



# Introduction to Cartography Part I

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Cartographers get embarrassed about big  
empty spaces.

Terry Pratchett



# Introduction to Cartography

- Maps vs. Globes
- General Types of Maps
- Standard Map Features



# Maps versus Globes

- ❑ **Map:** a representation of the world, or part of it, in two dimensions
- ❑ **Globe:** a 3-D representation of the entire earth's surface

What are some advantages and disadvantages of each?



# General Types of Maps

## General Purpose and Topographic

Depict the form and relief of the surface and/or general features such as roads, buildings, political boundaries.

## Thematic

These maps represent the spatial dimensions of and focus on a particular phenomenon (theme) such as climate, vegetation, economy, population, language, etc.



# General Purpose Maps



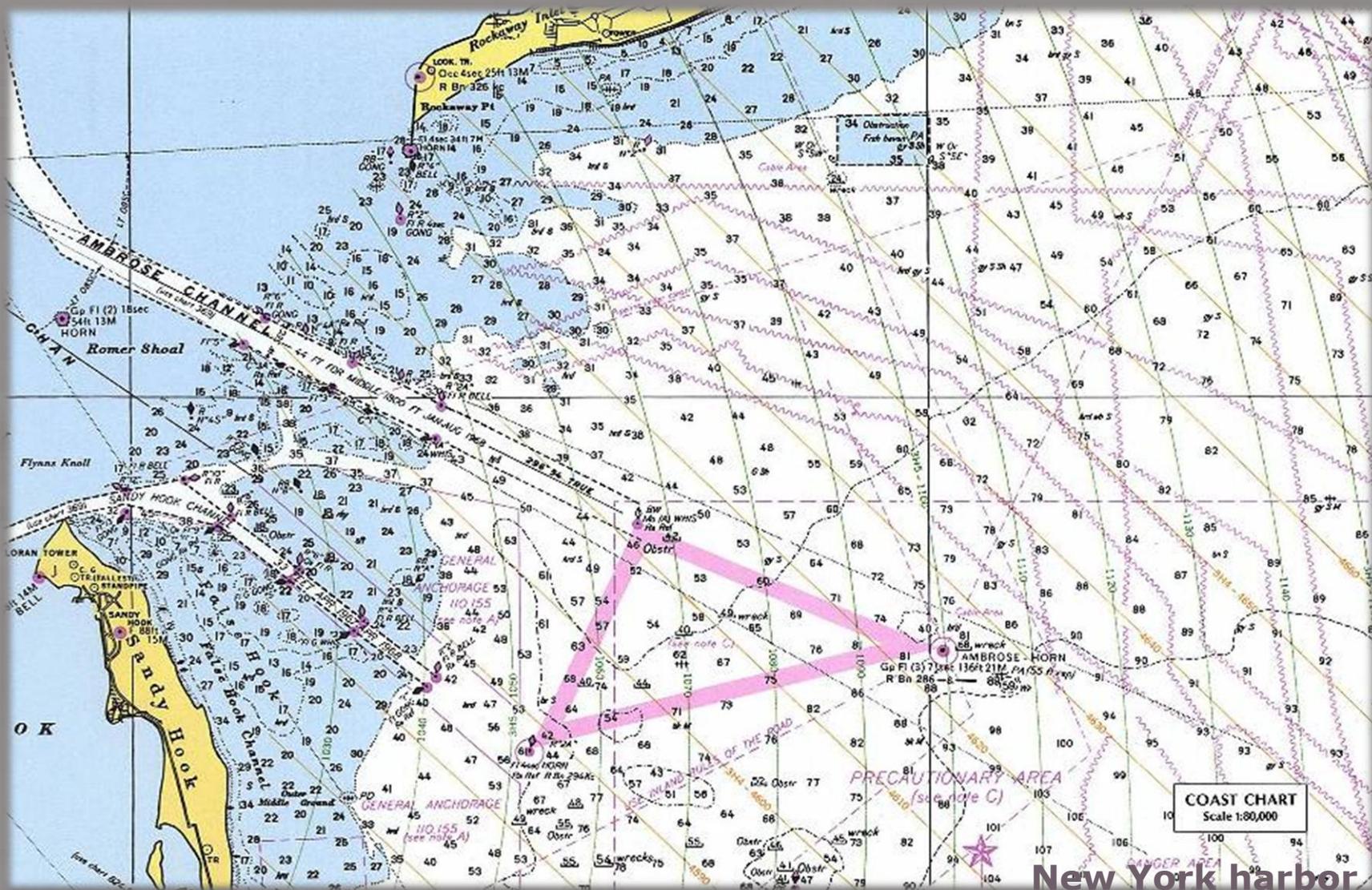


# Road Maps





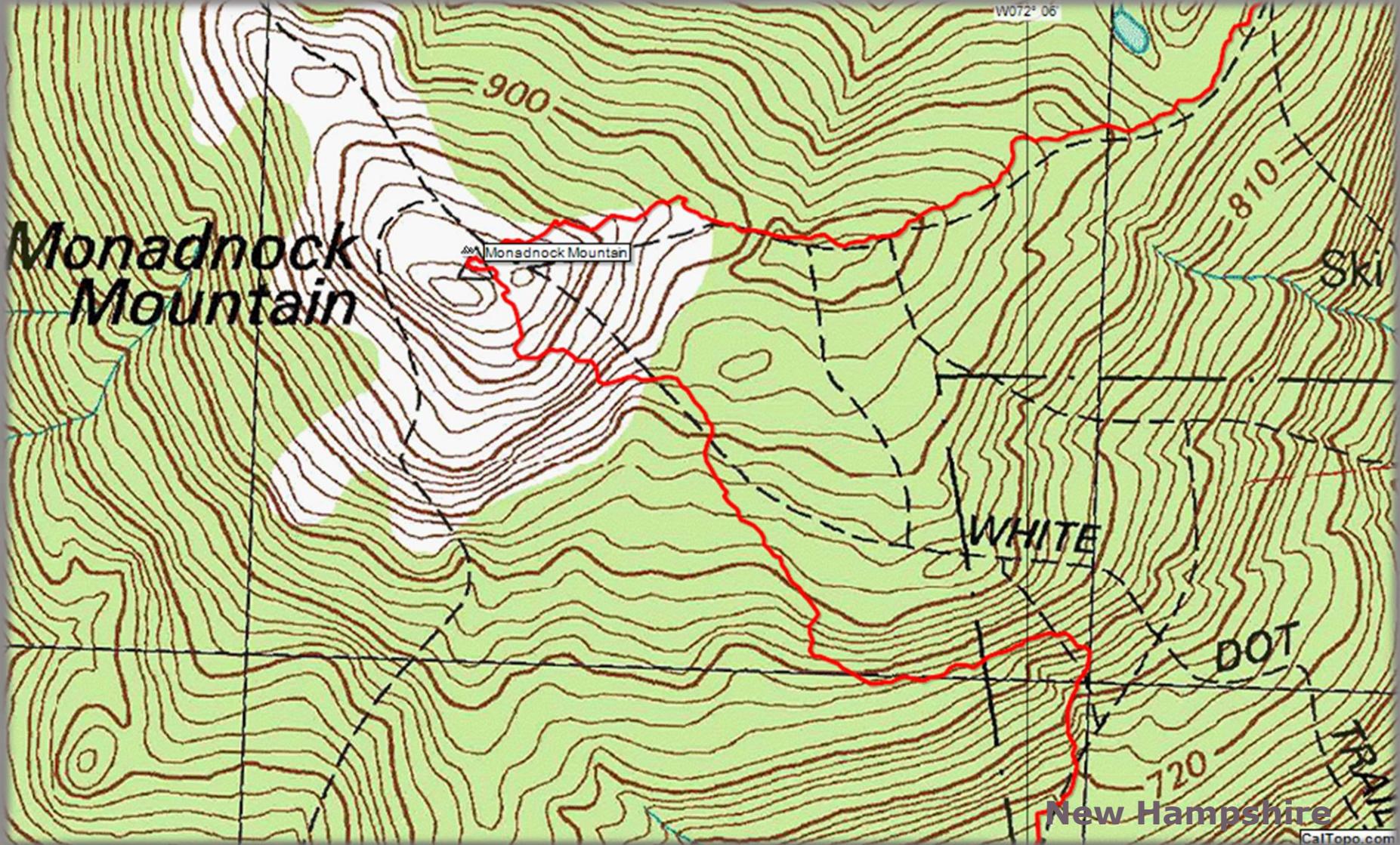
# Nautical Charts



New York harbor



# Topographic Maps





# Topographic Maps

- **Layer tinting** is a method of showing relief by color. A different color is used for each band of elevation.
- **Form lines** (dashed lines) have no standard elevation and give only a general idea of relief.
- **Relief shading** indicates relief by a shadow effect. The darker the shading, the steeper the slope.
- **Contour lines** are the most common method of showing relief and elevation on a standard topographic map. [isoline]



# Topographic Maps

- A **contour line** represents an imaginary line on the ground, above or below sea level.
- All **points** on the contour line are at the same elevation.
- The elevation represented by contour lines is the **vertical distance above or below sea level**.
- The **closer** the contour lines, the **steeper** the slope. The **farther** apart the contour lines, the **gentler** the slope.



