is \$50, each 1 percent increase in the response rate to the mailing produces marginal revenue of \$1,000,000. If half the new purchasers become loyal customers with yearly purchases of \$50, annual revenues will increase by \$500,000. These revenue streams represent a substantial return on the investment in data and GIS technology employed in this chapter.

World Treasures New York data dictionary	
Attribute	Description
<i>For UsersZIPs</i>	
txtZIP	Subscriber's ZIP Code
<i>For NYZIPDemographics and State</i>	
ZIPCode	ZIP Code number
TOTPOP_CY	Total population, 2004
HHPOP_CY	Population living in households, 2004
TOTHH_CY	Total households, 2004
AVGHHSIZ_CY	Average household size, 2004
MEDAGE_CY	Median age, 2004
AVGDI_CY	Average family disposable income, 2004
PctAssocHigher	Percentage of people > 25 with associate degree or higher, 2004
PctHomeOwner	Percentage of households owning their home, 2004
Source: ESRI Community Data, 2005	

Exercise 6.1 Explore and prepare data


In this project, you will analyze customer data and demographic data at the ZIP Code level. To prepare for this analysis, you must explore a basemap of New York and add the relevant data tables to the map document. You must also prepare customer data for integration with the basemap attribute table. Therefore, in this exercise, you will:

- Explore a basemap of New York and its ZIP Codes
- Add demographic and customer data tables to the project
- Create a summary table of users by ZIP Code to use in your customer profiling analysis

Open an existing map

- 1 To start ArcMap, from the Windows taskbar click Start > All Programs > ArcGIS > ArcMap.

Depending on how ArcGIS and ArcMap have been installed you may have a different navigation path.

- 2 If you see a startup window, click the "An existing map" option. Otherwise, click the Open button  on the ArcMap Standard toolbar.
- 3 Browse to your `\GISMKT\WorldTreasuresNY` folder, choose the **WorldTreasuresNY1** map document, and click Open.

The map includes four layers, three of which are visible. The first three, from the bottom up, display the state of New York, its major urban areas, and its interstate highways. The fourth layer, which displays New York's ZIP Codes, is turned off.



Modify the map content

You will examine population information by adding demographic data to the ZIP Code layer and editing its symbology. You can view the ZIP Code layer by turning layers on and off.

Turn layers on and off

- 1 Check the small white box to the left of the New York State layer to turn it off.
- 2 Check the box to the left of the New York ZIP Codes layer to turn it on.

The map now displays the boundaries of New York's ZIP Codes as well as the layers for urban areas and interstate highways. You will use this layer to integrate demographic and customer data into the layer attribute table and display it on the map.

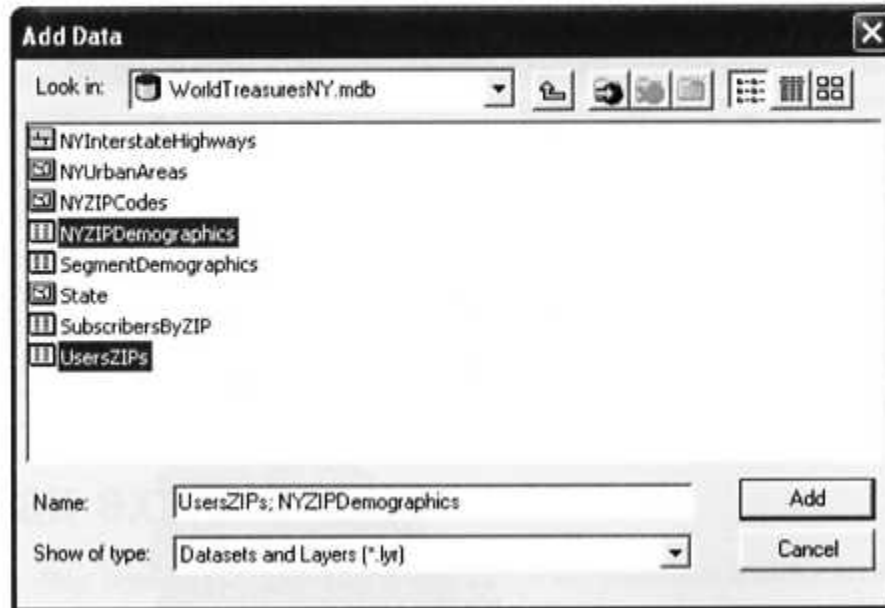


Add tabular data to the table of contents

Demographic data at the ZIP Code level is contained in a table in the WorldTreasuresNY.mdb personal geodatabase. Another table contains the ZIP Codes of subscribers to the World Treasures electronic newsletter in New York. You will add these tables to the table of contents to include them in the analysis.

- 1 Click the Add Data button. 
- 2 Navigate to the folder where **WorldTreasuresNY.mdb** is stored, and open the geodatabase.

- 3 Press and hold the Ctrl key, then click the **NYZIPDemographics** and **UsersZIPs** tables to select them.



- 4 Click Add to add the data tables to the table of contents. Notice that when tables are added to the map document, the table of contents switches to the Source tab so the tables can be seen.

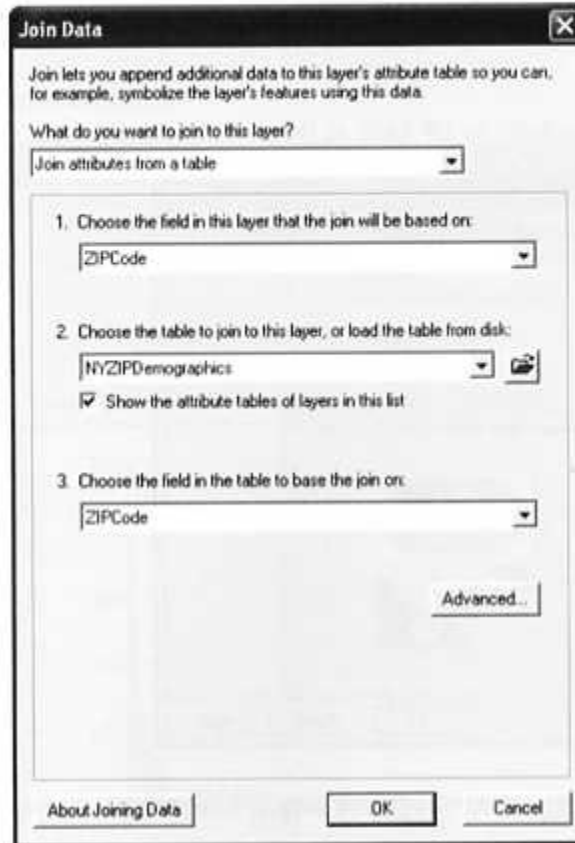


Join tabular data to a feature class attribute table

To design thematic maps that display demographic values for New York's ZIP Codes, you must integrate this data into the attribute table for the basemap layer.

- 1 Right-click the New York ZIP Codes layer, point to Joins and Relates, then click Join.
- 2 In the Join Data dialog box, make sure the first option reads "Join attributes from a table."
- 3 For item 1, choose ZIPCode from the drop-down menu.
- 4 For item 2, choose NYZIPDemographics.

- 5 For item 3, choose ZIPCode.



- 6 Click OK to run the join operation.

The New York ZIP Codes layer now contains data from NYZIPDemographics in addition to its original data. The join operation added the attributes in the demographics table to the features in the New York ZIP Codes layer that have the same ZIP Code.

