Examining Local Demographics Using GIS

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Lesson: In this lesson, you will examine local population and housing characteristics for the Rosebud Sioux Tribe so that you can plan an after-school GIS club for primary and secondary school students.

Skills Involved:

1) Downloading Census data.
2) Creating a layout.
3) Tabular sort and query.
4) Joining tables.
5) Geocoding addresses.
6) Analyzing population and housing data, patterns, linkages, and trends.
7) Solving a problem based on spatial analysis.

Acquiring and Managing Data

Create a folder for this exercise and name it *rosebud*. As you know from previous lessons, it is best to name the folder without any spaces in the name.

You do not need to download any data this lab exercise from these web pages; you will download it from the site where the data resides.

Go to the following web site:

http://www.esri.com/data/download/census2000_tigerline/index.html
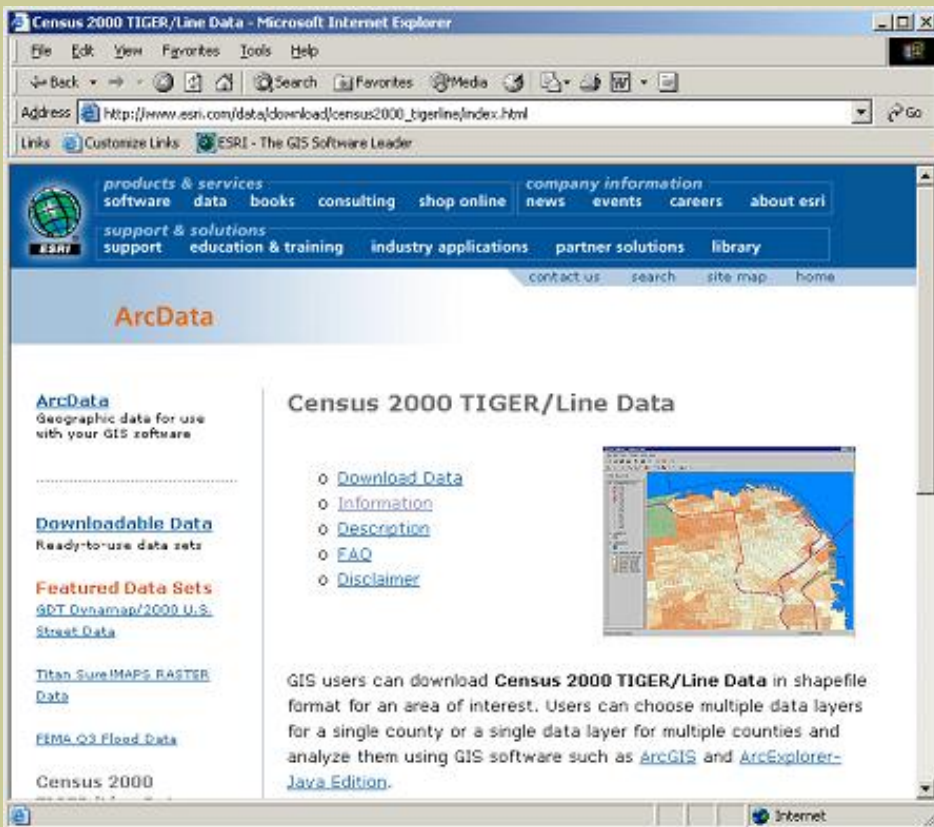
Click on "Download Data" and on the next screen, select South Dakota on the map or on the list.

On the next screen, select Todd County and press "Submit."

On the next screen, click the following 3 boxes, and then press "proceed to download" at the bottom of the list:

Block Groups – 2000
Line Features – Roads
Census Block Group Demographics (Under "statewide layers").

Next, you will receive a notice that your data file is ready:

Click **Download File** to retrieve your data to the folder you created at the beginning of this lab.

Unzip the file with Winzip. Note that there will be three files that are zipped underneath this zip file. Unzip each of the files and extract. When you are finished, you will have 8 files:

