

Section 2: **Getting started with maps and data**

Chapter 3

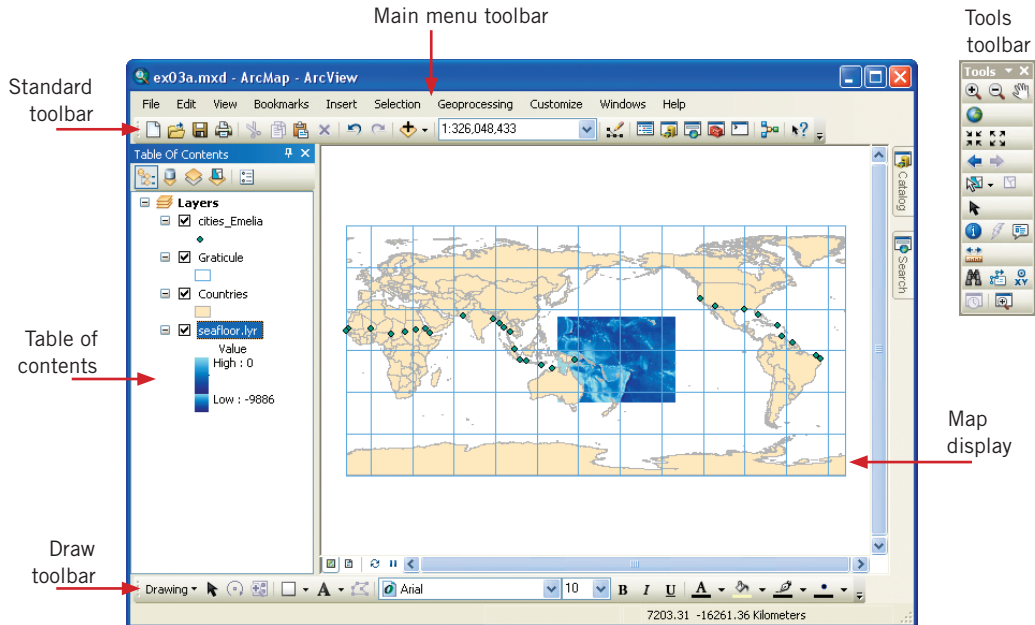
Exploring ArcMap

Displaying map data

Navigating a map

Looking at feature attributes

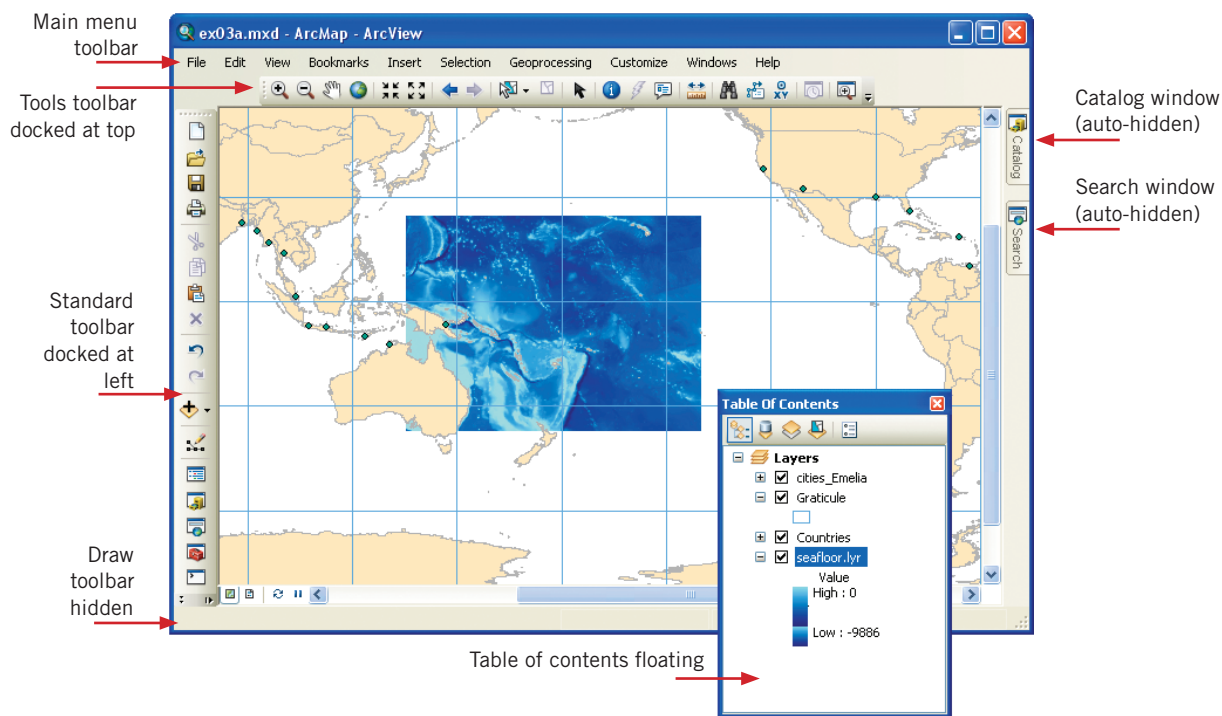
ArcMap is an application for displaying maps and investigating them, for analyzing maps to answer geographic questions and producing maps that make analysis persuasive. The ArcMap application window consists of a map display for viewing spatial data, a table of contents for listing the layers shown in the display, and a variety of toolbars for working with the data.



You can change the way ArcMap looks to suit your preferences and the kind of work you do. Toolbars can be hidden or shown. New commands can be added to them. They can be docked at different places in the application window or can float independently of it.

To dock a floating toolbar, drag it to the interface. To undock it, click the vertical gray bar at its left edge and drag it away from the interface. To hide or show a toolbar, click the Customize menu, point to Toolbars, and check or uncheck the toolbar name.

Alternatively, some windows (such as Catalog or Search) can be docked to the interface. These windows have the ability to collapse into a tab or expand to show its entirety. To dock a floating window, drag it to the interface. The window turns blue and four arrows point at locations where the window can be docked. When the window is docked, click the Auto Hide button to enable the tabbed behavior. To remove the tab, click the Auto Hide button and undock the window.



This book assumes that you are working with the default interface. The exercise graphics reflect this, with one exception—toolbars are always shown horizontally.

Changes you make to the interface are applied to subsequent ArcMap sessions, so if you dock a toolbar or window in one session, it will be docked the next time you start ArcMap, and if you resize the application window, it will keep the new size in the next session. Changes like this will not significantly affect the exercises, but may give you slightly different results for such operations as labeling that are influenced by the size and scale of the map display.

For more information about customizing the interface, click the Contents tab in ArcGIS Desktop Help and navigate to *Customizing and developing with ArcGIS > Customizing the user interface*.

Displaying map data

In this exercise, you'll learn how to display data in ArcMap. You'll learn how to navigate maps and get information about map features.

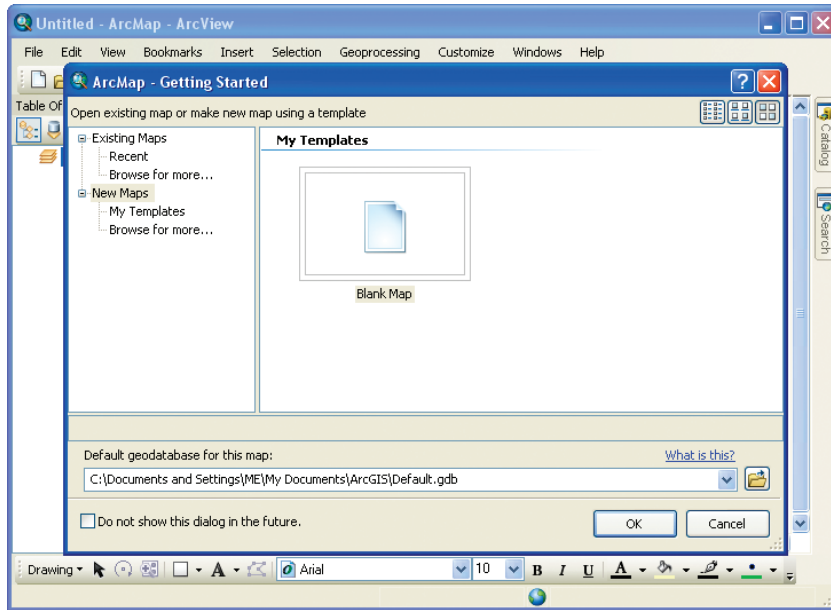
You will be able to do the exercises only if you have installed the 180-day trial version of ArcView 10 that comes with this book, or if you have a licensed version of ArcEditor 10 or ArcInfo 10 software on your computer. Keep in mind that using a previous version of ArcGIS means that certain tools, functions, windows, or dialog boxes may or may not be present. You may encounter steps in the exercises where a workaround may be necessary.