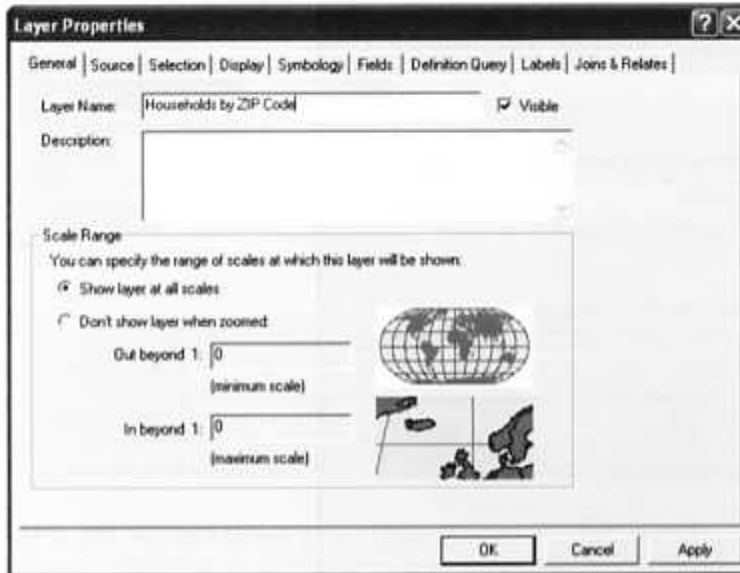
- 7 Right-click the New York ZIP Codes layer, then click Open Attribute Table to view the results of your join operation.

The demographic data has been added to the attribute table. You must scroll to the right to see it. Note also that the label for each attribute in the table now displays its home table in addition to its attribute name. For example, NYZIPDemographics.TOTPOP_CY is from the NYZIPDemographics table. This naming convention clearly shows the source of the attributes in the joined table.

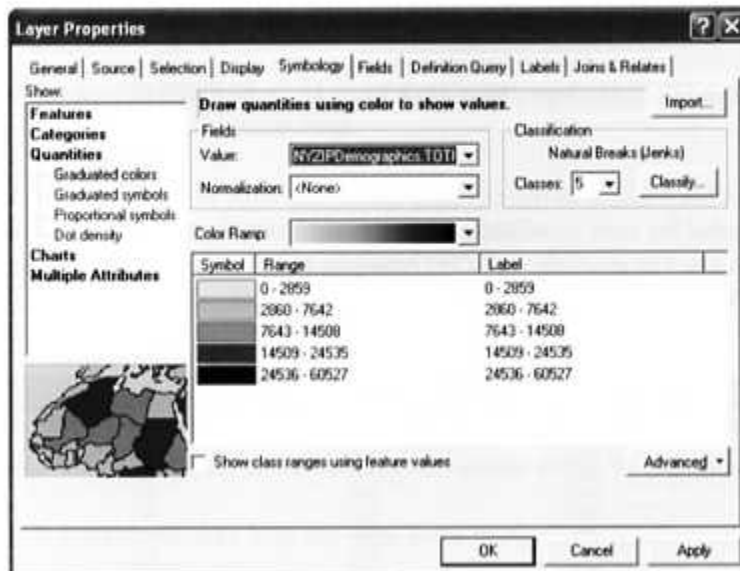
OBJECTID	NYZIPDemographics.TOTPOP_CY	NYZIPDemographics.JOBPOP_CY	NYZIPDemographics.TOTBI_CY	NYZIPDemographics.AV
1	974	940		340
2	1195	1192		460
3	1300	1229		501
4	2405	2405		329
5	2745	2745		1051
6	2990	2903		1042
7	3458	2356		874
8	3460	3430		1337
9	3592	3431		1476
10	4443	0		0
11	5422	5144		2146
12	4611	4701		1913

Edit a layer's name and symbology

- 1 Close the table, then double-click the New York ZIP Codes layer (or right-click the layer and select Properties).
- 2 Click the General tab and enter **Households by ZIP Code** as the new layer name.

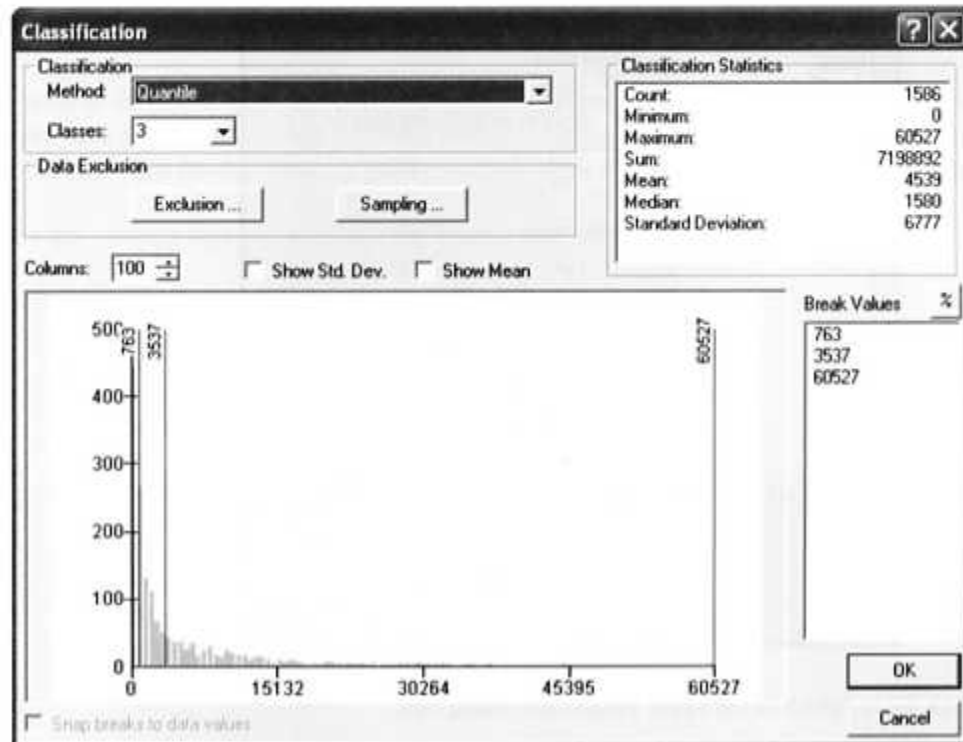


- 3 Click the Symbology tab. Click Quantities, then Graduated Colors. A random color ramp is assigned to the data.
- 4 Select the appropriate attribute in the Value field. Use the data dictionary to identify the attribute that reports total households for each ZIP Code. (Note: To see the full attribute name, select an attribute from the drop-down list, then hover your mouse pointer over the value.)



Notice the default classification system in this dialog box. It uses five classes assigned by the natural breaks method, which uses a statistical technique to identify clusters within the attribute's values.

- 5 Click the Classify button to open the Classification dialog box.
- 6 For Method, choose Quantile from the drop-down menu.
- 7 For Classes, choose 3.



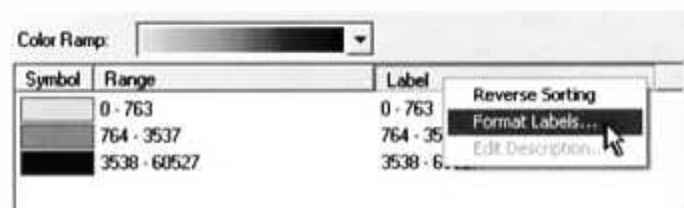
This will cause the map to define three classes with a roughly equal number of ZIP Codes in each. The classifications include the highest, middle, and lowest third of ZIP Codes.

