

Name: _____ Instructor: _____

True Maps, False Impressions: Making, Manipulating, and Interpreting Maps

▶ ACTIVITY 1: SCALE

Map scale is the ratio of the distance on the map to the distance on the ground, where both are measured in the same units. Scale can be represented in three different ways:

Representative Fraction. The map distance to ground distance ratio is written as a simple fraction (e.g., 1/50,000) or ratio (1:50,000). In this example, it simply means that one unit (inches, centimeters, etc.) on the map represents 50,000 of the same units on the ground.

Verbal Scale. Words instead of numbers are used to express the scale. The verbal scale can thus be thought of as a “translation” of the representative fraction into words. For example, the scale of 1:100,000 can also be expressed as “one centimeter to one kilometer,” or “one centimeter represents one kilometer.” This is because there are 100 centimeters in 1 meter, and 1,000 meters in 1 kilometer.

$$100 \frac{\text{cm}}{\text{m}} \times 1,000 \frac{\text{m}}{\text{km}} = 100,000 \frac{\text{cm}}{\text{km}}$$

Multiply 100 by 1,000 and cancel the *m*'s on top and bottom and you get 100,000 centimeters in a kilometer. Therefore, in a map with a scale of 1:100,000, one centimeter on the map represents 100,000 centimeters, or one kilometer, on the ground. Likewise, a verbal scale of “one inch to one mile” translates to a representative fraction of 1:63,360 because there are 63,360 inches in a mile:

$$12 \frac{\text{inches}}{\text{foot}} \times 5,280 \frac{\text{feet}}{\text{mile}} = 63,360 \frac{\text{inches}}{\text{mile}}$$

Graphic Scale. This normally appears as a line or bar divided into conveniently numbered segments. You can think of this as a picture of the words in the verbal scale. In the example below, two centimeters represents one kilometer (use a ruler to test it out!).



Questions 1.1 to 1.3 assume a scale of 1:25,000. Note that this scale is different from those in either of the examples just given.

1.1. Suppose that City A is four centimeters away from City B on the map. How many *centimeters* apart are they on the surface of the earth?

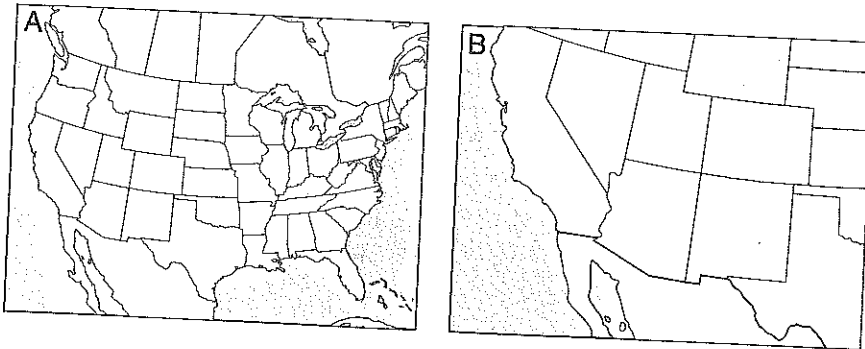
1.2. How many *kilometers* apart are Cities A and B on the surface of the earth?

1.3. A bakery needs to supply bread to every store within a six-kilometer radius. How many centimeters will this radius be when drawn on the map? *Hint: First convert 6km to cm, and then multiply by the representative fraction: 1/25,000.*

1.4. Which is the largest-scale map?

- a. 1/24,000 b. 1/62,500 c. 1/100,000 d. 1/250,000

1.5. Which of the following maps is larger scale?



1.6. Would your college campus appear larger on a map at a scale of 1:500 or 1:5,000?

Scale is more than just a way of zooming in or out for a closer look or a broader perspective. When you change scales, you can actually see a different spatial process at work. The process you will investigate in Questions 1.7 to 1.9 involves whether the northeastern U.S. population became more concentrated or more spread out during the twentieth century.

Figure 1.12 shows each county's percentage of the northeast regional population for 1900 (top) and 2000 (bottom) at a relatively small scale of 1:12,000,000. At this scale you can see the whole northeastern section of the United States, and each county is fairly small. We could call this a "regional-scale" map.