Exercise 3a

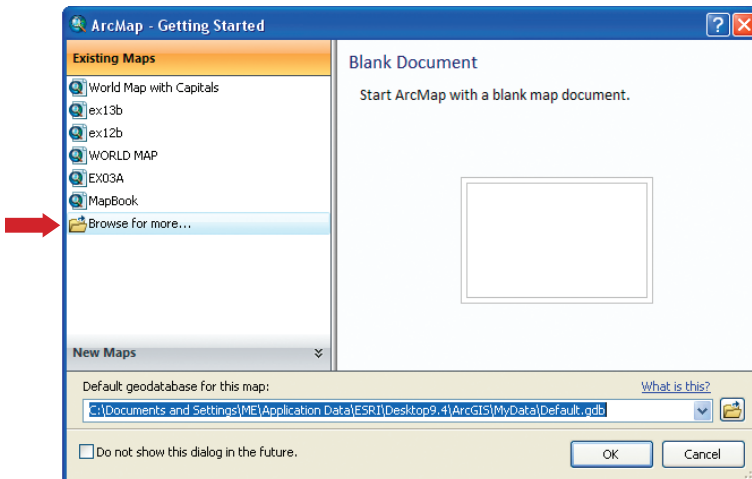
You work for an aviation history foundation that is researching the last flight of Amelia Earhart. In 1937, Earhart was near the end of a flight around the world when her plane disappeared over the Pacific Ocean. The U.S. government spent more than \$4 million searching for Earhart and her navigator, Fred Noonan. The foundation believes Earhart may have crashed on Nikumaroro, one of several tiny islands that make up the country of Kiribati, and would like to mount an expedition to look for the wreckage. You have been asked to manage a GIS project that will help organize data and acquaint potential sponsors with the foundation's plans.

- 1 Start ArcMap by clicking the Start button on the Windows taskbar, point to All Programs, point to ArcGIS 10, and click ArcMap 10.

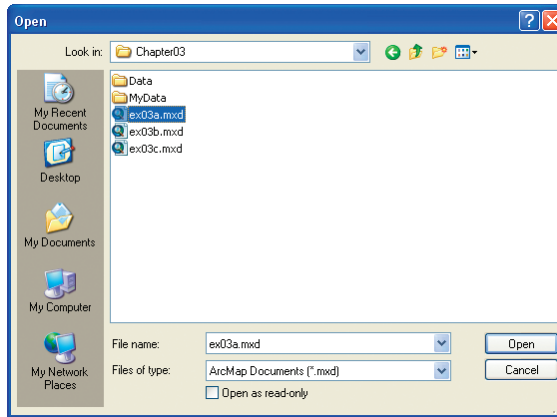
When ArcMap opens, you see the Getting Started dialog box on top of the main application window. This dialog box allows you to quickly start a new map, open an existing map or template.



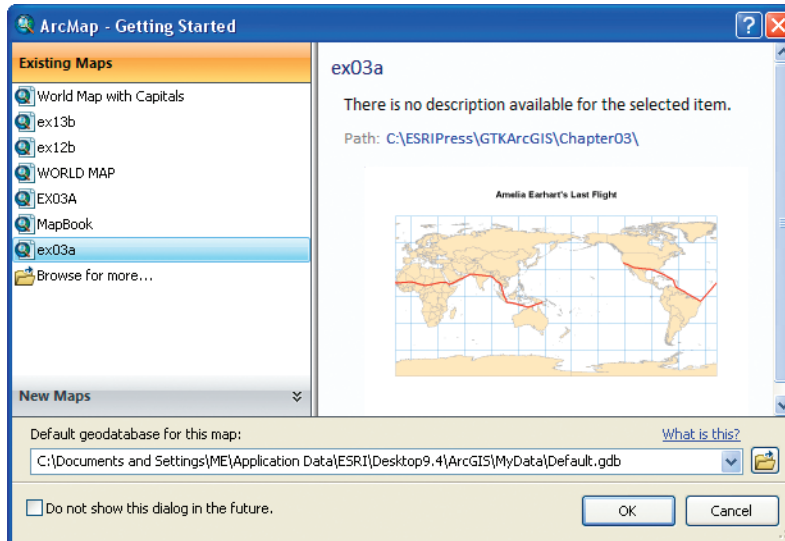
- 2 In the Getting Started dialog box, under the Existing Maps section, click “Browse for more...”



- 3 In the Open dialog box, navigate to **C:\ESRIPress\GTKArcGIS\Chapter03** (or to the folder where you installed the GTKArcGIS data). Click **ex03a.mxd**, as shown in the following graphic, and click Open.

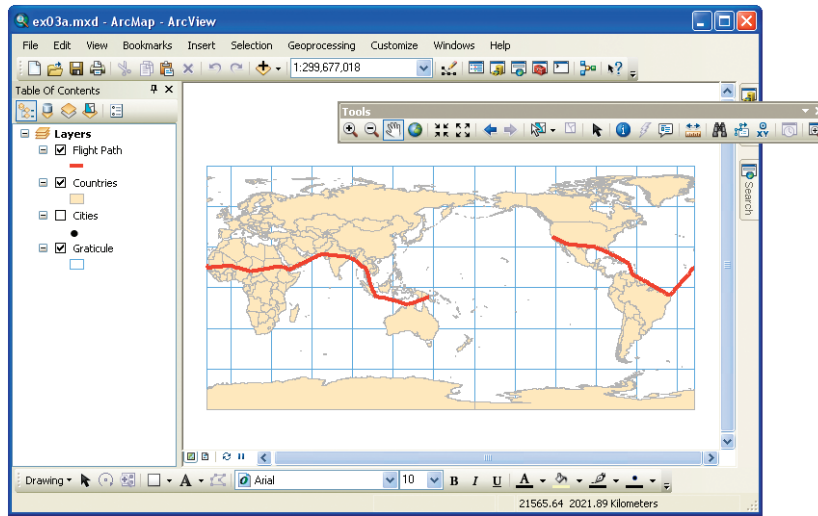


A preview of the map document opens inside the New Document dialog box.



- 4 In the New Document dialog box, click OK.

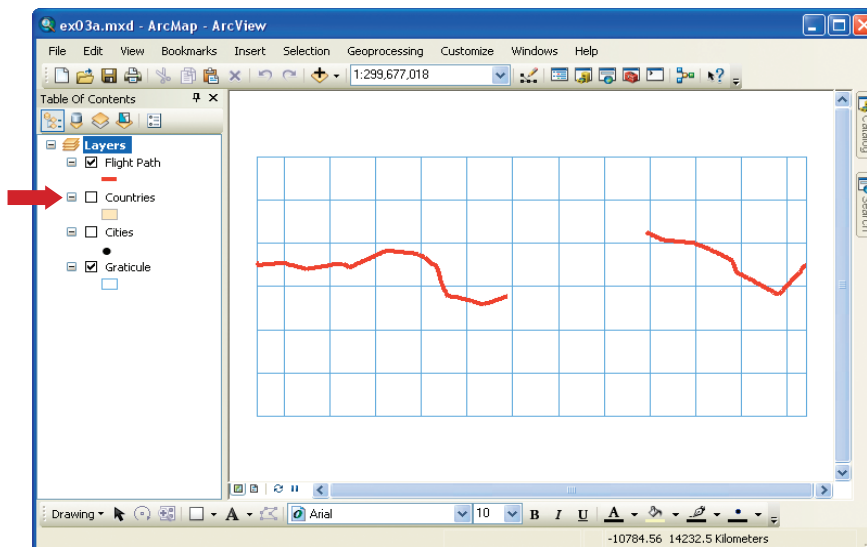
The map document opens. The map looks different from many world maps because it is centered on the South Pacific area where Amelia Earhart vanished, rather than on the prime meridian (which runs through Greenwich, England).



The map shows the countries of the world, Earhart's flight path, and a graticule, which is the technical name for lines of latitude and longitude on a map. Each of these categories of geographic information (countries, flight path, graticule) is called a layer.

The table of contents lists the names of the layers in the map. It shows the color or symbol used to draw each layer and tells you, by a check mark, whether or not the layer is visible. The Flight Path, Countries, and Graticule layers are currently visible. The Cities layer is not.

- 5 In the table of contents, click the check box next to the Countries layer to turn it off.



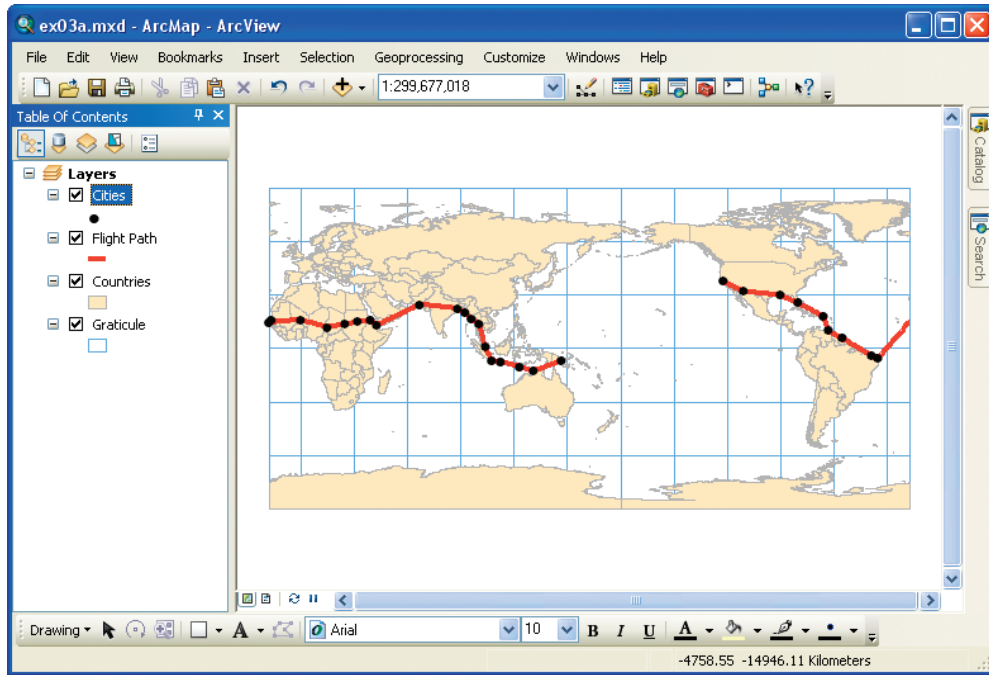
The countries disappear from the map.