- 8 Click OK to return to the Symbology tab.

Format classification labels

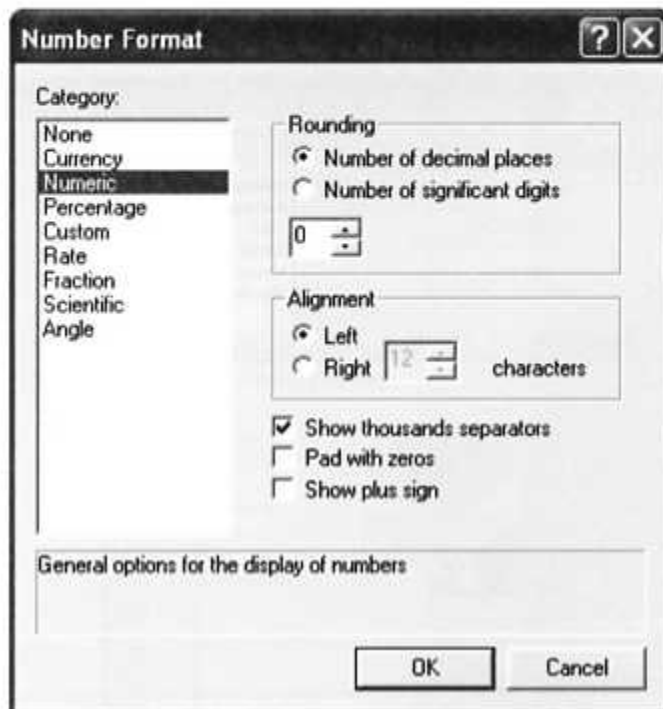
You will now modify the display of classification labels in the map legend.

- 1 Click the Label button in the Layer Properties dialog box, then click Format Labels to open the Number Format dialog box. (Note: Do not click the Labels tab at the top of this dialog box. If you do so inadvertently, click the Symbology tab to return.)

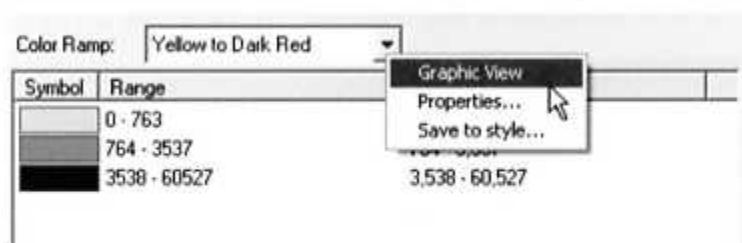


- 2 Select Numeric in the Category field.

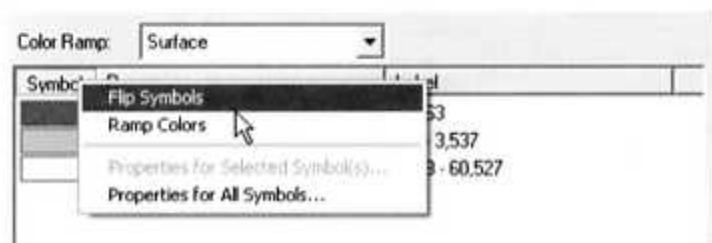
- 3 Click the Number of decimal places radio button, then enter 0 to display values as integers.
- 4 Check the Show thousands separators option, and uncheck any other options if necessary.



- 5 Click OK to return to the Layer Properties dialog box.
- 6 Right-click the drop-down arrow in the Color Ramp field, then click Graphic View to view the names of the color ramp schemes rather than their color spectra.



- 7 Click the drop-down arrow in the Color Ramp field, then click the Surface color ramp option.
- 8 The color ramp should display lower values in lighter colors, higher values in darker ones. If this is not the case, click the Symbol heading, then click Flip Symbols.



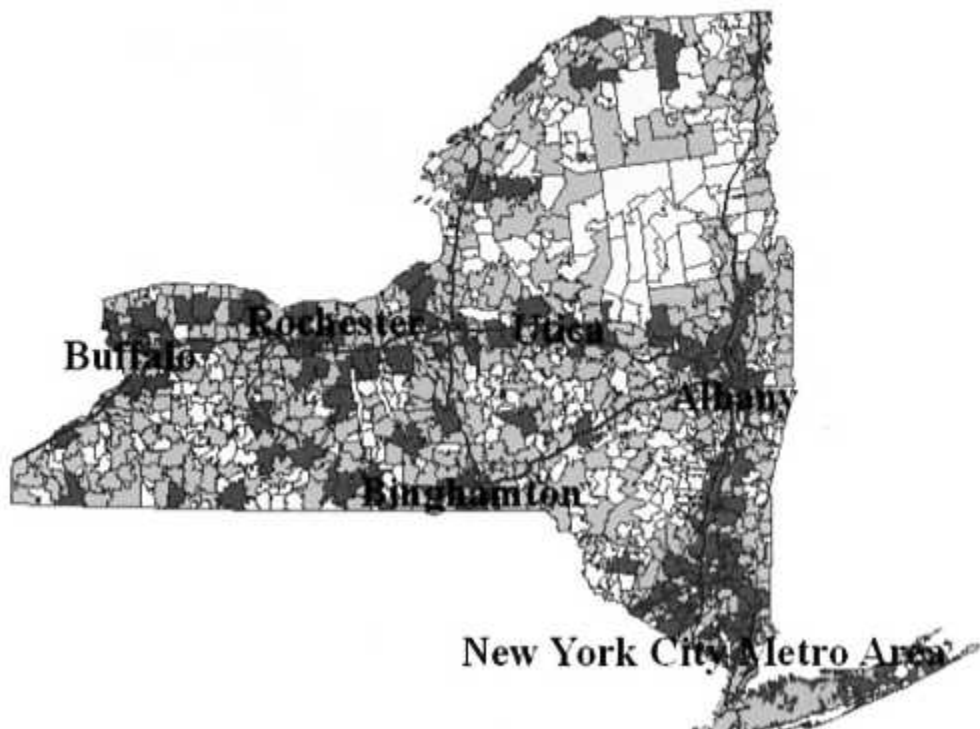
- 9 Select the “Show class ranges using feature values” option to define classification ranges using actual values from the dataset.
- 10 Click OK to close the Layer Properties dialog box and display the revised settings in the map.

Edit legend title

- 1 In the table of contents, click the attribute name **NYZIPDemographics.TOTHH_CY** under the title of the layer, then click again to edit it. (Note: If your second click is too quick, the Properties dialog box will open. Click Cancel, then try again, clicking more slowly to reach the edit function.)
- 2 Replace the existing legend title with **Total households**.



- Interstate Highways
- Major Urban Areas
- New York State
- Households by ZIP Code
 - Total households**
 - 0 - 763
 - 766 - 3,537
 - 3,542 - 60,527
- NYZIPDemographics
- UsersZIPs

The resulting map displays the number of households in each of New York’s ZIP Codes.

