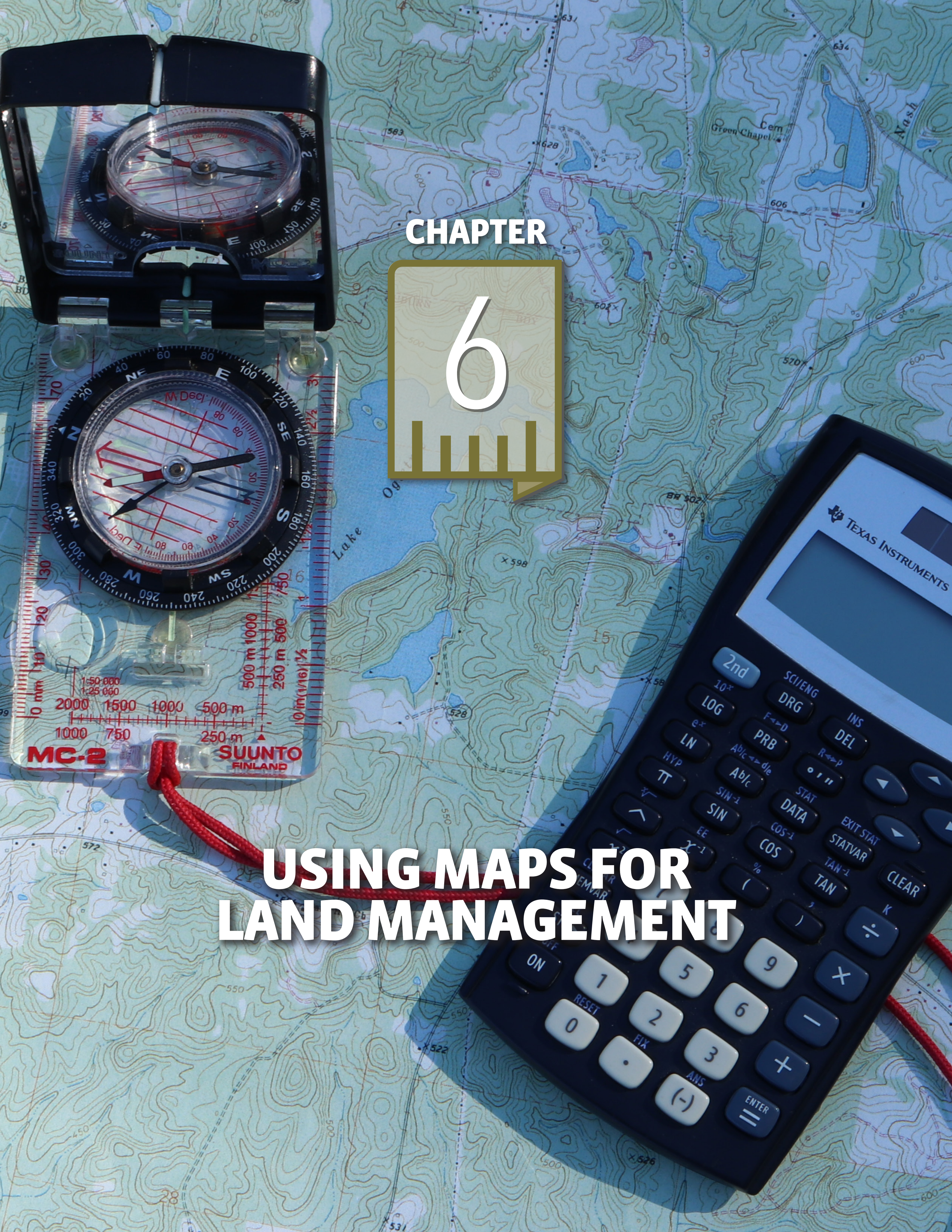
CHAPTER 6

USING MAPS FOR LAND MANAGEMENT



Using Maps for Land Management

WHAT IS A MAP?

