Module 3, Lesson 2
Patterns of a growing population

Lesson overview

Students will explore the role of the United States Census. Using data obtained in the 2000 Census, they will examine population patterns across the United States. Students will profile their state and examine data on population, population density, and other interesting statistics on mobility and Internet access. They will use GIS to examine and interact with a number of graduated color maps and filter data to answer relevant questions.

Estimated time
Approximately 60 minutes

Materials
The student activity can be found at http://esri.com/geoinquiries.

Click on the Thinking Spatially Using GIS link and choose Module 3, Lesson 2.

Objectives
After completing the lesson, a student is able to do the following:
- Explain population patterns across the United States
- Profile the information for their state
- Interpret thematic maps to answer questions and draw conclusions
- Work with tabular data
- Filter data to find answers and make decisions

GIS Tools and Functions
- Open a map file
- Zoom to desired section of the map
- Identify a feature on a map

Functions
- Turn layers on and off
- Change map style (legend)
- Filter attribute data
- Label features
- Sort attributes

National Geography Standards

Standard	K-4	5-8
3 How to analyze the spatial organization of people, places, and environments on Earth's surface	That places and features are distributed spatially across the Earth's surface	How to use the elements of space to describe spatial patterns
9 The characteristics, distribution, and migration of human populations on Earth's surface	The spatial distribution of population	The demographic structure of a population
10 The characteristics, distributions, and complexity of Earth's cultural mosaics	How the characteristics of culture affect the ways in which people live	The spatial distribution of culture at different scales (local to global)
18 To apply geography to interpret the present and plan for the future	The spatial dimensions of social and environmental problems	How to apply the geographic point of view to solve social and environmental problems by making geographically informed decisions

Teaching the lesson

Introducing the lesson

Begin this lesson by reviewing or discussing the following concepts.

- The difference between total population and population density
- Spatial patterns: cluster, random, and uniform
- How the U.S. Census can help us study the history of the United States
- The use of statistics in geography and mapping
- How census data is simplified so that it can be studied more easily
- The unique characteristics of each region of the United States
- Thematic mapping using graduated color maps
- The individual characteristics of your state and the people who live there

Student activity

We recommend that you complete this lesson yourself before completing it with students. This will allow you to modify the activity to accommodate the specific needs of your students.

Teacher Notes

- Explain the lesson to the students, and make sure they know where to answer the questions.
- For younger grades, you can conduct the GIS activity as a teacher-led activity and have students follow along. You can lead students through the GIS steps and ask them the associated questions as a class.
- Students will each need a printed copy of the activity so they can answer questions throughout.
- They can mark their answers directly on the activity sheet. Alternatively, you can provide a separate answer sheet.
- Ideally, students will have access to their own computers. However, students can complete the lesson in small groups.
- Some questions do require classroom and/or group interaction. You can decide on the best way to handle these questions.
- We recommend that students save their work as they progress through the GIS activity. Students can use either the Save command (to save their changes to the original map) or the Save As command (to save their changes to a new map). Please explain to students where and how they should save their work.
- Each student will complete a worksheet while going through the activity.
- To explain population density, have the students calculate the density of the students in your classroom (number of students / area of classroom = density).

The following are things to look for while the students are working on this set of activities:

- Are students thinking about the underlying geographic concepts as they work through the steps (such as the population of their community and how population affects decision making)?
- Are students answering the questions as they work through the steps?
- Are students experiencing any difficulties with the buttons, tools, and mouse clicking, etc.?

Concluding the lesson

- Engage students in a discussion about the United States and its population. For example, you can discuss issues such as how fast the population is growing, where people are living, and how population patterns might change in the future.
- Have students do Internet research to learn more about the future growth of the United States and/or world population and to learn about the next U.S. Census.
- Ask students what they know about the populations in other countries.
- Discuss the value of accurately counting people. For example, how would this affect the location of schools and construction of new homes?
- Talk about how your community compares with the state and the country in terms of population and other characteristics. Does their community represent the state as a whole?

- Has this activity raised any questions that they would like to explore further? How can GIS help them to learn about people and places?
- How can GIS help them organize information and find answers to questions?