**Index contour**



**Intermediate contour**



**Supplementary contour**



**Closed depression**



# Relief Maps





# Thematic Maps

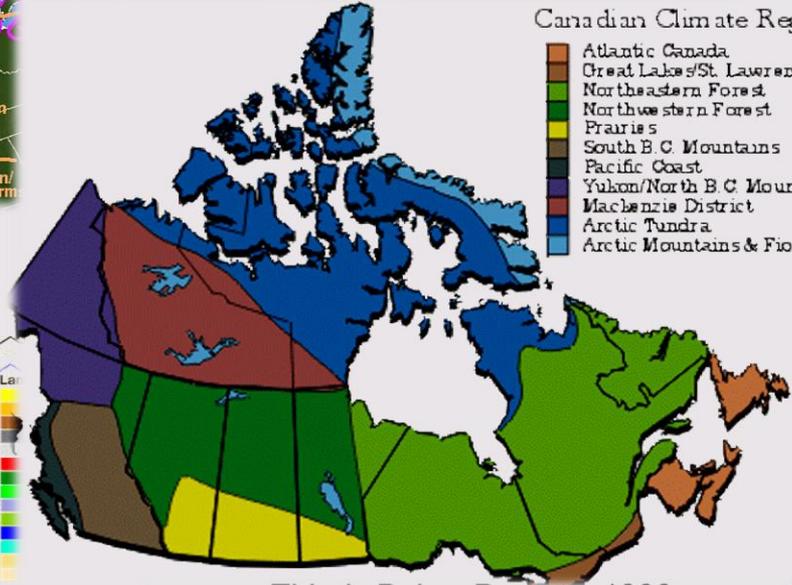
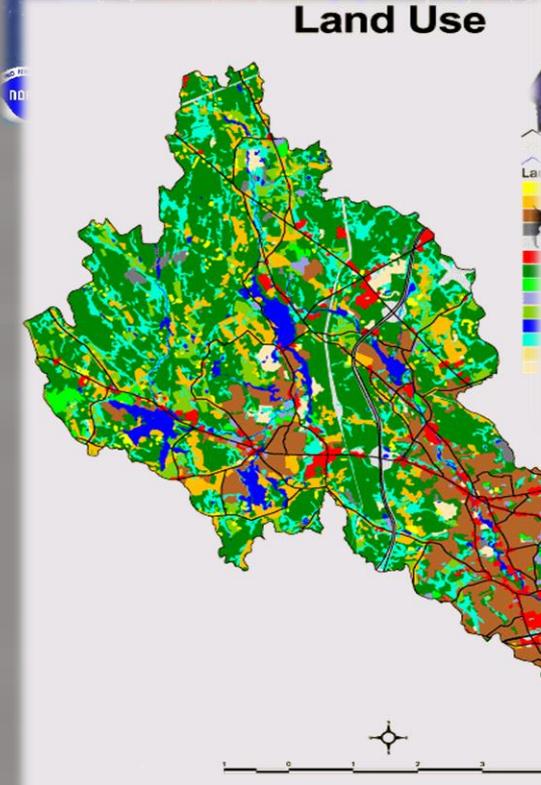
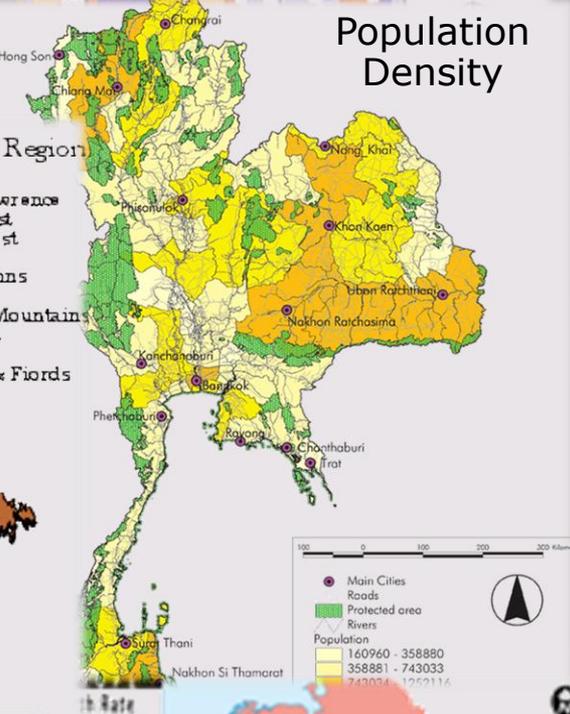
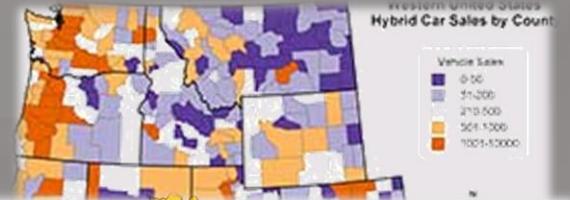
These maps represent the spatial dimensions of a particular phenomenon (theme).

## Types:

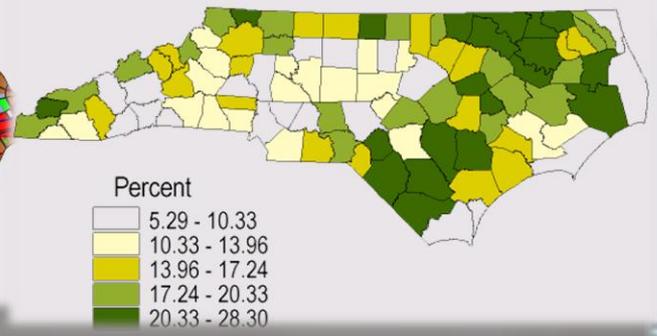
- ❑ **Isopleth maps** - isolines connect points of equal magnitude
- ❑ **Choropleth maps** - tonal shadings are graduated to represent area variations in number or density within a region, usually a formal region.