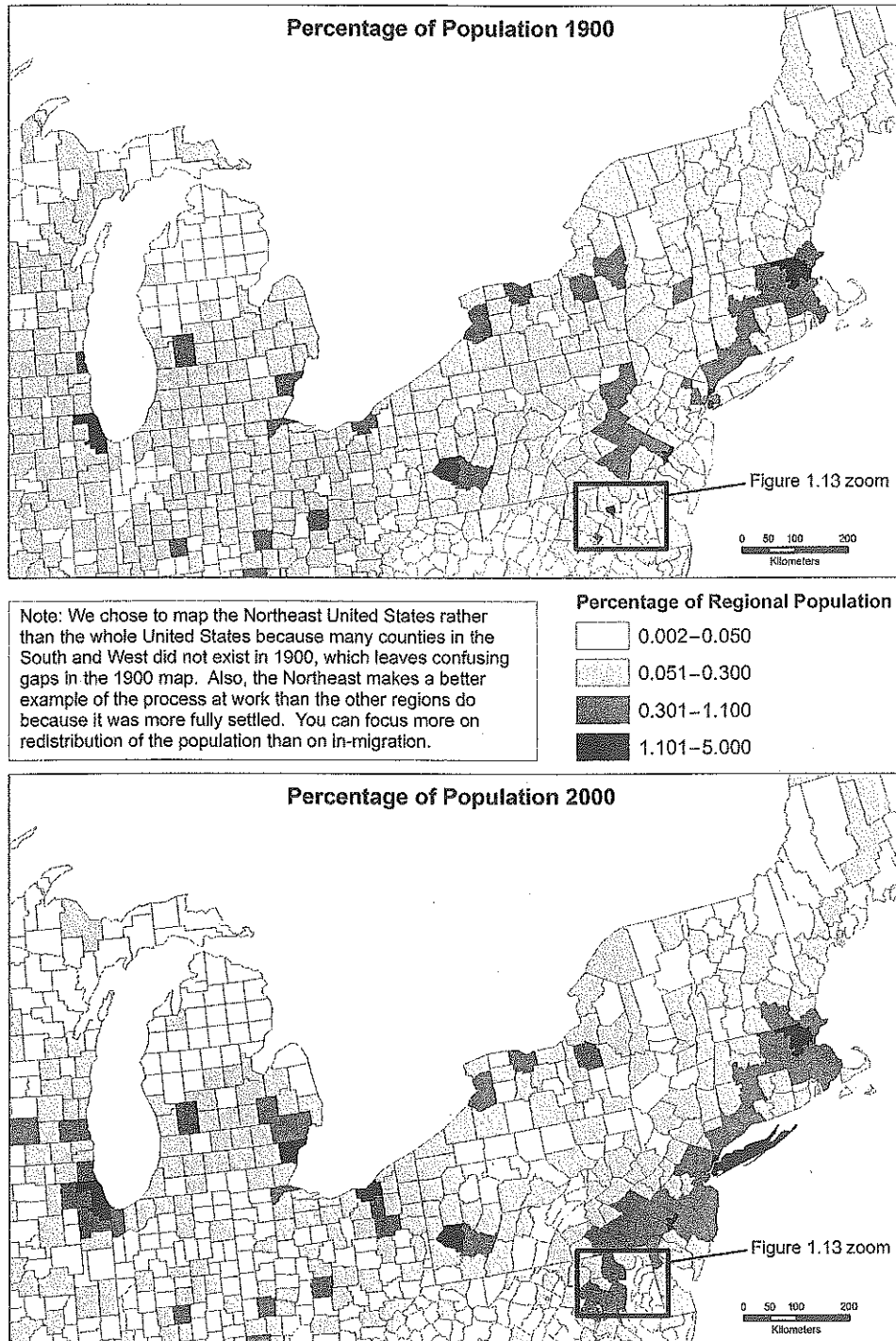


Figure 1.12 Regional-scale map of population by county in the northeastern United States, 1900 and 2000.

1.7. On the regional-scale maps (Figure 1.12), did the population become more spread out (people distributed more uniformly and evenly across counties) or more concentrated (more people living in a few places) from 1900 to 2000? Explain how you interpreted the map pattern to reach this conclusion.

Now look at Figure 1.13, which zooms in on the Baltimore-Washington region. This is a larger-scale map at 1:1,200,000. In fact, it is exactly 10 times larger. This is a more "local-scale" map. Notice that the level of aggregation has stayed the same as in Figure 1.12: It still shows the percentage of regional population by county.