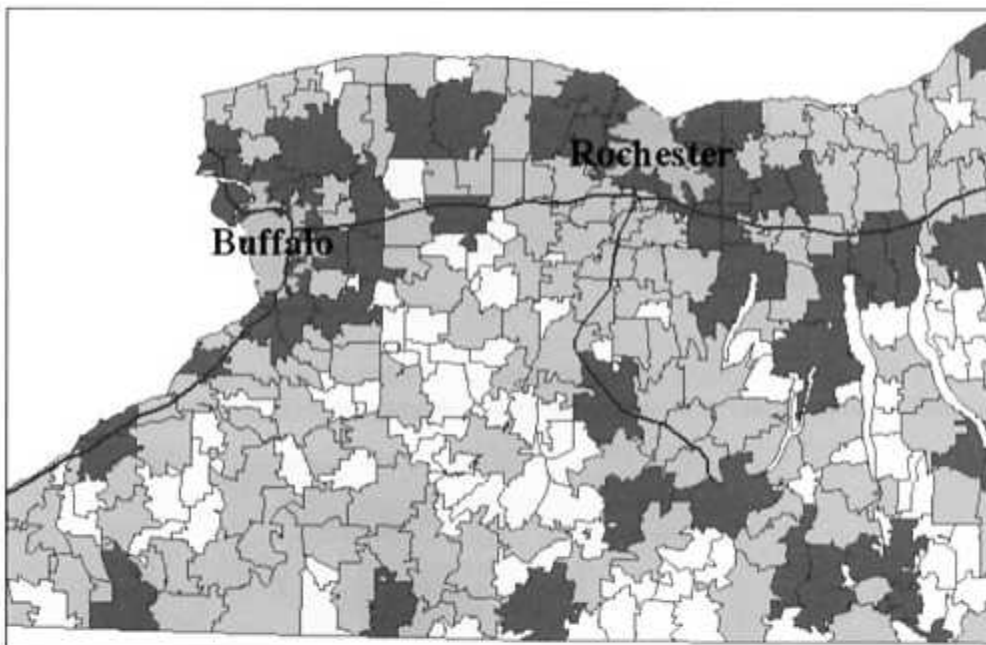



Examine layers in detail with ArcMap navigation tools

Next you will use the Zoom In tool to examine specific areas of the state, observing how population concentrations are related to urban areas and major highways. Zoom to specific areas of the map to study these relationships in various regions of the state.

- 1 Click the Zoom In tool  to select it. Click and hold the mouse button to draw a box around the area you want to zoom to, then release the mouse button.
- 2 Click the Pan tool  Click and hold a point on the map and drag the Pan cursor in one direction to view a different area of the map.

The following map is zoomed to the western portion of the state. Your map will differ based on the area you choose and how far you are zoomed in.



- 3 When you have completed your examination, click the Full Extent button  to return the map view to the original full extent of New York.

Use your observations to answer the report question, found at the end of this exercise, about population distribution in New York.

Summarize customer data table

- 1 Right-click the UsersZIPs data table, then click Open to open the table and view its contents.

Note the text at the bottom of the table that reads Records (0 out of *2000 Selected.) The asterisk before the number 2000 indicates that there are additional records in the table.

- 2 Click the Last Record button at the bottom of the window to go to the last record in the table.

8	11694
9	11772
10	11598
11	12078
12	11518
13	11510

Record: 1

Note that there are 33,060 subscriber records.

UserID'	txtZip
33049	14209
33050	10977
33051	12520
33052	10465
33053	11215
33054	10025
33055	12198
33056	11803
33057	11203
33058	10536
33059	11967
33060	11355

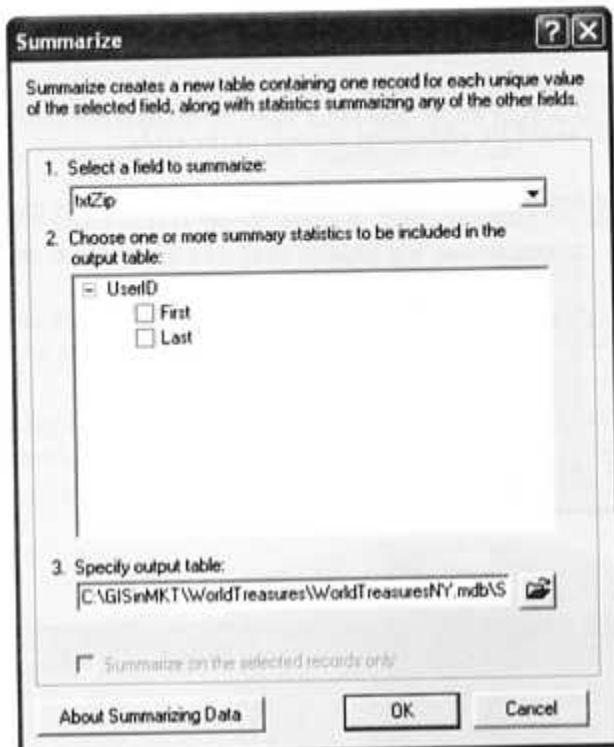
Record: 33060

Show: All Selected Records (0 out of 33060 Selected.)

This table has been extracted from the World Treasures electronic newsletter subscription list. It contains one record for each subscriber. As subscriber names are irrelevant for your analysis, they have been deleted from the table.

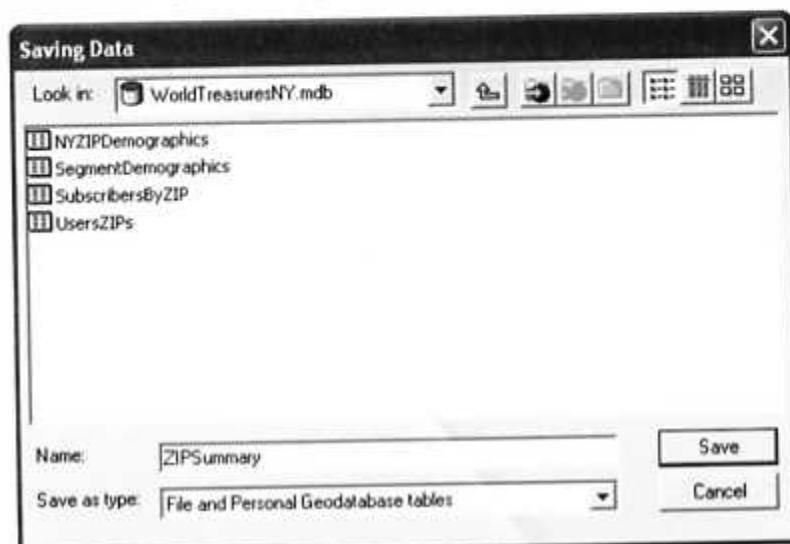
For this analysis, you require a table that contains the number of subscribers who live in each of New York's ZIP Codes. To create this table, you will perform a summary operation on the UsersZIPs table.

- 3 Right-click the column header containing the attribute txtZip, then click Summarize to reach the Summarize dialog box.



- 4 Click the Browse button to the right of the Specify output table option to open the Saving Data dialog box.
- 5 Select File and Personal Geodatabase tables in the Save as type drop-down box.
- 6 Navigate to and open the **WorldTreasuresNY.mdb** personal geodatabase, and enter **ZIPSummary** for the Name.

This will save the summary table as a personal geodatabase table.