# Thematic Maps



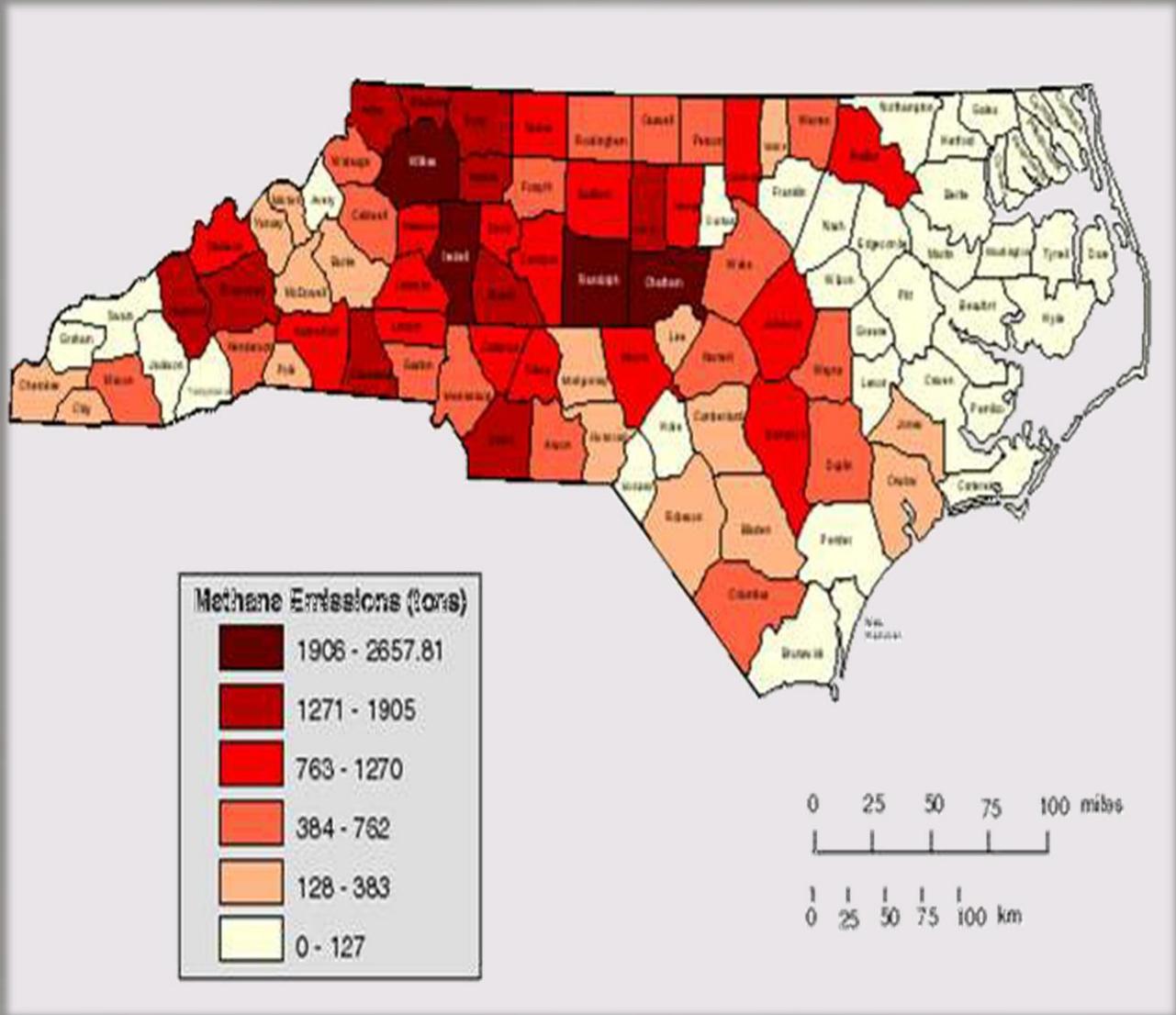
**Elderly Below Poverty, 1999**  
Persons Age 65 or Older for Whom Poverty Status Determined