- 6 In the table of contents, click the Countries check box to turn it back on. Click the check box next to the Cities layer to turn it on as well.



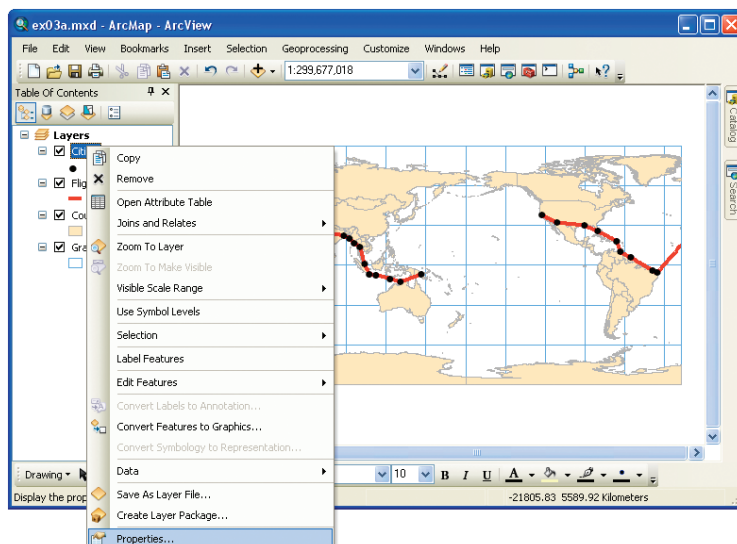
The Cities layer is checked but you still can't see the cities. This is because data is displayed on the map in the order of the layers in the table of contents. The Cities layer is covered by the countries.

- 7 In the table of contents, click the Cities layer name to highlight it. Click and drag the layer to the top of the table of contents, then release the mouse button. As you drag the layer, a horizontal black bar indicates its position.

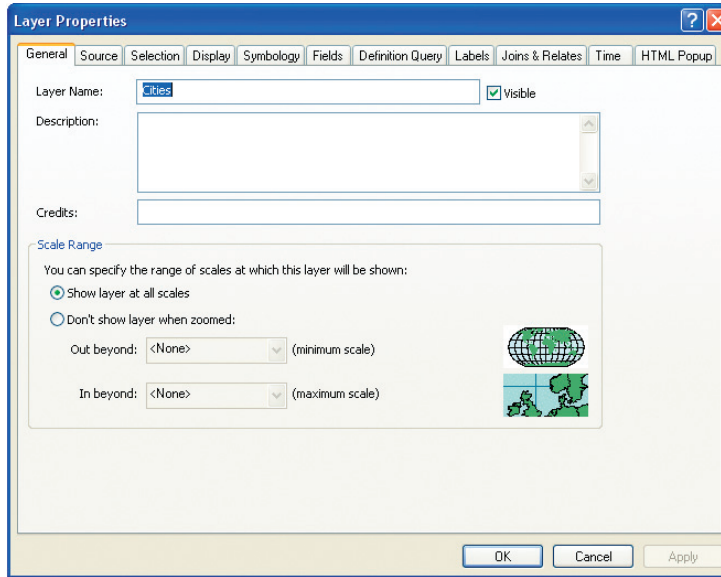


Now you can see the cities on the map. Each of them is a stop on Earhart's route. You'll change the layer name to make this clear.

- 8 In the table of contents, right-click the Cities layer name. A context menu opens. Many ArcMap operations are started from context menus. On the context menu, click Properties to open the Layer Properties dialog box.

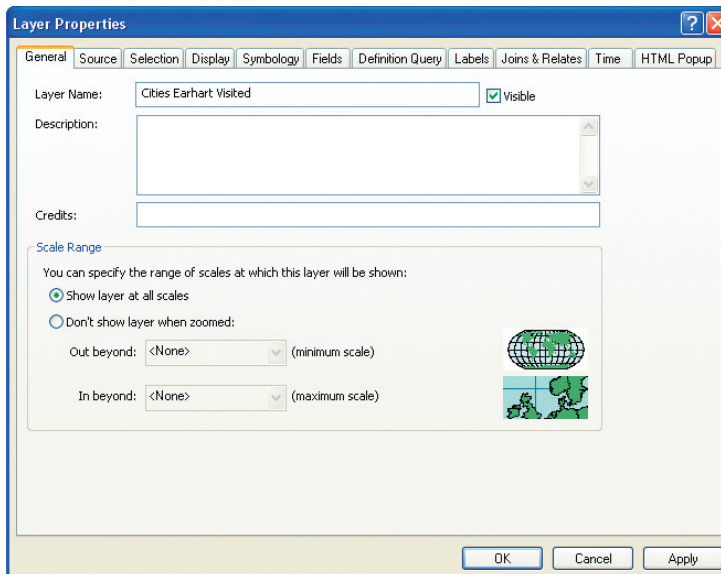


- 9 In the Layer Properties dialog box, click the General tab.

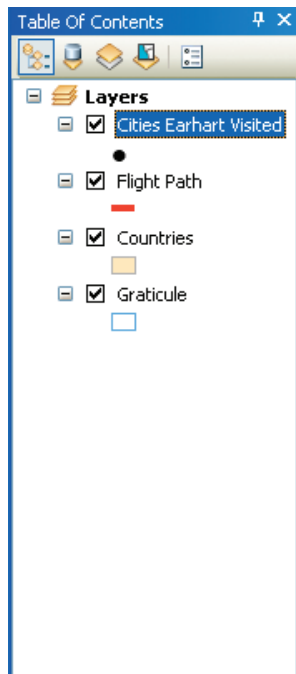


The Layer Properties dialog box has several tabs for setting layer properties, most of which you'll use in this book.

- 10 In the Layer Name text box, the name "Cities" is highlighted. Type **Cities Earhart Visited** in its place. Make sure that your dialog box matches the following graphic, then click OK.

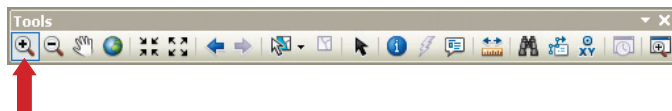


The layer is renamed in the table of contents.

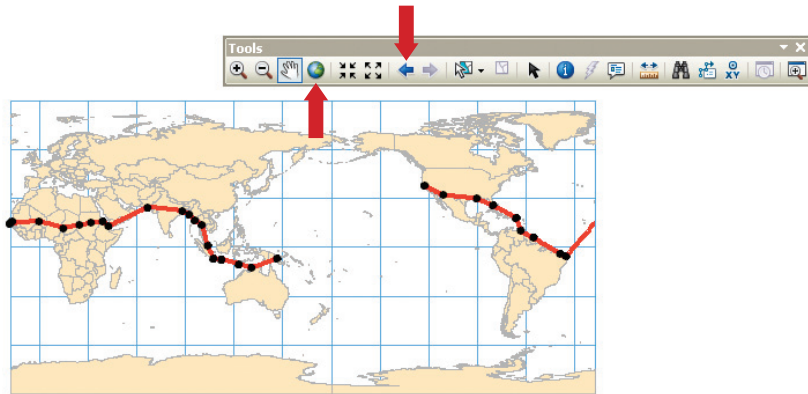


You will now track the progress of Earhart's round-the-world flight, which began on the west coast of the United States. She chose an equatorial route so as to circle the globe at its full circumference and flew east to minimize the effects of storms and headwinds.

- 11 On the Tools toolbar, click the Zoom In tool. (Move the mouse pointer over it to see its name.) Your toolbar may be oriented vertically. You can change its orientation if you like by dragging one of its corners.



- 12 Move the mouse pointer over the map. The cursor changes to a magnifying glass. Drag a box around the United States, approximately as shown in the following graphic. (If you make a mistake, click either the Full Extent or Go Back To Previous Extent buttons and try again.)



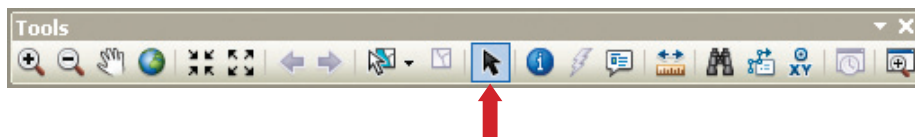
The display zooms in on the United States.



Zooming in or out changes the display scale, which is shown on the Standard toolbar. When the map showed the whole world, the scale was about 1:300,000,000. This means that map features are displayed at one three hundred millionths of their actual size. The scale should now be about 1:50,000,000. (Scale is also affected by the size of the ArcMap application window.)

Although the cities are not labeled, you can find out their names and get other information about them with ArcMap tools.

- 13 On the Tools toolbar, click the Select Elements tool.



- 14 Move the cursor over the westernmost city on the display. The city name displays as a map tip.



Map tips are a layer property. They can be turned on or off on the Display tab of the Layer Properties dialog box. You can see map tips no matter which tool is selected.

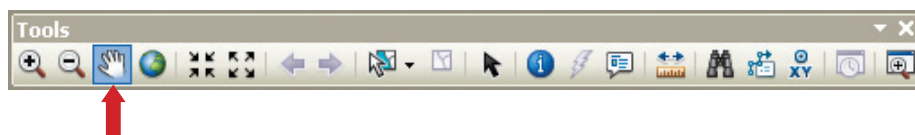
- 15 Move the cursor over the other three cities on the display. They are Tucson, New Orleans, and Miami. You may also be able to see San Juan, Puerto Rico.