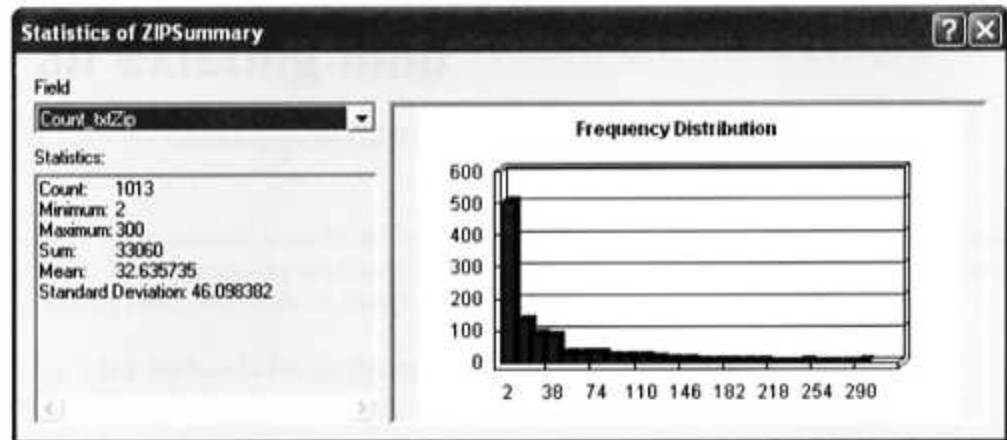
- 7 Click Save, then OK to perform the summary operation. (As you require only a count of records for each ZIP Code, it is not necessary to summarize any attribute in the table.) When asked if you wish to add the resulting table to the map, click Yes.
- 8 Close the UsersZIPs table.

The ZIPSummary table now appears in the table of contents.

- 9 Open the ZIPSummary table.

Note that World Treasures subscribers live in 1,013 of New York's ZIP Codes. The descriptive statistics of the count field will reveal important information about the distribution of these subscribers.

- 10 Right-click the Count_txtZip column header, then click Statistics to calculate descriptive statistics for this attribute and display the Statistics of ZIPSummary window.



This window contains important information for the rest of your analysis. Note the minimum and maximum values that report the highest and lowest values for the attribute. (There will be several ZIP Codes with no subscribers, but they do not appear in this table, which, by definition, is limited to those ZIP Codes where World Treasures subscribers reside.) The reported sum is 33,060, the number of subscribers in the original table. The mean value is important, as you will use this value to divide ZIP Codes into those with a high number of subscribers and those with a low number. Use this window to answer the report questions on the following page.

Update report and save map document

- 1 Use the ZIP Code map and data tables to answer the following questions. Summarize your answers in the appropriate section of the project report template (WorldTreasuresNY_ReportTemplate.doc), which you will find in your \GISMKT\WorldTreasuresNY folder.



What do you observe about the geographic distribution of households relative to New York's urban areas and interstate highways? How many World Treasures subscribers live in New York? How many ZIP Codes have World Treasures subscribers residing in them? What is the highest number of subscribers in any ZIP Code? The lowest? The average number of subscribers per ZIP Code?

- 2 Save your map file as World TreasuresNY1_fl.mxd (replace f and l with your first and last initials). To do so, click File, then Save As in ArcMap. Navigate to your \GISMKT\WorldTreasuresNY folder, type **World TreasuresNY1_fl.mxd** as the file name, and click Save.

Exercise 6.2 Define market segments and assign them to ZIP Codes

The first step in profiling customer segments by ZIP Code is to define appropriate segments and assign them to the correct ZIP Codes. The appropriate segmenting measure for this project is the number of subscribers in each ZIP Code. Thus, in this exercise, you will:

- Define segments based on the number of subscribers
- Assign segment values to New York's ZIP Codes
- Design a map displaying the geographic distribution of these market segments

Open an existing map

- 1 In ArcMap, open the **WorldTreasuresNY2** map document from your **\GISMKT\WorldTreasuresNY** folder.

This map displays the household population layer you created in the previous exercise and a general layer of New York. The household population data displays values from the NYZIPDemographics table, to which it is joined. The table of contents also includes a new table, **SubscribersByZIP**.

- 2 If necessary, click the **Source** tab on the table of contents to see the tables. Tables are only visible on the **Source** tab.

The **SubscribersByZIP** table is the same as the **ZIPSummary** summary table you created in the previous exercise. It has been renamed to more accurately reflect its contents.

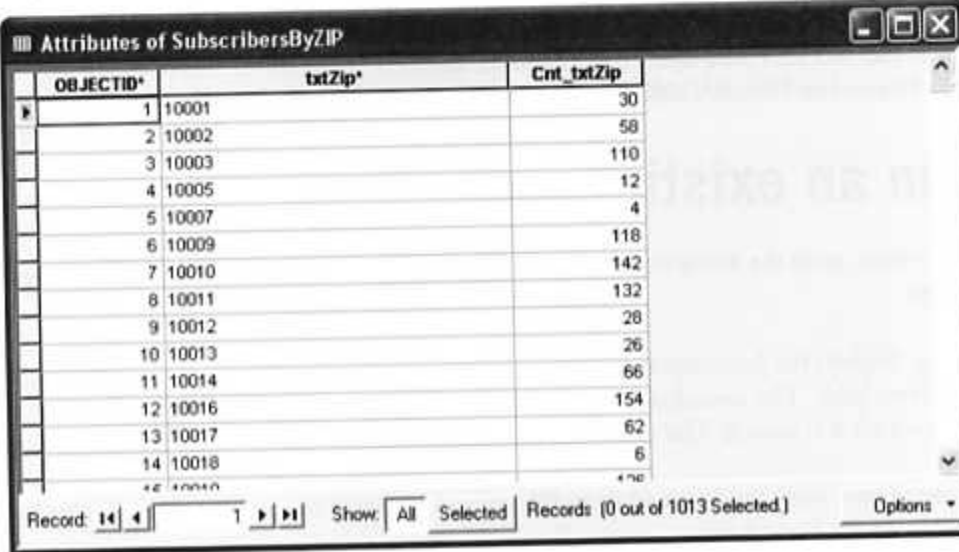


Join data table to map layer

Before you can assign segment values to ZIP Codes based on the number of subscribers they contain, you must join the data in *SubscribersByZIP* to the ZIP Code map layer.

- 1 In the table of contents, right-click *SubscribersByZIP*, then click *Open* to view its contents.

The table contains the number of newsletter subscribers in New York's ZIP Codes. Note that it contains only those ZIP Codes with some subscribers present. To assign segment values to ZIP Codes and display the subscriber count values, you will join the *SubscribersByZIP* table to the *Households By ZIP Code* layer's attribute table.



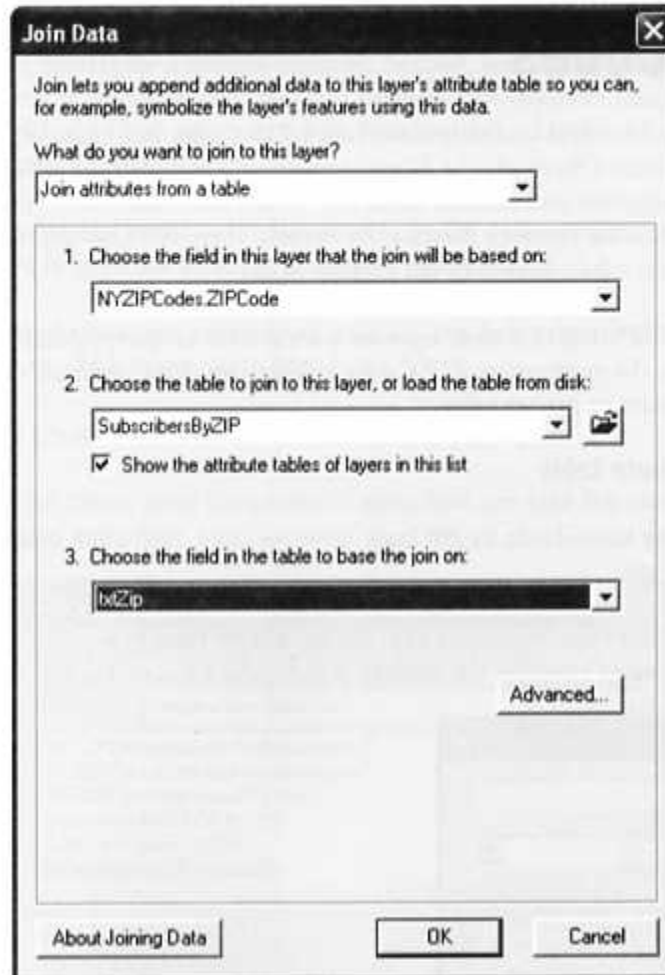
The screenshot shows a table window titled "Attributes of SubscribersByZIP". The table has three columns: OBJECTID*, txtZip*, and Cnt_txtZip. The data is as follows:

OBJECTID*	txtZip*	Cnt_txtZip
1	10001	30
2	10002	58
3	10003	110
4	10005	12
5	10007	4
6	10009	118
7	10010	142
8	10011	132
9	10012	28
10	10013	26
11	10014	66
12	10016	154
13	10017	62
14	10018	6

At the bottom of the window, there is a status bar with the following information: Record: 14 | 1 | Show: All Selected | Records (0 out of 1013 Selected) | Options

- 2 Close the table.
- 3 Right-click the *Households By ZIP Code* layer, click *Joins and Relates*, then *Join* to open the *Join Data* dialog box.
- 4 For item 1, choose *NYZIPCodes.ZIPCode* from the drop-down menu.
- 5 For item 2, choose *SubscribersByZIP*.

- 6 For item 3, choose txtZIP.



- 7 Click OK to run the join operation.

The Households By ZIP Code layer now contains the subscriber count data from SubscribersByZIP in addition to the demographic data from NYZIPDemographics. You may now explore the relationship between subscriber data and demographic data and use the spatial capabilities of the basemap to display the results geographically.

- 8 Right-click the Households By ZIP Code layer, then click Open Attribute Table to view the results of your join operation. Scroll to the right of the table to view the joined data.

Note that several ZIP Codes in the map layer did not have corresponding ZIP Code records in SubscribersByZIP. These records contain <null> values indicating that World Treasures has no subscribers living in these ZIP Codes.

Define segments and assign segment values to ZIP Codes

You wish to use the number of subscribers to divide New York's ZIP Codes into three segments designated as High, Low, and None. Obviously the None segment will include those ZIP Codes with no subscribers. The High segment will include those ZIP Codes with more subscribers than the average value you calculated in the previous exercise. By default, then, the Low segment will include those ZIP Codes with less subscribers than the average value.

In ArcMap, you will select the ZIP Codes for each segment with a series of query operations. You will assign the segment values to the appropriate ZIP Codes by creating a new attribute called Segment and assigning each feature its proper value.

Add a field to a layer's attribute table

- 1 Click the Options button in the Households By ZIP Code attribute table, then click Add Field to display the Add Field dialog box.
- 2 For Name, enter **Segment**. In the Type drop-down box, select Text. In Field Properties replace the length of 50 with 12. This number specifies the number of characters allowed in this text field.



- 3 Click OK to apply the settings and create the new field.

Scroll through the attribute table to locate the new NYZIPCodes.Segment field. Note that it is created within the original attribute table to which the other two tables were joined. Thus, if you remove the joins, the Segment field and the values assigned to each ZIP Code will remain in the attribute table for the Households By ZIP Code layer.

Select ZIP Codes by attribute and define the High segment

Assigning segment values to ZIP Codes is a two-step process. First, you will select those ZIP Codes that meet the criteria for a specific segment. Second, you will enter the appropriate value for these ZIP Codes in the Segment field. You will perform this sequence once for each of the three segments, beginning with the High segment, which includes those ZIP Codes with a higher-than-average number of subscribers.

- 1 Click the Options button in the Households by ZIP Code attribute table, then click Select by Attributes to open the Select by Attributes dialog box.
- 2 In the list of attributes, scroll down until you see SubscribersByZIP.Cnt_txtZip. Double-click this attribute to add it to the query box.
- 3 Click the greater than (>) button to add it to the query box.
- 4 Position the cursor after the greater than symbol and type the average value you discovered in the previous exercise.

Select by Attributes [?] [X]

Enter a WHERE clause to select records in the table window.

Method:

'NYZIPDemographics.PctAssocHigher' ^
 'NYZIPDemographics.PctHomeOwner' ^
 'NYZIPDemographics.ZIPCode' ^
 SubscribersByZIP.OBJECTID
 SubscribersByZIP.txtZip
 SubscribersByZIP.Cnt_txtZip v

= <> Like
 > >= And
 < <= Or
 ? = () Not

Is Get Unique Values Go To:

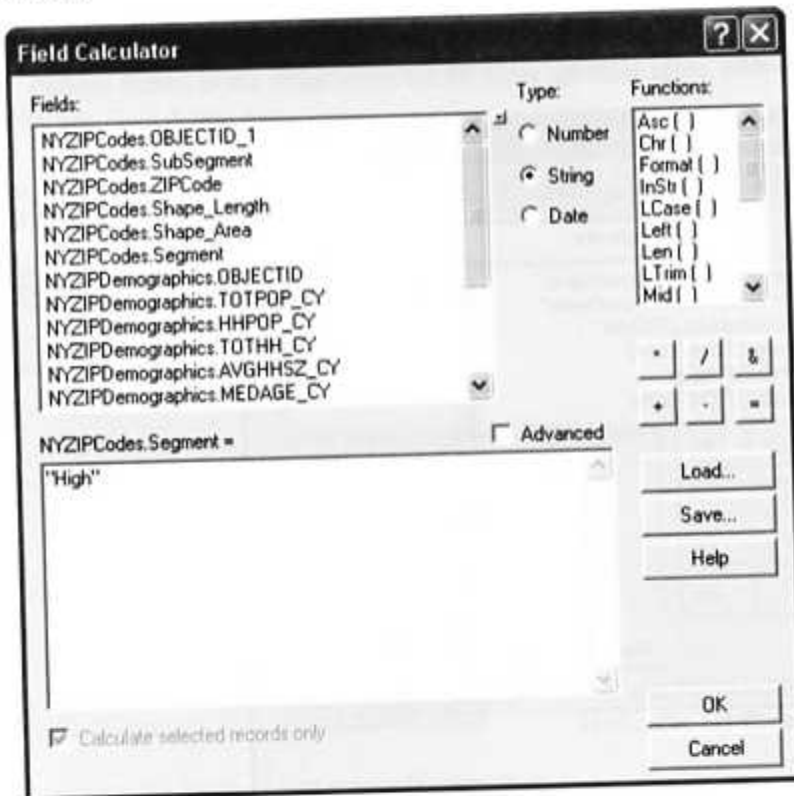
SELECT * FROM NYZIPCodes_NYZIPDemographics_SubscribersByZIP
 SubscribersByZIP.Cnt_txtZip > 32.63

Clear Verify Help Load... Save...
 Apply Close

- 5 Click Apply to run the query.

Observe the number at the bottom of the attribute table that reports how many ZIP Codes have been selected.

- 6 In the attribute table, click the Selected button to view only the selected features. You will assign these ZIP Codes to the High segment.
- 7 Right-click the NYZIPCodes.Segment column header, then click Field Calculator.
- 8 Click Yes if a warning appears.
- 9 In the Field Calculator, select String for the type, then enter "High" in the expression area.
(Note: Be sure to include the quotation marks, which designate the entry as text rather than numeric data.)