Extending the lesson

- Download a 2000 Census form and have each student complete the form (short or long form). Do a mini census of the classroom.
- Examine other kinds of questions that could be asked on the U.S. Census.
- Choose one state from each region of the United States to profile, and see how those states compare to yours.
- Discuss population patterns in the country and how they relate to history, landforms, climate, etc.

References

- www.census.gov
- http://people.howstuffworks.com/census1.htm
- http://www.ourtownamerica.com/sponsor/movingstats.php

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🌐 **Q1: What is the name of your state? Write it on your "Patterns of a growing population" worksheet.**

Task 1: Open the map

Task 2: Enlarge the ArcGIS Online window

Task 3: Work with layers

🌐 **Q2: Look at your map and find the darkest colored states. From those states, select three that each have populations of more than ten million people.** *Answers may include the following:*
    a. *California*
    b. *Texas*
    c. *Florida*
    d. *New York*
    e. *Pennsylvania*
    f. *Ohio*
    g. *Illinois*

🌐 **Q3: Look at the location of all the states that fall in the highest population category. What do they have in common? (Circle the correct answer.)**
    a. *They are all next to one another.*

    b. *They all start with the letter C.*

    c. *They all have some of their border along water.*

    d. *They are all in the middle of the country.*

🌐 **Q4:** *List three of the states that have fewer than one million people (the lightest color).* *Answers may include the following:*

     a. *Montana*
     b. *North Dakota*
     c. *South Dakota*
     d. *Wyoming*
     e. *Vermont*
     f. *Delaware*
     g. *Alaska*

🌐 **Q5:** *What pattern do these states show?*

     a. *They are mostly clustered together.*

     b. **They are randomly spread apart.**

     c. **They are evenly distributed across the country.**

🌐 **Q6:** *Which state has the highest population (the one at the top of the list)?* *California*

🌐 **Q7:** *Scroll back to see the state names. Which state has the lowest population (the one at the top of the list)?* *Wyoming*

🌐 **Q8:** *Write the population of your state in the appropriate location on your worksheet*

Task 4: More people, less space

🌐 **Q9:** *What is the name of the state that has the lowest population density? (Hint: Scroll the table to the left to see the state name.)*
State: Alaska

🌐 **Q10:** *Can you think of two reasons why this state has the lowest population density?*
Answers may include the following:

     a. *The weather is cold.*
     b. *It is very far from the contiguous states (states that are connected).*
     c. *The land, or terrain, is rugged.*
     d. *The types of industries in Alaska are more limited than in many other states.*
     e. *The actual area of the state is quite large, so people can spread out more.*

🌐 **Q12:** *Can you think of two reasons why this state has the highest population density?*
Answers may include the following:

     a. *It is a small state, so there is not a lot of space for people.*
     b. *There are lots of jobs nearby (e.g., New York City).*
     c. *The weather is moderate.*
     d. *People have access to transportation.*
     e. *It is near major cities.*

🌐 **Q13: Look at your map and notice how population density is spread across the states. Describe any patterns you see. Use words such as "located together" (or clustered), "without any pattern" (or random), and "looking the same as the others" (or uniform).**
Answer: Students can answer this creatively. Appropriateness will vary depending on grade level. The following are some points for students to consider:
- *Other than California, Washington, and Florida, the states with higher density are clustered in the Northeast.*
- *The states with mid-density are essentially clustered in the middle of the country.*

🌐 **Q14: What was the population density (Pop_Dens) of your state at the 2000 Census? Write it on your worksheet.**

Task 5: Moving around the country

🌐 **Q15: Choose any five states from those selected and write their names here:**
Answers may include the following:
a. *North Dakota*
b. *Wisconsin*
c. *Minnesota*
d. *Iowa*
e. *Pennsylvania*
f. *Ohio*
g. *West Virginia*
h. *Kentucky*
i. *Alabama*
j. *Mississippi*
k. *Louisiana*
l. *Michigan*

🌐 **Q16: In which part of the country are most of these states located?**
a. *East*
b. **West**

🌐 **Q17: Discuss with your classmates why you think people want to remain living in these states. *Answer: This is just a conversation the students should have in order to answer the following question.***