To make the names visible at all times, you can label the cities.

- 16 In the table of contents, right-click the Cities Earhart Visited layer and click Label Features.

The name of each city appears next to the map feature. From Miami, Earhart flew southeast to Puerto Rico and then to South America.

- 17 On the Tools toolbar, click the Pan tool.

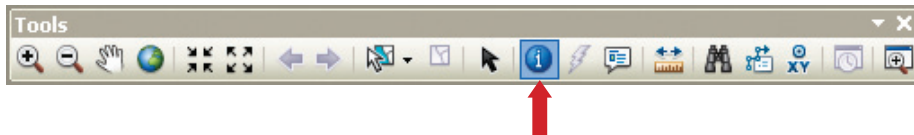


- 18 Move the mouse pointer over the map. The cursor changes to a hand. Click and drag the display up and to the left until Miami is in the upper left corner of the window. Release the mouse button.

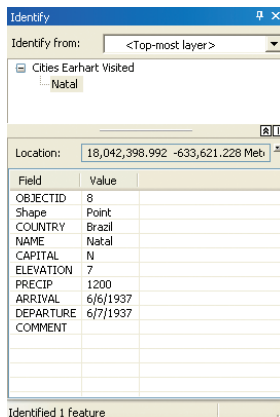


You can get information about any of the cities Earhart visited with the Identify tool.

- 19 On the Tools toolbar, click the Identify tool. When you click the tool, the Identify window opens. If it covers most of the map display, move it out of the way.

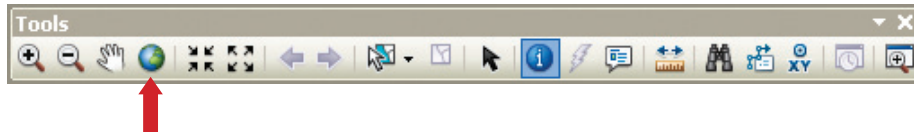


- 20 On the map, click the city of Natal. You must click exactly on the city or you will identify something else, such as a segment of the flight path or the country of Brazil. If this happens, try again.



The Identify window shows you the country and city name, and various facts about Natal, such as its elevation (meters), its average annual precipitation (millimeters), and the dates Earhart and Noonan arrived and departed.

- 21 Close the Identify window. On the Tools toolbar, click the Full Extent button.



The map zooms to its original extent.



In the next exercise, you will follow the rest of Earhart's journey to the point where she and Noonan disappeared.

- 22 If you want to save your work, click the File menu and click Save As. Navigate to `\GTKArcGIS\Chapter03\MyData`. Rename the file `my_ex03a.mxd` and click Save.

Saving your work is optional. When you begin a new exercise, however, it is important that you open the new map document specified in the instructions. The exercises are not always perfectly continuous, and if you work in the same map document throughout a chapter you may get results that don't match those in the book.

- 23 If you are continuing with the next exercise, leave ArcMap open. Otherwise, click the File menu and click Exit. Click No if prompted to save your changes.

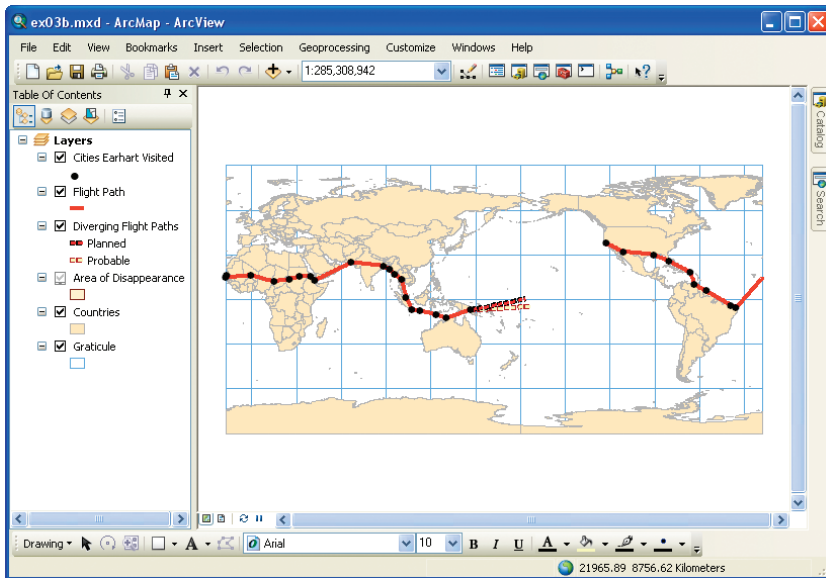
Navigating a map

In this exercise, you'll continue to work with ArcMap navigational tools. You will also learn how to create spatial bookmarks, which save a specific view of a map.

Exercise 3b

Earhart and Noonan crossed the Atlantic at night. When they saw the west coast of Africa, they realized they were north of their intended destination—the city of Dakar in Senegal. They landed at the first airstrip they saw, in the Senegalese city of Saint Louis, and from there made the short flight to Dakar. They proceeded to fly across Africa and Asia, making their last stop in Lae, Papua New Guinea. They intended to go on to tiny Howland Island in the South Pacific, then to Hawaii and back to California.

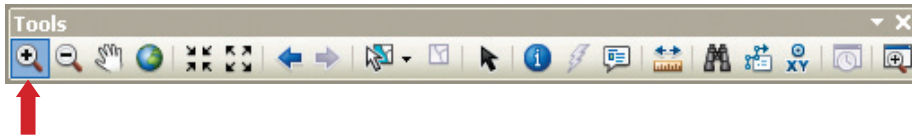
- 1 Start ArcMap. In the ArcMap—Getting Started dialog box, under the Existing Maps section, click Browse for more. (If ArcMap is already running, click the File menu and click Open.) Navigate to **C:\ESRI\Press\GTKArcGIS\Chapter03**. Click **ex03b.mxd** and click Open.



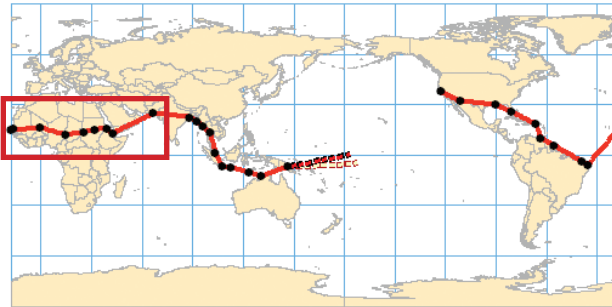
The map resembles the one in the previous exercise but has two additional layers. The Diverging Flight Paths layer contains two line features. One represents the course Earhart and Noonan planned to take. The other represents the course the foundation believes they actually followed.

The Area of Disappearance layer is shown in the table of contents with a grayed-out check mark (and a tiny scale bar under the check box). This means that the layer's visibility depends on the map's display scale. This layer includes hundreds of Pacific islands too small to be represented on a general world map. When you zoom in to look at the end of Earhart's flight, this layer will become visible.

- 2 On the Tools toolbar, click the Zoom In tool.



- 3 On the map, drag a rectangle that includes the northern half of Africa and reaches to India, as shown in the following graphic.

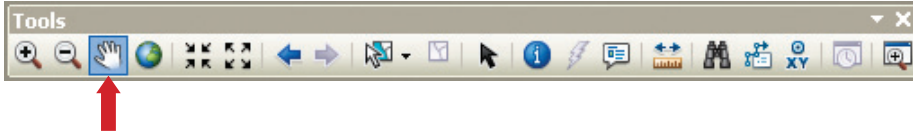


The display zooms in on the African stretch of the route. If your display doesn't show the west coast of Africa, use the Pan tool to adjust it.



At this scale, the city labels appear. The display of labels, like that of map features, can be made scale-dependent in the Layer Properties dialog box. In this map, labels appear only when the scale is larger than 1:100,000,000. (The larger the scale, the nearer features are to their actual size.)

- 4 On the Tools toolbar, click the Pan tool.



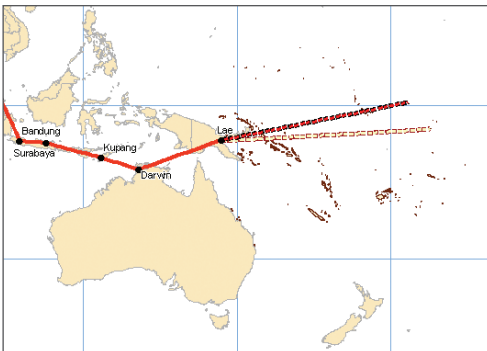
- 5 Drag the display to the left to follow the flight path.

From Assab (in what is now Eritrea) on the east coast of Africa, Earhart flew to Karachi (now in Pakistan). She then headed south, flying over Southeast Asia to Indonesia.



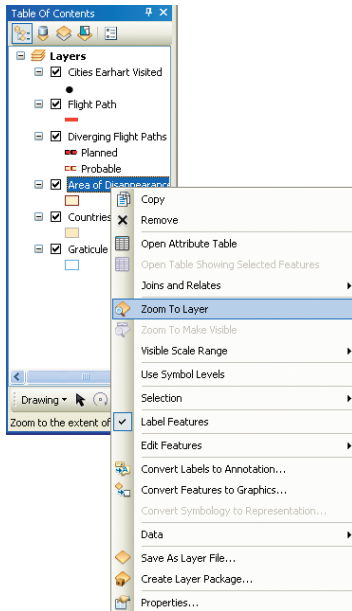
- 6 Continue panning along the route.