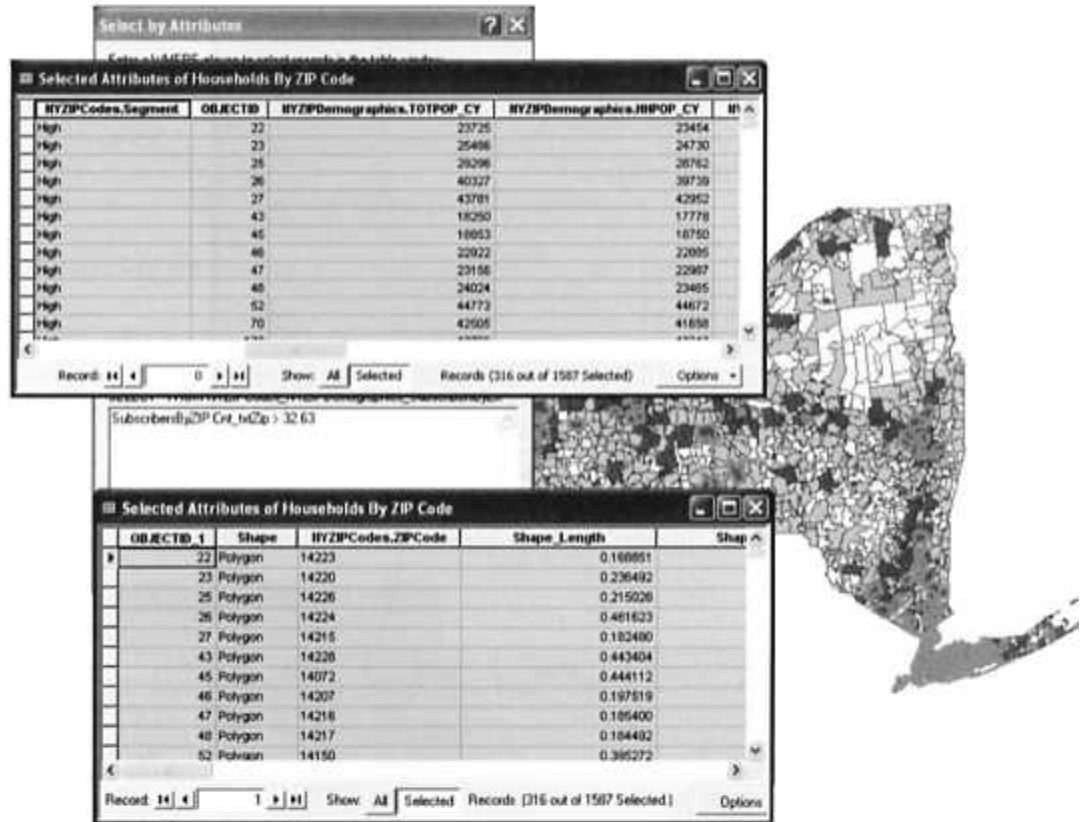
10 Click OK to complete the process.

Observe the NYZIPCodes.Segment field of the attribute table, noting that the value High now appears as the attribute value for all the selected features. These ZIP Codes now constitute the High segment.



How many ZIP Codes does the High segment contain?

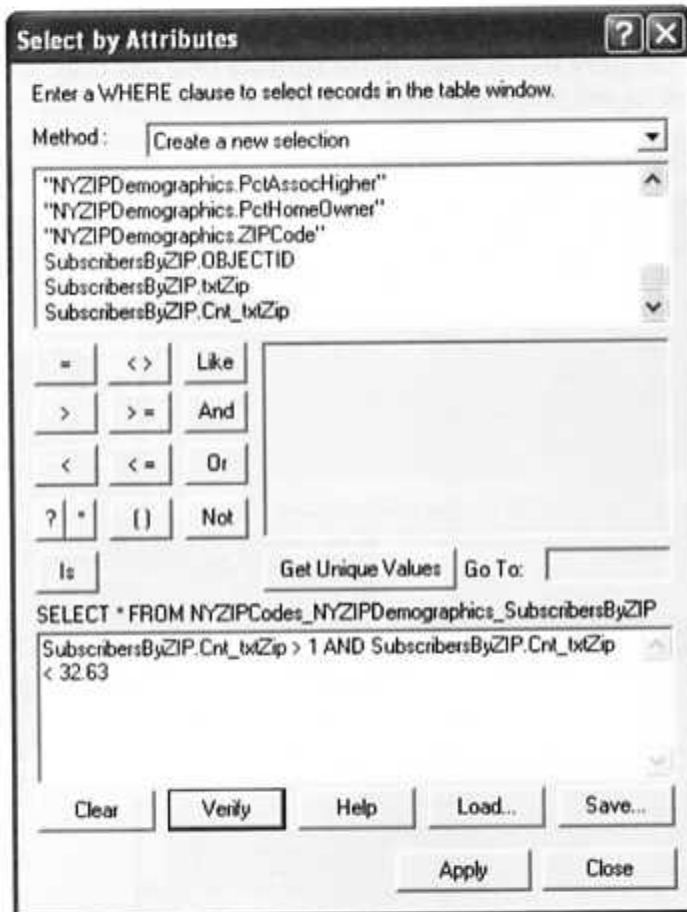
The following graphic depicts the query and its results in the attribute table and map. You will repeat these steps to create the Low and None segments.



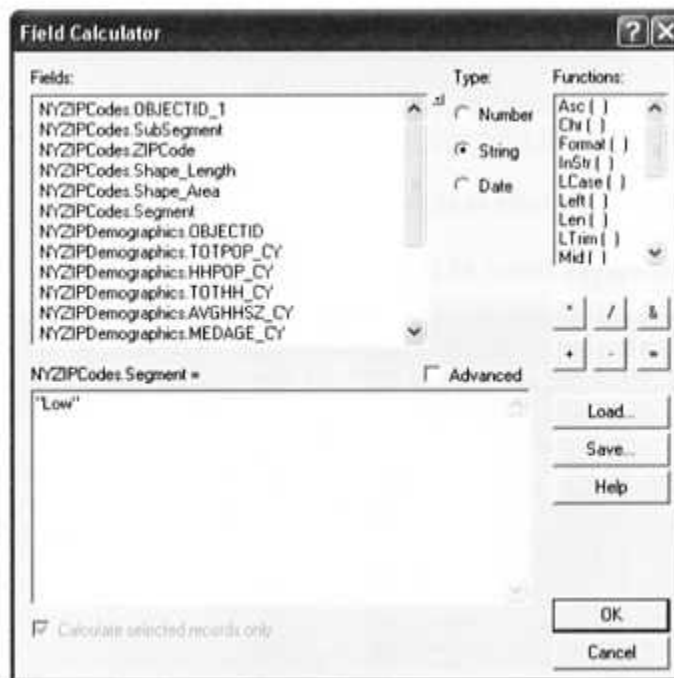
Define the Low segment

The selection procedure for the Low segment involves the same steps you just performed. However, the query is more complex as you must specify a range of values.

- 1 In the attribute table, click Options > Select by Attributes.
- 2 Use the attribute names, operators, and your keyboard to enter **SubscribersByZIP.Cnt_txtZip > 1 AND SubscribersByZIP.Cnt_txtZip < 32.63** in the query box.