🌐 **Q18: List two reasons why people would not move away from the state they were born in.** *Answer: The following answers, as well as any other valid reasons, are acceptable.*
- *a. Their family lives there.*
- *b. They have good jobs.*
- *c. They have a house.*
- *d. They cannot afford to move.*
- *e. They like where they live.*
- *f. They like the weather.*
- *g. Their friends live there.*
- *h. They have never left the state.*

🌐 **Q19: Ask your classmates if they were born in the state they live in. How many said yes? How many said no?** *Answers will vary.*

🌐 **Q20: What is the percent of people living in the state that were born there? Write this on your worksheet.** *Answers will vary*

🌐 **Q21: Did you notice a significant change in the map? (Hint: Turn off and on the Born in Another State layer to take another look.)**
- *a.* *Yes*
- *b. No*

🌐 **Q22: Describe the change in pattern that you noticed.** *The darker colors moved to the West of the country, showing that people in the west have typically moved there from other states.*

🌐 **Q23: Look at the map. Which states have the highest number of people who were born in another state (the darkest color)? Write two of them here.** *Answers may include the following:*
- *a. Wyoming*
- *b. New Hampshire*
- *c. Alaska*
- *d. Nevada*
- *e. Arizona*

🌍 **Q24 What do you think makes these states so popular?** *Answers may include the following:*

- *Nicer weather (not in all cases)*
- *Better job opportunities*
- *Lower cost of living/less expensive housing*
- *Better lifestyle*
- *Attend college/university*

🌍 **Q25: Look at the map. Which states have the lowest number of people who were born in another state (the lightest color)? List three of them here:** *Answers may include the following:*

a. *Massachusetts*
b. *New York*
c. *Pennsylvania*
d. *Illinois*
e. *Louisiana*
f. *Michigan*

🌍 **Q26: Why do you think so few people from other states move there?** *Answers may include the following:*

a. *High cost of living*
b. *Very large cities*
c. *More pollution*
d. *Colder weather (not in all cases)*
e. *A lot of people live in cities (urban areas)*

🌍 **Q27:   What is the percent of people living in your state who were born in another state? Write this on your worksheet.**

Task 6: Surfing the Internet.

Each year, the U.S. Census performs a survey called the American Community Survey. The survey collects interesting facts on a small percentage of the U.S. population and publishes them on the Web. One of the pieces of data the survey examines is people's access to the Internet. The U.S. Census collects this information for each household in the United States.

🌐 **Q28: Look at your map. List three of the states where more than 60 percent of households have access to the Internet. (These will be the states in the darkest color.)**
Answers may include the following:
   a. *Alaska*
   b. *Washington*
   c. *Minnesota*
   d. *Oregon*
   e. *New Hampshire*
   f. *Connecticut*
   g. *New Jersey*
   h. *Utah*
   i. *Colorado*
   j. *Virginia*

🌐 **Q29: Look at your map. What pattern do you notice among the states where more than 60 percent of the population has Internet access? (Circle all that apply.)**
   a. *There is a random pattern—these states are spread all over the country.*
   b. *There is a cluster pattern—the states are grouped together in certain areas.*
   c. There is a uniform pattern—the states are spaced evenly apart.
   Answer: a or b—it will depend on the student's spatial perspective.

🌐 **Q30: Which three states have the lowest percent of households with access to the Internet? You might have to scroll back to the left to see the names of the states.**
   a. *Mississippi*
   b. *Arkansas*
   c. *Louisiana*

🌐 **Q31: In which region of the country are these states located?**
   a. North
   b. *South*
   c. East
   d. West

🌐 **Q32: Which three states have the highest percent of households with access to the Internet?**
   a. *Alaska*
   b. *New Hampshire*
   c. *Colorado*

🌐 **Q33: Overall, which part of the country appears to have the most access to the Internet?**

    a. North

    b. South

    c. East

    d. *West*

🌐 **Q34: What is the percent of Internet access for households in your state? Write this number on your worksheet.**

Task 7: Save your work and exit ArcGIS Online.

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Worksheet

Name of your state: _____

Topic	Your State
Population in 2000	Answer will vary
Population density	Answer will vary
Born in state	Answer will vary
Born in another state	Answer will vary
Internet access	Answer will vary

One you have completed this table, write a brief paragraph that describes the population characteristics of your state. Use the information you have obtained during this activity.

Answers will vary