Tgr46121grp00.dbf
Tgr46121grp00.shp
Tgr46121grp00.shx
Tgr46121lkA.dbf
Tgr46121lkA.shp
Tgr46121lkA.shx
Tgr46000sf1grp.dbf
Readme.html
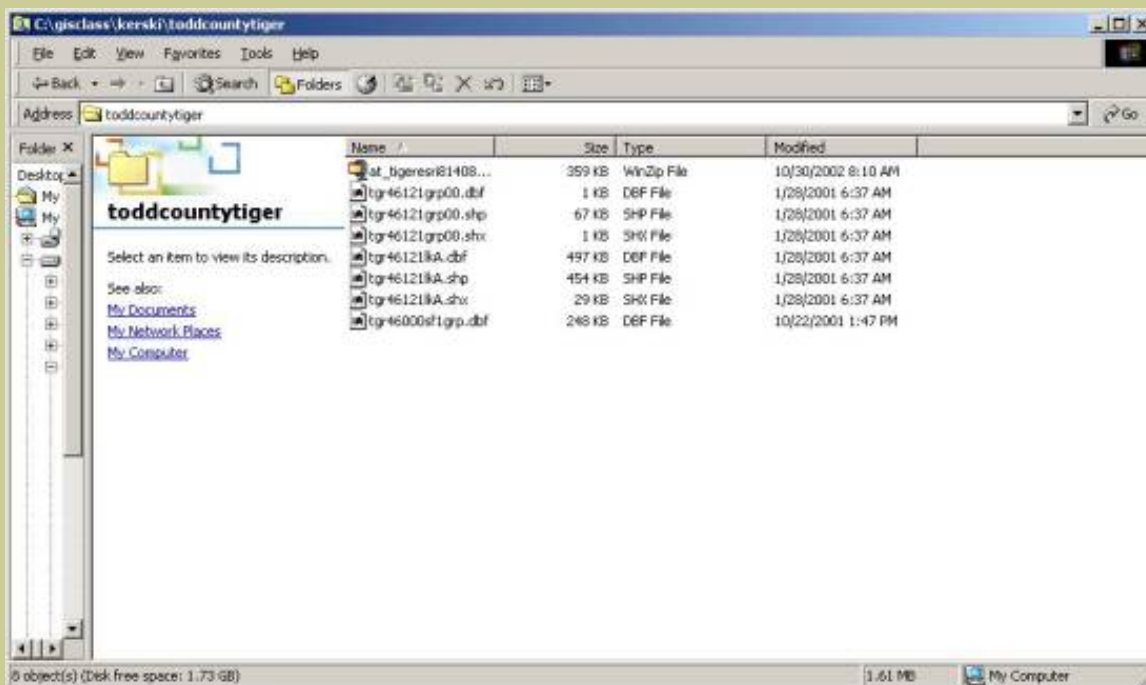
Read the table that is in the file list that you downloaded called readme.html to answer the following questions:

1) In which file are the roads?

The Census Bureau collects data for statistical areas and political areas. Political areas include Indian Reservations, cities, counties, and states. Statistical areas include Census Tracts, Block Groups, and Blocks. Blocks in a city or town are usually the same as a typical city block, bounded on all sides by streets. Blocks in a rural area may be much larger in area, and may be bounded by roads, streams, or a railroad. Groups of blocks are called Block Groups. Groups of Block Groups are called Census Tracts. Census Tracts nest within counties.

Block groups are analogous to neighborhoods; they are the smallest statistical area for which the more detailed Census data is available. You have just downloaded the Block Groups for Todd County.

2) In which file are the block group boundaries?

3) In which file is the Census data for the Block Groups?

4) In what year was the data collected?

Start ArcView GIS with a new project and a new view.

Add both of the themes you downloaded above to your view: Roads and Block Group boundaries.

Go to View—> Properties and name your view "Rosebud."

Save your project and give it an appropriate name," placing it into the appropriate directory.

Set your view properties to kilometers for the distance units.

Your data sets are now ready to analyze. Refer to previous lessons if you need help symbolizing a theme.

5) Make a unique value map for roads, symbolizing the roads based on the attribute cfcc2. How did you create this map?

6) Zoom in on the map when you are done, using the "I" identify button to answer the following question: What is the cfcc2 code for the most important (major) roads on the Rosebud lands?

7) Name at least three other types of information contained in the attributes of roads table.

8) Complete this sentence: The roads table contains one record for every _____.

Open the theme table ⊞ for the Block Group theme.

9) How many records does this table have?

10) In the project window, go to Tables--> Add, and add your table Tgr46000sf1grp.dbf. How many records does this table have?

11) Is the tgr46000sf1.grp table longer or shorter in length than the table for the Block Groups?

12) What geographic extent do you think the table Tgr46000sf1grp.dbf covers?   Go back to the web page where you downloaded the data to help you answer this question.

Clear any selected records in both tables by using the clear selection ⊞ button.

13) What is the **name of the field** that these two tables share that contain the same data?

Accessing and Analyzing Additional Data

You are now ready to join the 2 tables. It is **very important** to do the join in the correct order. You want to join FROM the table you just added (the tgr46000sf1grp.dbf) TO the table associated with the map (attributes of Tgr46121grp00.shp). Be careful not to click inside the table and inadvertently select any records in the table. If you did this, you'd only join these selected records, rather than the entire table.