Bjorn Kjellstrom (2009) in the book *Be an Expert with Map and Compass* defines a map as "a reduced representation of the surface of the earth." Most people are familiar with city or state road maps. These maps are usually planimetric; that is, they have no designation of elevation and are not usually used for navigating in the field or for land management.

Instead, topographic maps are most often used by natural resource managers and landowners for land management activities. Topographic maps illustrate in detail where natural features occur on the landscape. They give you descriptions of an area, designations, details, direction, and distances. We will cover how topographic maps address each of these aspects in this chapter.

OBTAINING A TOPOGRAPHIC MAP FOR YOUR AREA

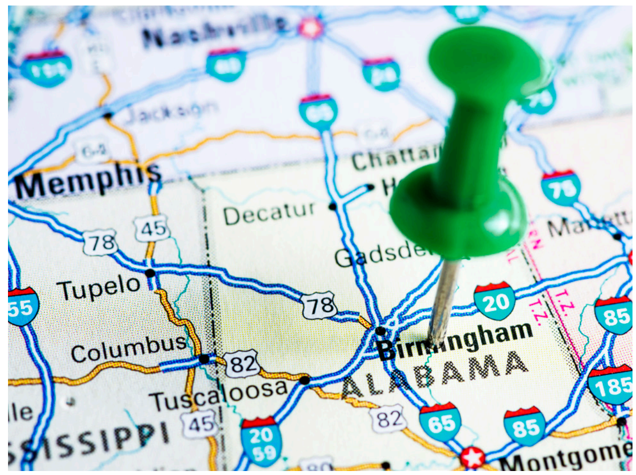
Topographic maps for your area of interest can be obtained by ordering or downloading from the US Geological Survey (USGS) online store.

When using a USGS map, either paper copy or electronic, the following provides definitions for various parts of USGS quadrangle maps, also called USGS quad maps, or US topo maps.

MAP DESCRIPTIONS

NAME OF MAP AREA

In the upper right-hand corner you will find the name of the USGS quad map. It is often the name of a prominent feature in the area. It is also the map name you use to find or order a copy of the map. For maps produced prior to 2016, the names of the quadrangles that border your map are written in small type along the edges and in the corners.



City or state road maps have no designation of elevation and so are rarely used for making land management decisions.

DATES

Date information is in the lower right-hand corner of the map. It tells you when the map was created and the date of any updates that may have been made.

LOCATION

Using USGS quad maps to determine location is common. Maps produced prior to 2016 include the General Land Office (GLO) system of land division where property is divided into acres and fractions of acres and location is described using sections, townships, and ranges. Section numbers and lines are in red. Township and range information is also in red and often found in the margins or near the edges of the printed map.

Other coordinate systems that are printed on USGS quad maps are universal transverse mercator (UTM) and latitude and longitude. These grid systems are printed on older USGS quad maps. For newer US topo maps (after 2015) the full UTM grid is standard. The GLO system of section, township, and range is not printed on US topo maps created after 2015.

DESIGNATIONS

Different lettering styles are used to designate different attributes on a map. Regular Roman fonts are used for places, boundary lines, and areas. Italic fonts are used for water features. Block numbers are used for elevations. Special notes and public works are in block italic font.

DETAILS

Details on a map are illustrated using map symbols. In general, human-made or cultural features are BLACK, water features are BLUE, vegetation is GREEN, and elevation features are BROWN.

HUMAN-MADE FEATURES

These are built features such as roads and trails, houses and public buildings, railroads, power lines, dams and bridges, and boundaries between areas. They are often depicted larger than they really are for clarity.

WATER FEATURES

These are swamps, streams, rivers, ponds, lakes, and oceans. Brooks and narrow rivers are a single blue line. Larger rivers are a solid blue wider band. Creeks and streams that may not flow year-round are a thin, dashed blue line with three dots.

VEGETATION

These areas are woodlands, orchards, or scrubland. It is important to be sure that you get a woodland copy of printed maps so that a green tint will designate forested areas.