- 3 Click Apply to run the query.
- 4 Observe the number at the bottom of the attribute table that reports how many ZIP Codes have been selected. If necessary, click the Selected button to view only the selected features. You will place these ZIP Codes in the Low segment.
- 5 Right-click the NYZIPCodes.Segment column header, then click Field Calculator.
- 6 Click Yes if a warning appears.
- 7 Select String for Type.
- 8 In the expression area type **"Low"**. (Note: Be sure to include the quotation marks, which designate the entry as text rather than numeric data.)



9 Click OK to complete the process.

The selected ZIP Codes have been placed in the Low segment.



How many ZIP Codes does the Low segment contain?

The map below depicts this query and its results in the attribute table and map.

NYZIPCodes.Segment	OBJECTID	NYZIPDemographics.TOTPOP_CY	NYZIPDemographics.HHPOP_CY
Low	4	2405	2405
Low	5	2745	2745
Low	9	3592	3431
Low	11	5422	5144
Low	13	12600	12594
Low	14	13393	12004
Low	15	14595	11942
Low	16	14848	14827
Low	17	16082	15800
Low	18	18164	18121
Low	19	19626	19394
Low	26	77130	10041

Define the None segment

The ZIP Codes that have not been assigned to the High or Low segments belong to the None segment. This time you will use a different approach for the selection process.

- 1 Click All at the bottom of the attribute table to show all records.
- 2 Click the Options button, then choose Select All to select all the records in the table.

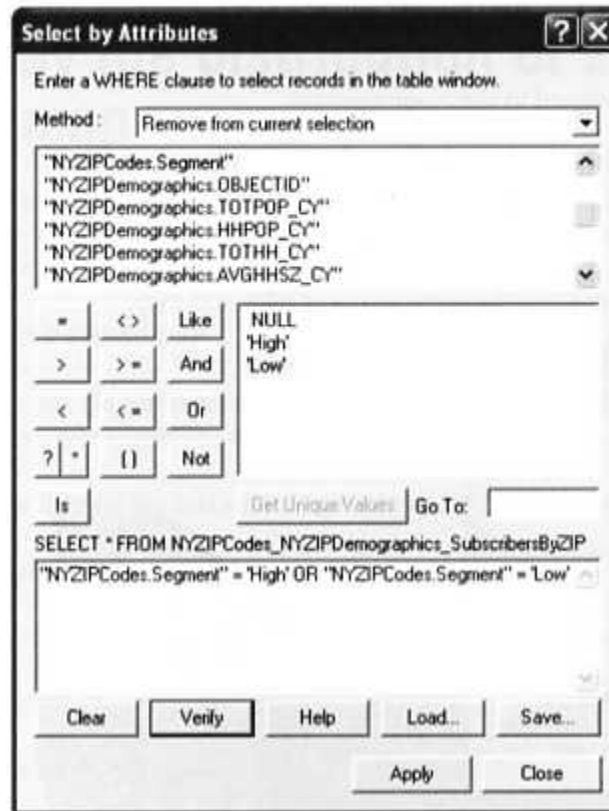
NYZIPCodes.ZIPCode	Shape_Length	Shape_Area	NYZIPCodes.Segment	OBJECTID	NYZIPDemographic
14784	0.501455	0.007549	<Null>	1	
14769	0.364325	0.002859	<Null>	2	
14728	0.617268	0.009535	<Null>	3	
14718	0.582909	0.010557	Low	4	
14775	0.68919	0.016183	Low	5	
14782	0.842704	0.016609	<Null>	6	
14716	0.324789	0.003331	<Null>	7	
14062	0.775888	0.020719	<Null>	8	
14757	0.933453	0.01486	Low	9	
14260	0.085562	0.00026	<Null>	10	
14136	0.481346	0.007168	Low	11	
14787	0.757509	0.012199	<Null>	12	

You will now use the Select by Attribute function to remove ZIP Codes from those that have been selected, leaving the ones you will assign to the None segment.

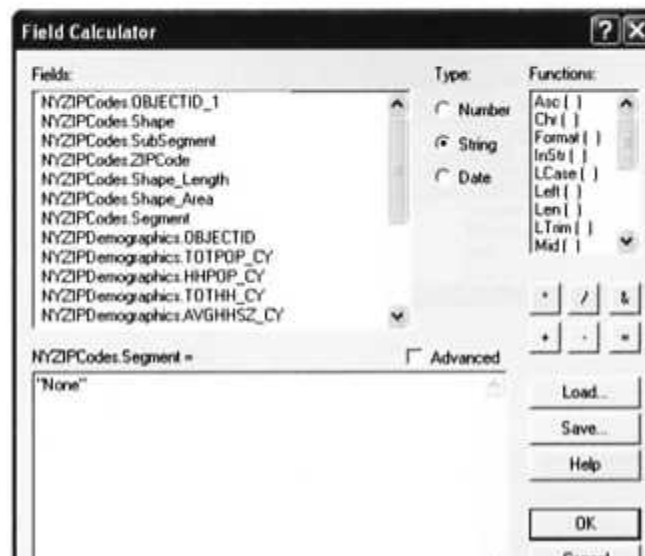
- 3 Click Options > Select by Attributes.
- 4 For Method, select the "Remove from current selection" option.

This setting will cause the records that meet the query to be removed from the current selection. By designing a query that removes all ZIP Codes that have been assigned to a segment, you will be left with the ZIP Codes that have not.

- 5 Use the attributes, operators, and keyboard to enter the following in the query box:
"NYZIPCodes.Segment" = 'High' OR "NYZIPCodes.Segment" = 'Low'



- Click Apply to run the query and remove the designated ZIP Codes from the selection.
- Right-click the NYZIPCodes.Segment column header, then click Field Calculator.
- Click Yes if a warning appears.
- Select String for Type.
- Type **"None"** in the expression box. (Note: Be sure to include the quotation marks, which designate the entry as text rather than numeric data.)



11 Click OK to complete the process.

The selected ZIP Codes have been assigned to the None segment.



How many ZIP Codes does the None segment contain?

The map below depicts this query and its results in the attribute table and map.

NYZIPCodes.Segment	OBJECTID	NYZIPDemographics.TOTPOP_CV
None	1	974
None	2	1195
None	3	1300
Low	4	2405
Low	5	2745
None	6	2993
None	7	3458
None	8	3460
Low	9	3592
None	10	4443
Low	11	5422

12 Close the attribute table and the Select by Attributes dialog box.

13 From the main menu bar, click Selection > Clear Selected Features.

Display the distribution of segments on a map

You have assigned each of the New York ZIP Codes to one of three classification segments. You will now display the geographic distribution of these segments on the map by revising the symbology of the Households By ZIP Code layer.

Edit a layer's symbology

- 1 Double-click the Households By ZIP Code layer (or right-click the layer and select Properties) to open the Layer Properties dialog box.
- 2 Click the General tab and enter **Segments by ZIP Code** as the new layer name.
- 3 Click the Symbology tab.
- 4 Select Categories, then Unique values in the Show box on the left.
- 5 Select NYZIPCodes.Segment in the Value Field box in the middle.
- 6 Uncheck <all other values>.
- 7 Click the Add All Values button below the classification box to add all the values for this attribute to the classification scheme.
- 8 Double-click the color symbol for the High segment to open the Symbol Selector dialog box.
- 9 Click the drop-down arrow for the Fill Color field, then select tarragon green (row 5, column 6). Click OK.
- 10 Repeat this procedure to select lemongrass (row 2, column 6) as the color for the Low segment, and arctic white (row 1, column 1) as the color for the None segment.