From Darwin, Australia, Earhart flew to her last known stop in Lae, Papua New Guinea. At this point, the path the foundation believes she followed diverges from the planned flight path.

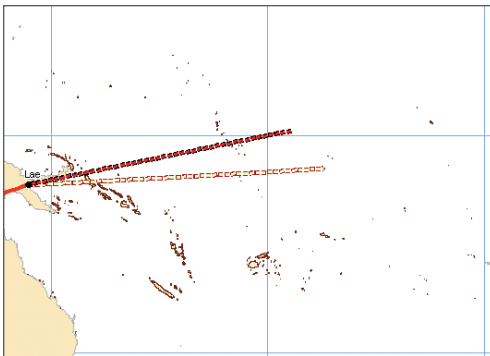


In the table of contents, the check mark by the Area of Disappearance layer is no longer grayed-out. (The layer displays at scales larger than 1:100,000,000.) The features in this layer are small islands. Until you zoom in very close, you see mostly outlines.

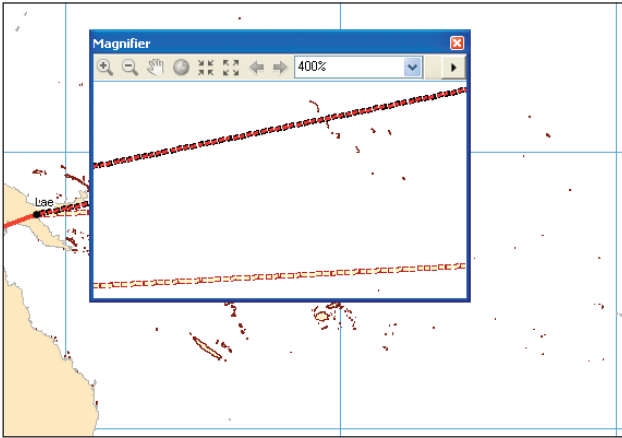
- 7 In the table of contents, right-click the Area of Disappearance layer and click Zoom To Layer.



You can see a number of tiny islands in the display, but it looks as if both flight paths stop in the middle of the ocean.

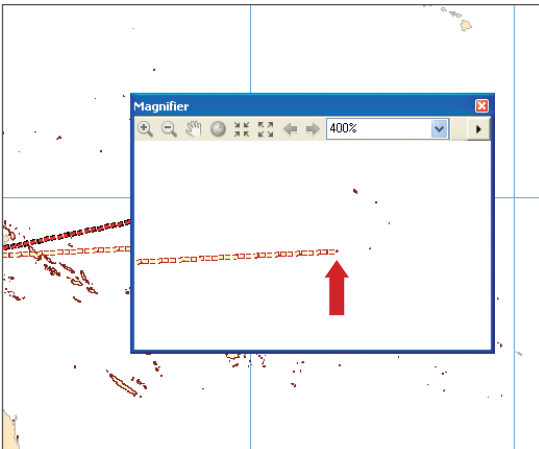


- 8 Click the Window menu and click Magnifier. A magnification window opens on top of the display. (Yours may open in a slightly different position from the one in the graphic.)



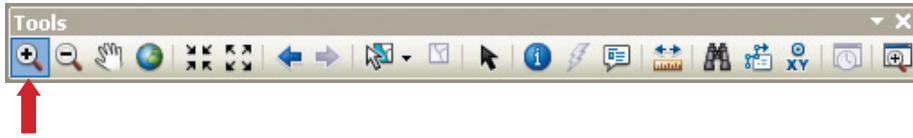
When you move the Magnifier window over the map, the area seen through the window is magnified four times (or 400 percent).

- 9 Click and drag the blue title bar at the top of the Magnifier window to move it to the right. As you drag it, it displays a crosshair to show you the point on which it's centered. Place the crosshair on the end of the probable flight path and release the mouse.

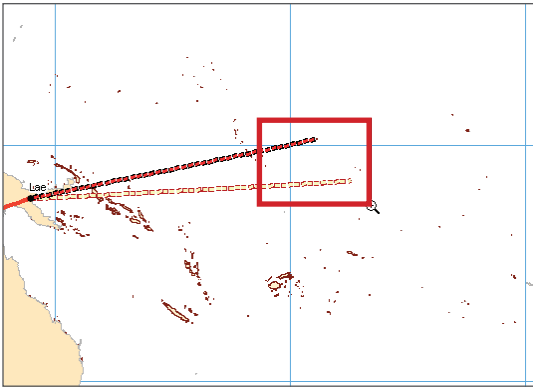


If your eyes are good, you can discern the tiny island of Nikumaroro at the end of the probable flight path. If not, you will soon get a better look.

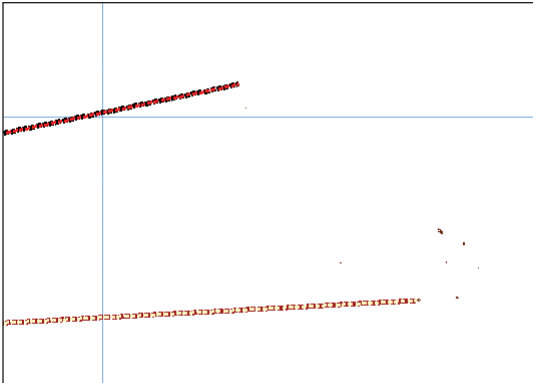
- 10 Close the Magnifier window. On the Tools toolbar, click the Zoom In tool.



- 11 On the map, drag a rectangle that includes the ends of both the planned and probable flight paths.

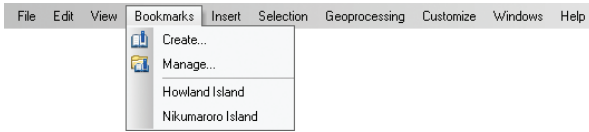


The display zooms in.

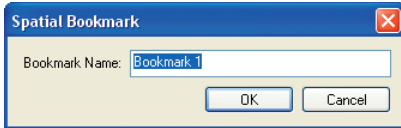


Even at this scale, it's hard to see land. Earhart and Noonan disappeared somewhere in this watery expanse. You will set a bookmark to save this map extent. You'll return to it later to measure the distance from Howland Island to Nikumaroro—the distance, if the foundation is right, by which the aviators were off course.

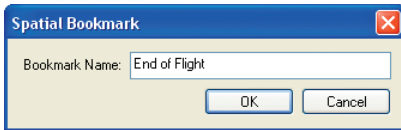
- 12 Click the Bookmarks menu and click Create.



The Spatial Bookmark dialog box opens.

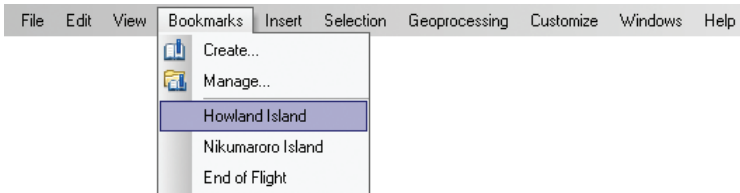


- 13 Replace the existing text with **End of Flight**, as shown in the following graphic, then click OK.

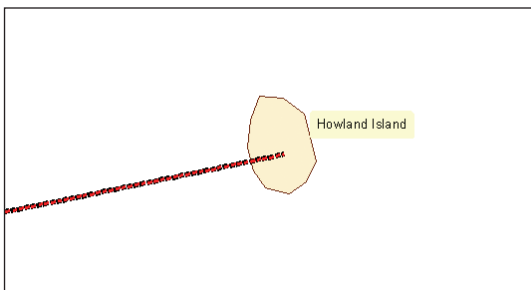


Now you'll zoom in for a close look at the islands at the ends of the two flight paths. You'll use bookmarks that have already been created.

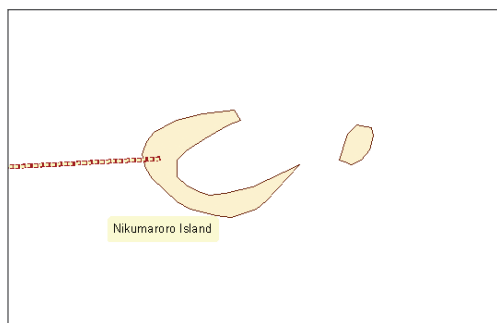
- 14 Click the Bookmarks menu and click Howland Island.



The display zooms in on Howland Island at the end of the planned flight path. Earhart intended to refuel here before going on to Hawaii.



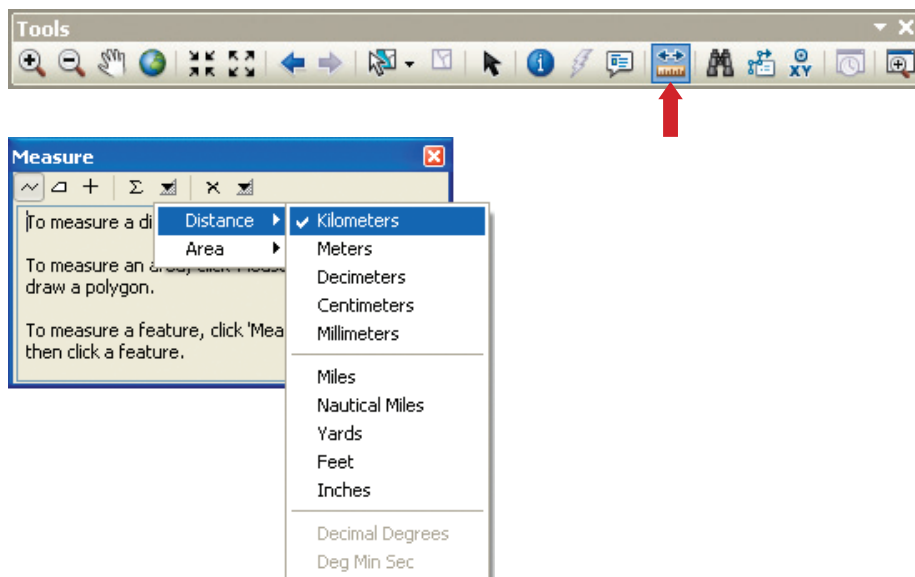
- 15 Click the Bookmarks menu and click Nikumaroro Island. The display zooms in on Nikumaroro Island.