ELEVATION

Changes in elevation are shown by thin brown lines called contour lines. A contour line is an imaginary line on the ground along which every point is the same elevation above sea level. Often, every fifth line is heavier than the others. These are known as index contour lines. They have a number on them that indicates the elevation along that line. The distance between one contour line and the next is known as the contour interval. The contour interval of your map should be printed in the bottom margin of your USGS quad.

Topographic maps show elevational changes and are useful when navigating in the field and when making land management decisions.

HOW DO I READ CONTOUR LINES?

See video 6:1, Reading USGS Topomap Contour Lines, on the Alabama Extension website at www.aces.edu/go/ForestInventoryBasics.

- Contour lines that are widely spaced represent a gentle slope.
- Lines closer together represent a steeper slope.
- Lines that run together represent a cliff.
- As lines cross a stream or river they make a “V” shape. The point of the V is always pointing uphill. Contour lines on ridges or hills are more “U” shaped. The bottom of the U points downhill.

DIRECTION

Most people think of using a map for directions. You may know how to use a map for basic highway driving navigation, but what if you want to know the actual direction between two points on a map relative to north and south? How do you determine it?

WHICH MAP DIRECTION IS NORTH?

When you read a USGS quad map and most other maps, north is often located at the top of the page while east is the right margin, west is the left margin, and south is the bottom margin. But if you are unsure, there should be a north arrow located in the bottom margin of the page.

FINDING MAP DIRECTIONS WITH AN ORIENTEERING COMPASS

See video 6:2, Getting Direction on a Map, on the Alabama Extension website at www.aces.edu/go/ForestInventoryBasics.

Chances are if you are trying to navigate to a given location, and you are not using a GPS, you will be using an orienteering compass and map to find your way.

To use a map and compass to determine the direction you should travel, place your compass on the map so that one edge of the base plate touches both your starting point and destination. If the distance is longer than your base plate, use a straight edge to draw a line between the two points and place your compass along that line. The direction-of-travel arrow on your compass should be pointing in the direction of your destination.

Next, turn the bezel on your compass until the orienting arrow points north and lies parallel with the nearest north/south meridian. Your compass is now set. To get the direction, read the degree marking on the bezel of your compass where the direction line touches it. That is your direction in degrees. To navigate to that spot on the ground, align the floating magnetic needle with your orienting arrow on the face of the compass. Use your compass as a guide and begin pacing in that direction.

DISTANCES

See video 6:3, Estimating Distance on a Map, on the Alabama Extension website at www.aces.edu/go/ForestInventoryBasics.

Scales at the bottom of maps help you determine distance on the map and on the ground. These scales may be presented in four ways: (1) as a fraction like 1:24,000; (2) as a ruler or scale bar that is divided into miles and quarters of a mile; (3) as a ruler or scale bar that is divided into thousands of feet; and (4) into a scale bar that is divided into kilometers and fractions of kilometers.

On the USGS quad map the scale is 1:24,000. That means that 1 inch on a regular ruler is equal to 24,000 inches on the ground, or 2,000 feet. To get the distance in feet, measure the number of inches and multiply by 2,000. To get the number of miles, divide that number by 5,280 feet/mile. To determine the distance in chains, divide the number of feet by 66 feet/chain.

Using an engineer's scale can help you make more precise measurements on your map. If your scale is 1:24000 or 1 inch equals 2,000 feet, use the 20 side of your engineer's scale. Every tick mark is equal to 100 feet, with ten tick marks equaling 1,000 feet and 20 tick marks representing 2,000 feet. One inch is found at the 2 mark. There are 20 tick marks between the 0 point on your scale and the 2, so 20 × 100 = 2,000 feet.