1.8. On the local-scale maps (Figure 1.13), did the population of the Baltimore-Washington region become more spread out or more concentrated from 1900 to 2000? Explain how you interpreted the map pattern to reach this conclusion.

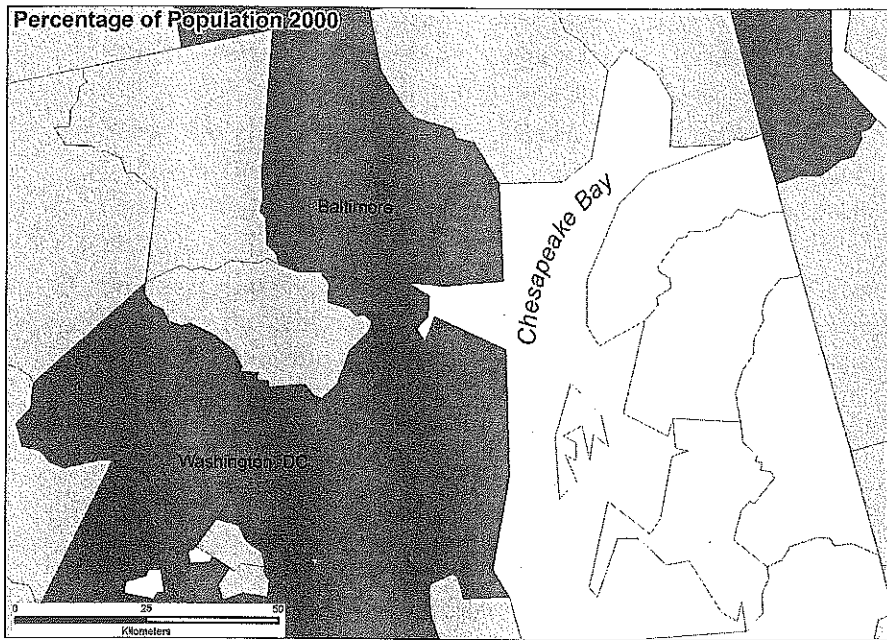
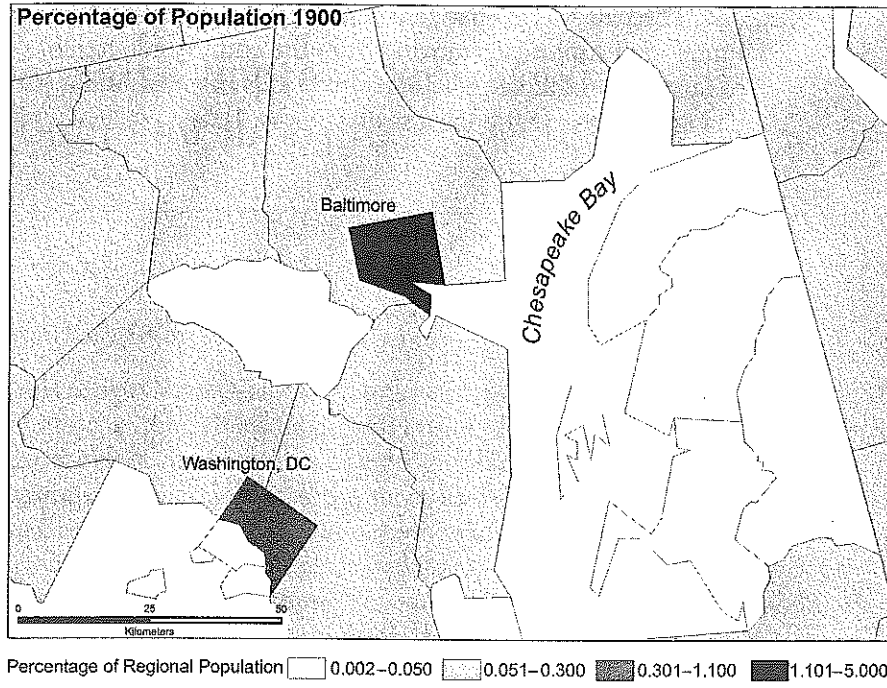


Figure 1.13 Populations in Baltimore-Washington region, 1900 and 2000.

1.9. The patterns of change you see in the regional-scale maps (Figure 1.12) are the function of Americans moving from the countryside to cities due to mechanization of farming and industrial and service jobs in cities. What is behind the patterns of change you see at the local scale (Figure 1.13)?