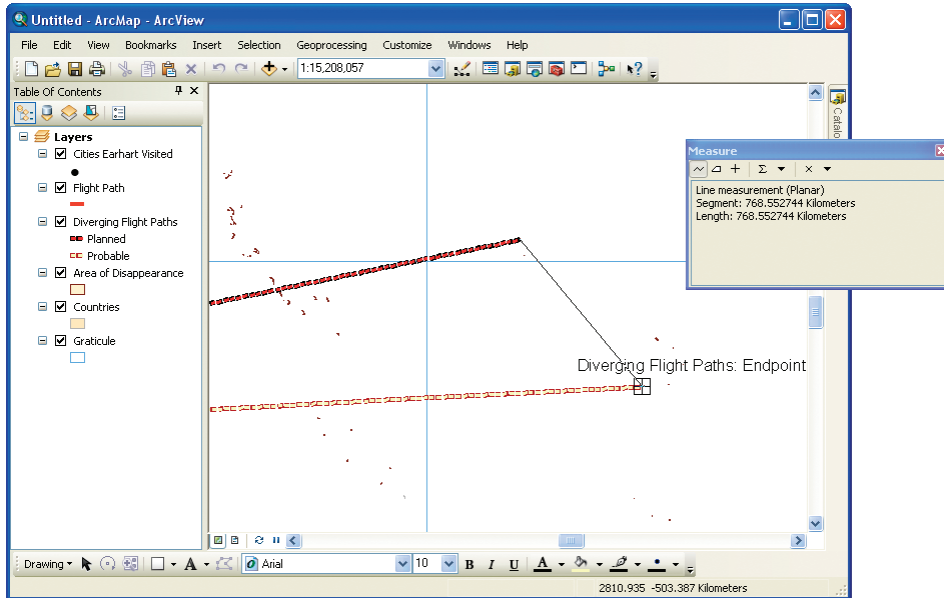
Clothing and empty food tins found on the west bank of the island suggest that Earhart and Noonan may have crashed nearby. In addition, Earhart said, in her last message to the U.S. Coast Guard cutter Ithaca, “We are in line of position 158 degrees –337 degrees...” The line she mentioned is a sun line, used in celestial navigation, that runs directly through both Howland Island and Nikumaroro.

If, indeed, Earhart crashed on or near Nikumaroro, she and Noonan were far off course.

- 16 Click the Bookmarks menu and click End of Flight. The display zooms to the extent you bookmarked.
- 17 On the Tools toolbar, click the Measure tool. The Measure window opens. Click the Choose Units drop-down arrow, point to Distance, and click Kilometers.



- 18 Move the mouse pointer over the display. The cursor is a ruler with a small crosshair. Place the crosshair at the end of the planned flight path and click to begin a line. Move the cursor to the end of the probable flight path and double-click to end the line.



The length of the line is displayed in the Measure window. If the probable path is the actual one, Earhart and Noonan were off course by about 770 kilometers. Poor maps, cloud cover, the scarcity of landmarks, and the sheer length of the planned flight from Lae all may have contributed.

- 19 If you want to save your work, click the File menu and click Save As. Navigate to `\GTKArcGIS\Chapter03\MyData`. Rename the file `my_ex03b.mxd` and click Save.
- 20 If you are continuing with the next exercise, leave ArcMap open. Otherwise, click the File menu and click Exit. Click No if prompted to save your changes.

Looking at feature attributes

In a GIS, a feature on a map may be associated with a great deal of information—more than can be displayed at any given time. This information is stored in an attribute table. A layer's attribute table contains a row (or record) for every feature in the layer and a column (or field) for every attribute or category of information.

When you clicked the city of Natal to identify it at the end of exercise 3a, the information you saw in the Identify window was the information stored in the layer attribute table.

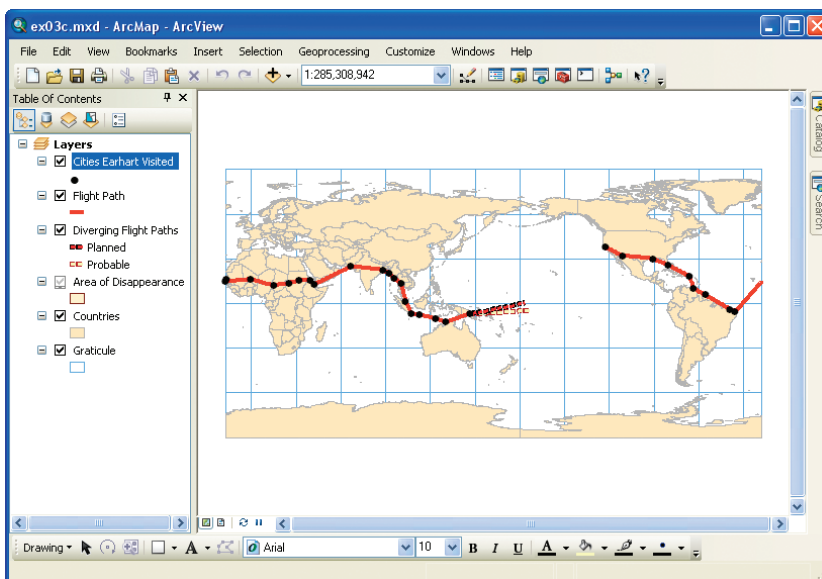
In this exercise, you will look at the attribute tables for two map layers. You will learn how to change a table's appearance and how to get statistical information from it.

Exercise 3c

The long transatlantic flight from Brazil to Senegal put Earhart north of her intended destination. The flight from Lae to Howland Island would have been even longer. You will look at the lengths of the various stages of the flight.

- 1 Start ArcMap. In the ArcMap—Getting Started dialog box, under the Existing Maps section, click Browse for more. (If ArcMap is already running, click the File menu and click Open.) Navigate to **C:\ESRI\Press\GTKArcGIS\Chapter03**. Click **ex03c.mxd** and click Open.

You see the familiar map of the world and of Earhart's flight.



Now you will open the attribute table for the Cities Earhart Visited layer.

- 2 In the table of contents, right-click the Cities Earhart Visited layer and click Open Attribute Table.

OBJECTID	Shape *	COUNTRY	NAME	CAPITAL	ELEVATION	PRECIP	ARRIVAL	DEPART	COMMENTS
1	Point	USA	Tucson	N	1045	300	5/21/1937	5/21/1937	
2	Point	USA	New Orleans	N	0	1700	5/22/1937	5/22/1937	
3	Point	USA	Miami	N	24	1700	5/23/1937	5/23/1937	
4	Point	Puerto Rico	San Juan	Y	36	1700	6/1/1937	6/1/1937	
5	Point	Venezuela	Caripito	N	126	1700	6/2/1937	6/2/1937	
6	Point	Suriname	Paramaribo	Y	11	2400	6/3/1937	6/3/1937	
7	Point	Brazil	Fortaleza	N	15	1200	6/4/1937	6/4/1937	
8	Point	Brazil	Natal	N	7	1200	6/6/1937	6/6/1937	
9	Point	Senegal	Saint Louis	N	21	500	6/8/1937	6/8/1937	
10	Point	Senegal	Dakar	Y	25	800	6/8/1937	6/8/1937	
11	Point	Mali	Gao	N	240	300	6/9/1937	6/9/1937	

- 3 Scroll down through the table. There are twenty-eight records, one for each city. Scroll across the table to look at the attributes.

There are ten attributes, or fields. The OBJECTID field contains a unique identification number for every record. The Shape field describes the feature geometry. Among the other attributes are the name of each city, the dates Earhart arrived and departed, and comments on any unusual activity.

The intersection of a record and a field is a cell. A cell contains an attribute value. For example, the attribute value of the NAME field for the first record is “Tucson.”

You’ll adjust the display width of the fields so you can see more attributes.

- 4 Scroll back all the way to the left. Place the mouse pointer on the vertical black bar between the NAME and CAPITAL fields. The cursor changes to a two-headed arrow.

OBJECTID	Shape *	COUNTRY	NAME	CAPITAL	ELEVATION	PRECIP	ARRIVAL	DEPART	COMMENTS
1	Point	USA	Tucson	N	1045	300	5/21/1937	5/21/1937	
2	Point	USA	New Orleans	N	0	1700	5/22/1937	5/22/1937	
3	Point	USA	Miami	N	24	1700	5/23/1937	5/23/1937	
4	Point	Puerto Rico	San Juan	Y	36	1700	6/1/1937	6/1/1937	
5	Point	Venezuela	Caripito	N	126	1700	6/2/1937	6/2/1937	
6	Point	Suriname	Paramaribo	Y	11	2400	6/3/1937	6/3/1937	
7	Point	Brazil	Fortaleza	N	15	1200	6/4/1937	6/4/1937	
8	Point	Brazil	Natal	N	7	1200	6/6/1937	6/6/1937	
9	Point	Senegal	Saint Louis	N	21	500	6/8/1937	6/8/1937	
10	Point	Senegal	Dakar	Y	25	800	6/8/1937	6/8/1937	
11	Point	Mali	Gao	N	240	300	6/9/1937	6/9/1937	

- 5 Drag the cursor to the left. As you drag, the original field width is marked by a vertical red line and the new width by a vertical black line. Release the mouse button somewhere before you start cutting off city names.