First, click on the join field in the tgr46000sf1.grp table.

Second, click on the join field in the table attributes of tgr46121grp00.shp.

Third, click on the "Join Tables" button. (looks like 2 tables with an arrow joining them) ⊞

Now, examine your attributes of the block group table.

14) What happened to your tables after you joined them?

15) How many block groups exist in Todd County?

16) How did you find out the answer to the question above?

Make a graduated color thematic map of the 5 to 17 year olds.
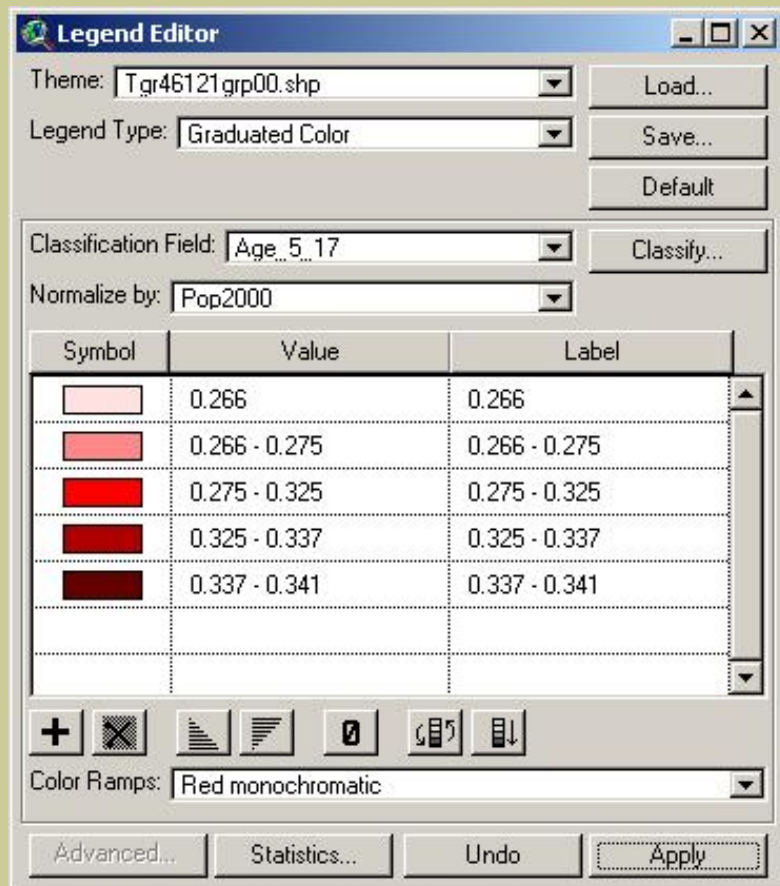
17) How did you do this?

18) Which area(s) on the Rosebud Reservation contain the most people in this age group?

19) How many 5 to 17 year olds lived in this Block Group in the year 2000?

20) Make a map of Median Age. Which area(s) on the Rosebud Reservation contain the lowest median age?

21) Make a map of Average Family Size. Which area on the Rosebud Reservation contains the highest average family size?

Make a map of 5 to 17-year-olds as a **percentage** of the total population. Do this by **normalizing** your data to that of the total 2000 population, as in the screen below:

Legend Editor

Theme: Tgr46121grp00.shp   Load...

Legend Type: Graduated Color   Save...

Default

Classification Field: Age_5_17   Classify...

Normalize by: Pop2000

Symbol	Value	Label
	0.266	0.266
	0.266 - 0.275	0.266 - 0.275
	0.275 - 0.325	0.275 - 0.325
	0.325 - 0.337	0.325 - 0.337
	0.337 - 0.341	0.337 - 0.341

Color Ramps: Red monochromatic

Advanced...   Statistics...   Undo   Apply

22) Which block group contains the highest percentage of 5 to 17 year olds?

23) What is the percentage in this block group?

24) On which part of the Reservation are you thinking of targeting your after-school program?

25) Why?