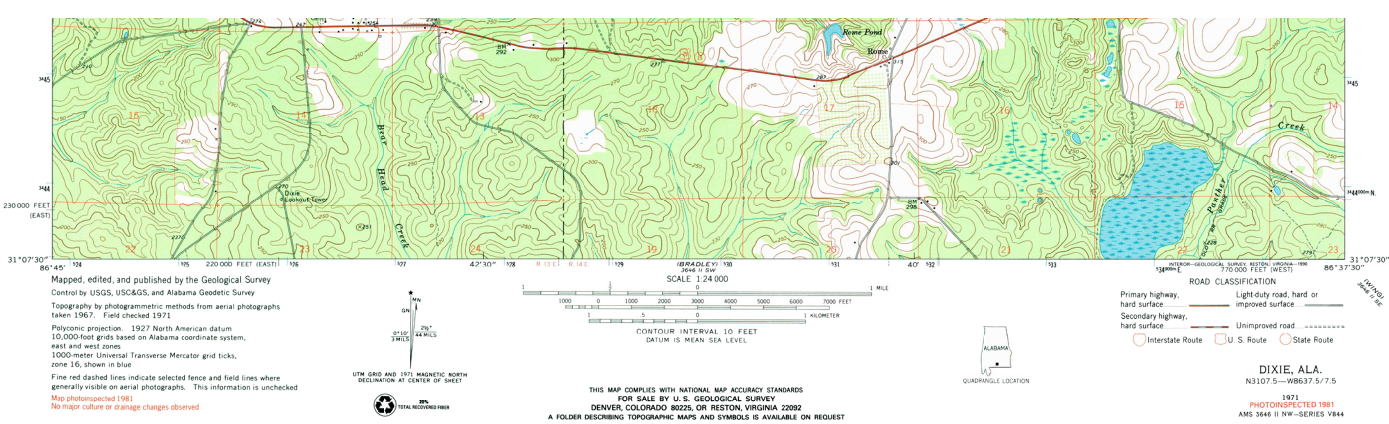
EXAMPLE

You measure the straight-line distance between two points on your USGS quad map using your engineer's scale. The scale on your map is 1:24,000 or 1 inch equals 2,000 feet. Using the 20 side on your scale you determine that the distance is 116 tick marks between points. What is the straight-line distance in feet, miles, and chains?

Distance in feet:
116 (tick marks) × 100 (feet per tick mark) = 11,600 feet

Distance in miles:
11,600 (feet) ÷ 5,280 (feet per mile) = 2.197 or about 2.2 miles

Distance in chains:
11,600 (feet) ÷ 66 (feet per chain) = 175.76 chains



Scales at the bottom of maps can help you determine how distances on maps translate to distances on the ground.

YOUR TURN

1. Using a USGS quadrangle map, you measure a straight-line distance from the community of Rome to Collins Cemetery using the 20 side on your engineer's scale. You count 209 tick marks. What is the straight-line distance between the two points?
   - In feet:__________
   - In miles:__________
   - In chains:__________
2. Using a USGS quadrangle map, you measure a straight-line distance from Sand Hill Church to Wright's Crossroads using the 20 side on your engineer's scale. You count 93 tick marks. What is the straight-line distance between the two points?
   - In feet:__________
   - In miles:__________
   - In chains:__________
3. Using a USGS quadrangle map, you measure a straight-line distance from Lost John Church to the town of Belk using the 20 side on your engineer's scale. You count 135 tick marks. What is the straight-line distance between the two points?
   - In feet:__________
   - In miles:__________
   - In chains:__________

ANSWERS

1. **209 × 100 = 20,900 feet; 20,900 feet ÷ 5,280 feet per mile = 3.96 miles; 20,900 feet ÷ 66 feet per chain = 316.67 chains**

2. **93 × 100 = 9,300 feet; 9,300 feet ÷ 5,280 feet per mile = 1.76 miles; 9,300 feet ÷ 66 feet per chain = 140.91 chains**

3. **135 × 100 = 13,500 feet; 13,500 feet ÷ 5,280 feet per mile = 2.56 miles; 13,500 feet ÷ 66 feet per chain = 204.55 chains**