OBJECTID	Shape	COUNTRY	NAME	CAPITAL	ELEVATION	PRECIP	ARRIVAL	DEPARTURE	COMMENT
1	Point	USA	Tucson	N	1045	300	5/21/1937	5/21/1937	
2	Point	USA	New Orleans	N	0	1700	5/22/1937	5/23/1937	
3	Point	USA	Miami	N	24	1700	5/23/1937	6/1/1937	
4	Point	Puerto Rico	San Juan	Y	36	1700	6/1/1937	6/2/1937	
5	Point	Venezuela	Caripito	N	126	1700	6/2/1937	6/3/1937	
6	Point	Suriname	Paramaribo	Y	11	2400	6/3/1937	6/4/1937	
7	Point	Brazil	Fortaleza	N	15	1200	6/4/1937	6/6/1937	
8	Point	Brazil	Natal	N	7	1200	6/6/1937	6/7/1937	
9	Point	Senegal	Saint Louis	N	21	500	6/8/1937	6/8/1937	
10	Point	Senegal	Dakar	Y	25	800	6/8/1937	6/9/1937	
11	Point	Mali	Gao	N	240	300	6/9/1937	6/10/1937	

The last letter of the DEPARTURE field name is cut off. You'll widen this field.

- 6 Scroll to the right side of the table. Place the mouse pointer on the vertical black bar between the DEPARTURE and COMMENT fields. Drag the cursor slightly to the right to see the entire field name.

CAPITAL	ELEVATION	PRECIP	ARRIVAL	DEPARTURE	COMMENT
N	1045	300	5/21/1937	5/22/1937	
N	0	1700	5/22/1937	5/23/1937	
N	24	1700	5/23/1937	6/1/1937	
Y	36	1700	6/1/1937	6/2/1937	Mechanical/Prep work
N	126	1700	6/2/1937	6/3/1937	
Y	11	2400	6/3/1937	6/4/1937	
N	15	1200	6/4/1937	6/6/1937	Mechanical work/tuneup
N	7	1200	6/6/1937	6/7/1937	
N	21	500	6/8/1937	6/8/1937	Unintended destination - navigational error
Y	25	800	6/8/1937	6/9/1937	
N	240	300	6/9/1937	6/10/1937	

The elevation and precipitation (ELEVATION and PRECIP) fields could contribute to a study of the weather Earhart faced. The CAPITAL field is probably not useful for any analysis connected with the flight. You will hide this field.

- 7 Place the mouse pointer on the vertical black bar between the CAPITAL and ELEVATION fields. Click and drag the cursor to the right edge of the NAME field and release the mouse button. The CAPITAL field is hidden.

OBJECTID	Shape *	COUNTRY	NAME	ELEVATION	PRECIP	ARRIVAL	DEPARTURE
1	Point	USA	Tucson	1045	300	5/21/1937	5/22/1937
2	Point	USA	New Orleans	0	1700	5/22/1937	5/23/1937
3	Point	USA	Miami	24	1700	5/23/1937	6/1/1937
4	Point	Puerto Rico	San Juan	36	1700	6/1/1937	6/2/1937
5	Point	Venezuela	Caripito	126	1700	6/2/1937	6/3/1937
6	Point	Suriname	Paramaribo	11	2400	6/3/1937	6/4/1937
7	Point	Brazil	Fortaleza	15	1200	6/4/1937	6/6/1937
8	Point	Brazil	Natal	7	1200	6/6/1937	6/7/1937
9	Point	Senegal	Saint Louis	21	500	6/8/1937	6/8/1937
10	Point	Senegal	Dakar	25	800	6/8/1937	6/9/1937
11	Point	Mali	Gao	240	300	6/9/1937	6/10/1937

If you wanted to restore the hidden field, you would double-click the border between the NAME and ELEVATION field names.

You can rearrange the order of fields as well. It would be more natural to have the city name appear before the country name.

- 8 Scroll to the left. Click the column heading of the NAME field. The field is highlighted.

OBJECTID	Shape *	COUNTRY	NAME	ELEVATION	PRECIP	ARRIVAL	DEPARTURE
1	Point	USA	Tucson	1045	300	5/21/1937	5/22/1937
2	Point	USA	New Orleans	0	1700	5/22/1937	5/23/1937
3	Point	USA	Miami	24	1700	5/23/1937	6/1/1937
4	Point	Puerto Rico	San Juan	36	1700	6/1/1937	6/2/1937
5	Point	Venezuela	Caripito	126	1700	6/2/1937	6/3/1937
6	Point	Suriname	Paramaribo	11	2400	6/3/1937	6/4/1937
7	Point	Brazil	Fortaleza	15	1200	6/4/1937	6/6/1937
8	Point	Brazil	Natal	7	1200	6/6/1937	6/7/1937
9	Point	Senegal	Saint Louis	21	500	6/8/1937	6/8/1937
10	Point	Senegal	Dakar	25	800	6/8/1937	6/9/1937
11	Point	Mali	Gao	240	300	6/9/1937	6/10/1937

- 9 Drag the column heading to the left. The cursor becomes a pointer with a small rectangle, showing that a field is being moved. When the vertical red line is between the Shape and COUNTRY fields, as shown in the following graphic, release the mouse button.

OBJECTID	Shape *	COUNTRY	NAME	ELEVATION	PRECIP	ARRIVAL	DEPARTURE
1	Point	USA	Tucson	1045	300	5/21/1937	5/22/1937
2	Point	USA	New Orleans	0	1700	5/22/1937	5/23/1937
3	Point	USA	Miami	24	1700	5/23/1937	6/1/1937
4	Point	Puerto Rico	San Juan	36	1700	6/1/1937	6/2/1937
5	Point	Venezuela	Caripito	126	1700	6/2/1937	6/3/1937
6	Point	Suriname	Paramaribo	11	2400	6/3/1937	6/4/1937
7	Point	Brazil	Fortaleza	15	1200	6/4/1937	6/6/1937
8	Point	Brazil	Natal	7	1200	6/6/1937	6/7/1937
9	Point	Senegal	Saint Louis	21	500	6/8/1937	6/8/1937
10	Point	Senegal	Dakar	25	800	6/8/1937	6/9/1937
11	Point	Mali	Gao	240	300	6/9/1937	6/10/1937

The field names are rearranged.

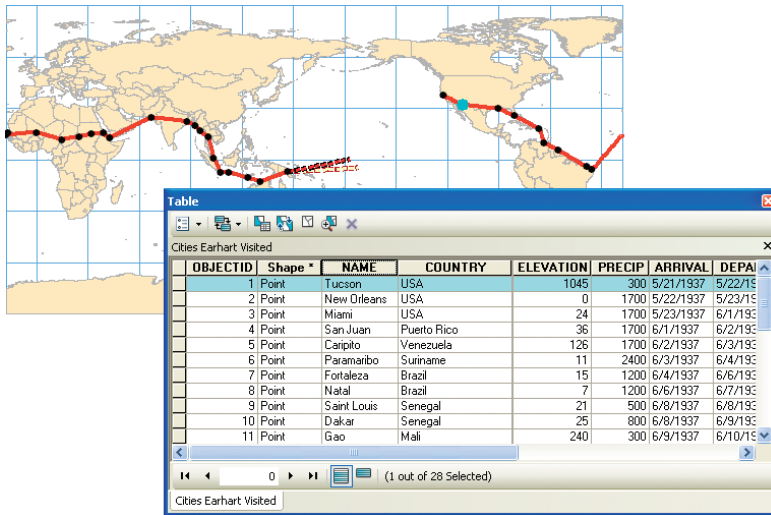
OBJECTID	Shape *	NAME	COUNTRY	ELEVATION	PRECIP	ARRIVAL	DEPARTURE
1	Point	Tucson	USA	1045	300	5/21/1937	5/22/1937
2	Point	New Orleans	USA	0	1700	5/22/1937	5/23/1937
3	Point	Miami	USA	24	1700	5/23/1937	6/1/1937
4	Point	San Juan	Puerto Rico	36	1700	6/1/1937	6/2/1937
5	Point	Caripito	Venezuela	126	1700	6/2/1937	6/3/1937
6	Point	Paramaribo	Suriname	11	2400	6/3/1937	6/4/1937
7	Point	Fortaleza	Brazil	15	1200	6/4/1937	6/6/1937
8	Point	Natal	Brazil	7	1200	6/6/1937	6/7/1937
9	Point	Saint Louis	Senegal	21	500	6/8/1937	6/8/1937
10	Point	Dakar	Senegal	25	800	6/8/1937	6/9/1937
11	Point	Gao	Mali	240	300	6/9/1937	6/10/1937

Records, as well as fields, can be highlighted. When a record is highlighted in a table, its corresponding feature is highlighted on the map. A highlighted record or feature is said to be selected.