Next, change your legend so that you can make a pie chart map. Use the guide below to create pie charts indicating the proportion of 5 to 17 year olds in the total population:
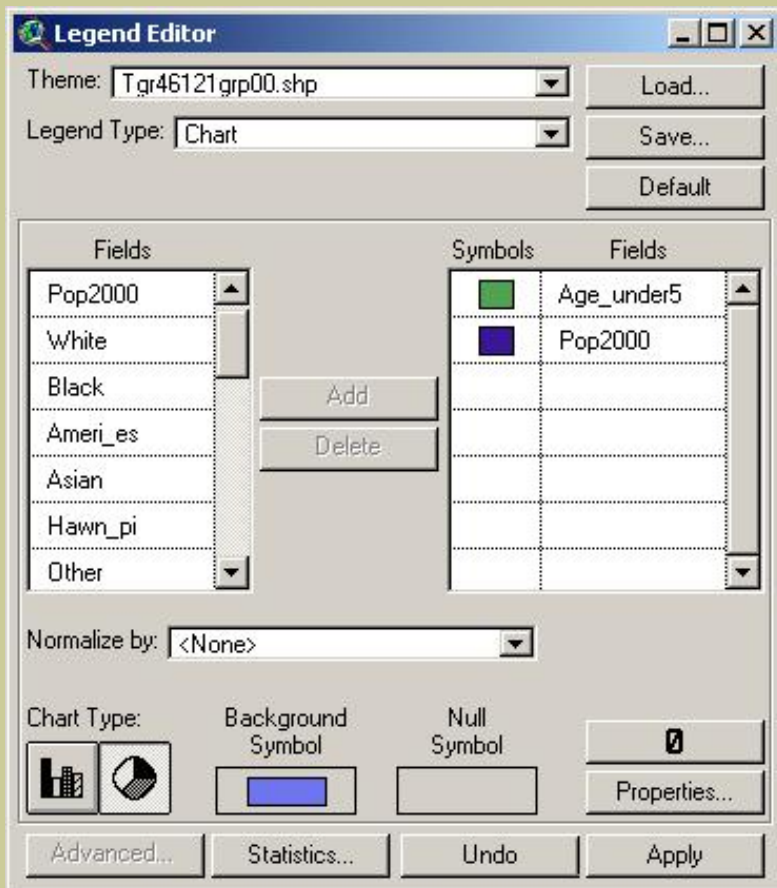
Next, double click on the theme name again to pull up the legend editor. Use the "properties" button in the lower right of the legend editor and make the 2000 population the size field for the pie charts.

26) What effect did the size property have on the map?

Next, make a dot map with 1 dot for every 1 five-to17 year old person. Describe this map.

27) In your opinion, which of the maps—graduated color, pie chart, or dot map—is the easiest to understand?

28) Why?

Using procedures you used above, answer the following questions:

29) Which block group contains the most Native Americans? (field ameri_es)

30) How many Native Americans lived in this block group in 2000?

31) What is the percentage of Native Americans to the total population in this Block Group?

32) What is the percentage of Native Americans to the total population **in the Block Group with the least number of American Indians**?

Examine your data; then think about and examine the following questions:

33) What is the relationship between student-age population and the number of Native Americans?

34) Why do you suppose this is the case?

35) What is the relationship of Native American population to other ethnic and racial groups in the area?

Use the query tool (hammer and question mark) to answer the following.

36) How many Block Groups contain over 1200 Native Americans and over 400 youth from age 5 to age 17?

37) What expression did you use to obtain the above results?

38) Where are these Block Groups located?

Clear your selection.

39) How many Block Groups contain over 1500 Native Americans and over 500 youth from age 5 to age 17?

40) What expression did you use to obtain the above results?

41) Where is/are this Block Group(s) located?

Geocoding Addresses

42) Open the table of your streets layer. Select a few streets in Mission on the map and examine them in the associated table. What do the fields faddl, taddl, faddr, and taddr mean?

Your streets layer is geocodable; that is, you can use it to locate addresses. To do this, you first need to perform a set up step. Go to Theme➔ Properties for your streets layer. Go to the Geocoding function and set the address style to US Streets. Select Yes at the next prompt.

Zoom in to the town of Mission in your view. In the view, select the push-pin symbol (to the left of the hammer/ question mark symbol) and type in: 285 2nd Street.

43) What happens?

44) Say you want to place your office to run your after-school program at 360 Todd St. Enter this address after selecting the push-pin symbol. In what part of Mission will your office be located?

45) What are the names of the streets that will bound the block where you will locate your office?

46) What direction is US Highway 18 from your office?

47) If you live in Rosebud, but work in Mission, name all of the roads that you will travel on to reach your office.

Save your project.

Create a layout for printing that contains the results of your analysis. Zoom on the map until you can see both Mission and Rosebud.

48) View —> Layout. Create your layout. With the text tool, add your name, date, and change the title of the map to something that reflects what the map is showing.

Print the layout.

Save your project. Close your project and exit ArcView.

49) Summarize in a few sentences what you have learned about analyzing population by neighborhoods within a county in this lesson.

50) Summarize in a few sentences what you have learned about GIS in this lesson.

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