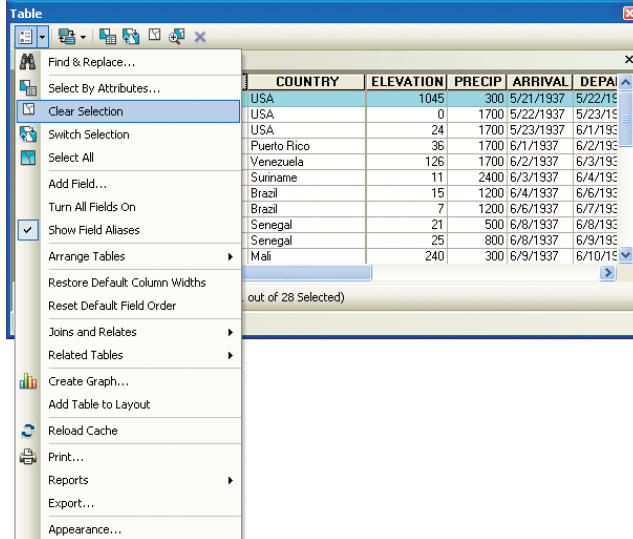
- Click the gray tab at the left edge of the first record in the table. The record is selected.

OBJECTID	Shape *	NAME	COUNTRY	ELEVATION	PRECIP	ARRIVAL	DEPARTURE	COMMENT
1	Point	Tucson	USA	1045	300	5/21/1937	5/22/1937	
2	Point	New Orleans	USA	0	1700	5/22/1937	5/23/1937	
3	Point	Miami	USA	24	1700	5/23/1937	6/1/1937	Mechanical/Prep work
4	Point	San Juan	Puerto Rico	36	1700	6/1/1937	6/2/1937	
5	Point	Caripito	Venezuela	126	1700	6/2/1937	6/3/1937	
6	Point	Paramaribo	Suriname	11	2400	6/3/1937	6/4/1937	
7	Point	Fortaleza	Brazil	15	1200	6/4/1937	6/6/1937	Mechanical work/tuneup
8	Point	Natal	Brazil	7	1200	6/6/1937	6/7/1937	
9	Point	Saint Louis	Senegal	21	500	6/8/1937	6/8/1937	Unintended destination - navigational
10	Point	Dakar	Senegal	25	800	6/8/1937	6/9/1937	
11	Point	Gao	Mali	240	300	6/9/1937	6/10/1937	

- 11 Move the attribute table away from the map display. Tucson is highlighted on the map. (The attribute table can be docked; however, for this exercise, do not dock it.)

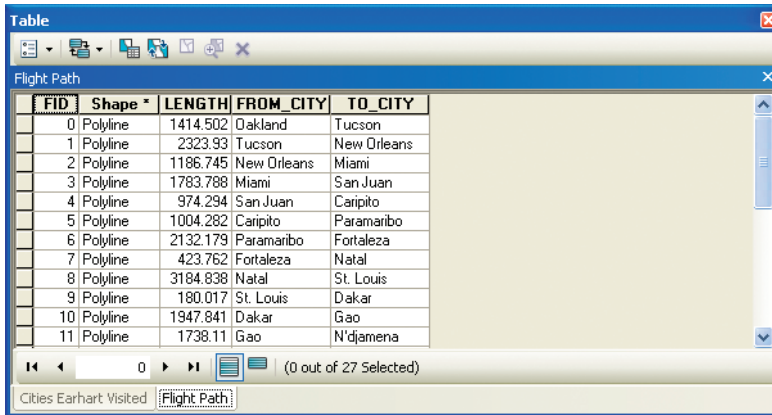


- 12 At the top of the attribute table, click the Table Options menu and click Clear Selection.



The record is unselected in the table, and the feature is unselected on the map.

- 13 In the table of contents, right-click the Flight Path layer and click Open Attribute Table.



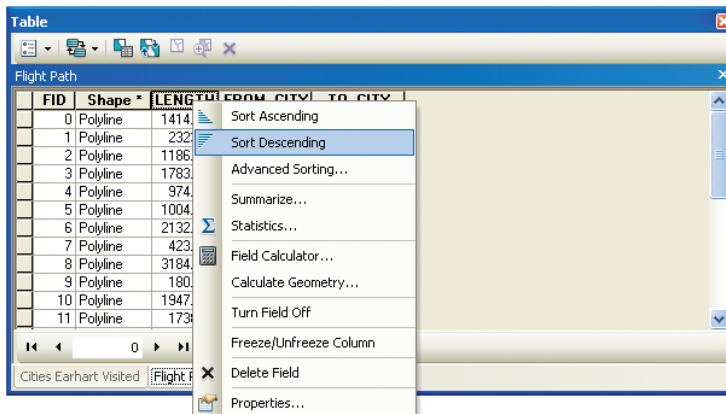
FID	Shape	LENGTH	FROM_CITY	TO_CITY
0	Polyline	1414.502	Oakland	Tucson
1	Polyline	2323.93	Tucson	New Orleans
2	Polyline	1186.745	New Orleans	Miami
3	Polyline	1783.788	Miami	San Juan
4	Polyline	974.294	San Juan	Caripito
5	Polyline	1004.282	Caripito	Paramaribo
6	Polyline	2132.179	Paramaribo	Fortaleza
7	Polyline	423.762	Fortaleza	Natal
8	Polyline	3184.838	Natal	St. Louis
9	Polyline	180.017	St. Louis	Dakar
10	Polyline	1947.841	Dakar	Gao
11	Polyline	1738.11	Gao	N'djamena

The attribute table opens. Notice the tabs at the bottom of the Table window. These tabs allow you to quickly switch between different attribute tables.

The Flight Path table contains a record for each stage of Earhart's flight. The attributes include the starting city (FROM_CITY), the destination city (TO_CITY), and the flight length (LENGTH) in kilometers.

The flight from Lae to Howland Island would have been 4,120 kilometers. The cumulative effect of small navigation errors over this distance might plausibly account for Earhart and Noonan's going well off course. You'll sort the LENGTH field to compare the distances of the flight segments they completed.

- 14 Right-click the LENGTH field name and click Sort Descending.



FID	Shape	LENGTH	FROM_CITY	TO_CITY
0	Polyline	1414.502	Oakland	Tucson
1	Polyline	2323.93	Tucson	New Orleans
2	Polyline	1186.745	New Orleans	Miami
3	Polyline	1783.788	Miami	San Juan
4	Polyline	974.294	San Juan	Caripito
5	Polyline	1004.282	Caripito	Paramaribo
6	Polyline	2132.179	Paramaribo	Fortaleza
7	Polyline	423.762	Fortaleza	Natal
8	Polyline	3184.838	Natal	St. Louis
9	Polyline	180.017	St. Louis	Dakar
10	Polyline	1947.841	Dakar	Gao
11	Polyline	1738.11	Gao	N'djamena

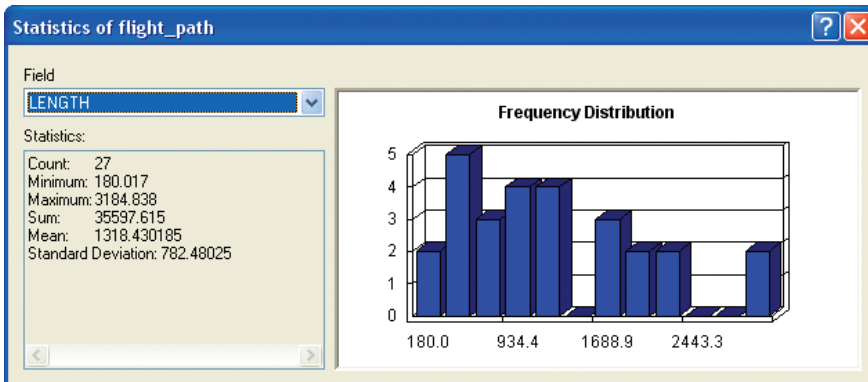
The records are ordered by length of flight segment from longest to shortest.

FID	Shape	LENGTH	FROM_CITY	TO_CITY
8	Polyline	3184.838	Natal	St. Louis
16	Polyline	3009.786	Assab	Karachi
17	Polyline	2390.498	Karachi	Calcutta
1	Polyline	2323.93	Tucson	New Orleans
6	Polyline	2132.179	Paramaribo	Fortaleza
10	Polyline	1947.841	Dakar	Gao
26	Polyline	1908.391	Darwin	Lae
3	Polyline	1783.788	Miami	San Juan
11	Polyline	1738.11	Gao	N'djamena
21	Polyline	1431.381	Bangkok	Singapore
0	Polyline	1414.502	Oakland	Tucson
24	Polyline	1248.818	Surabaya	Kupang

The longest completed leg of the flight, 3,184 kilometers, was over water from Natal, Brazil, to Saint Louis, Senegal. This was also a flight that had significant navigational error. (The aviators were about 175 kilometers off course from their intended destination, Dakar.)

Sorting a field is useful for seeing high and low values, but ArcMap can give you more detailed information.

- 15 Right-click the LENGTH field and click Statistics. The Statistics of flight_path window opens.



The Statistics box displays the number of records in the table (27) and the minimum, maximum, sum, mean, and standard deviation values. The average flight length, for example, was 1,318 kilometers.

The Frequency Distribution chart represents the distribution of values graphically. You can see that most of the flights were less than 1,500 kilometers and that only two were more than 2,500 kilometers. (The last bar in the chart reaches the 2 mark.)

- 16 Close the Statistics window. Close the Attributes of Flight Path table.

In the next chapter, you will see how the data for the Earhart project is managed in ArcCatalog.

- 17 If you want to save your work, click the File menu and click Save As. Navigate to `\GTKArcGIS\Chapter03\MyData`. Rename the file `my_ex03c.mxd` and click Save.
- 18 Click the File menu and click Exit. Click No if prompted to save your changes.