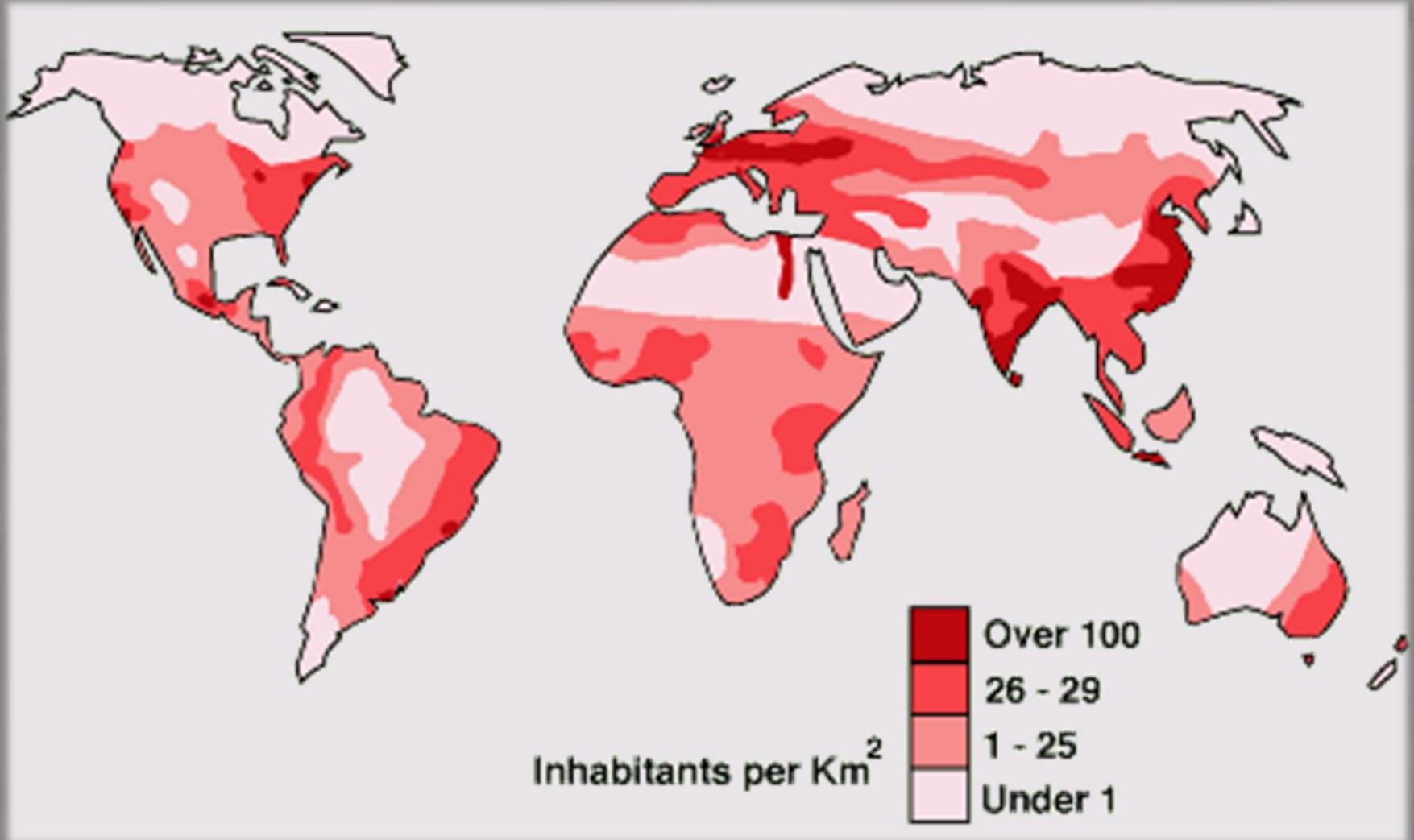
# Choropleth Map

cattle  
emissions  
in NC by  
county



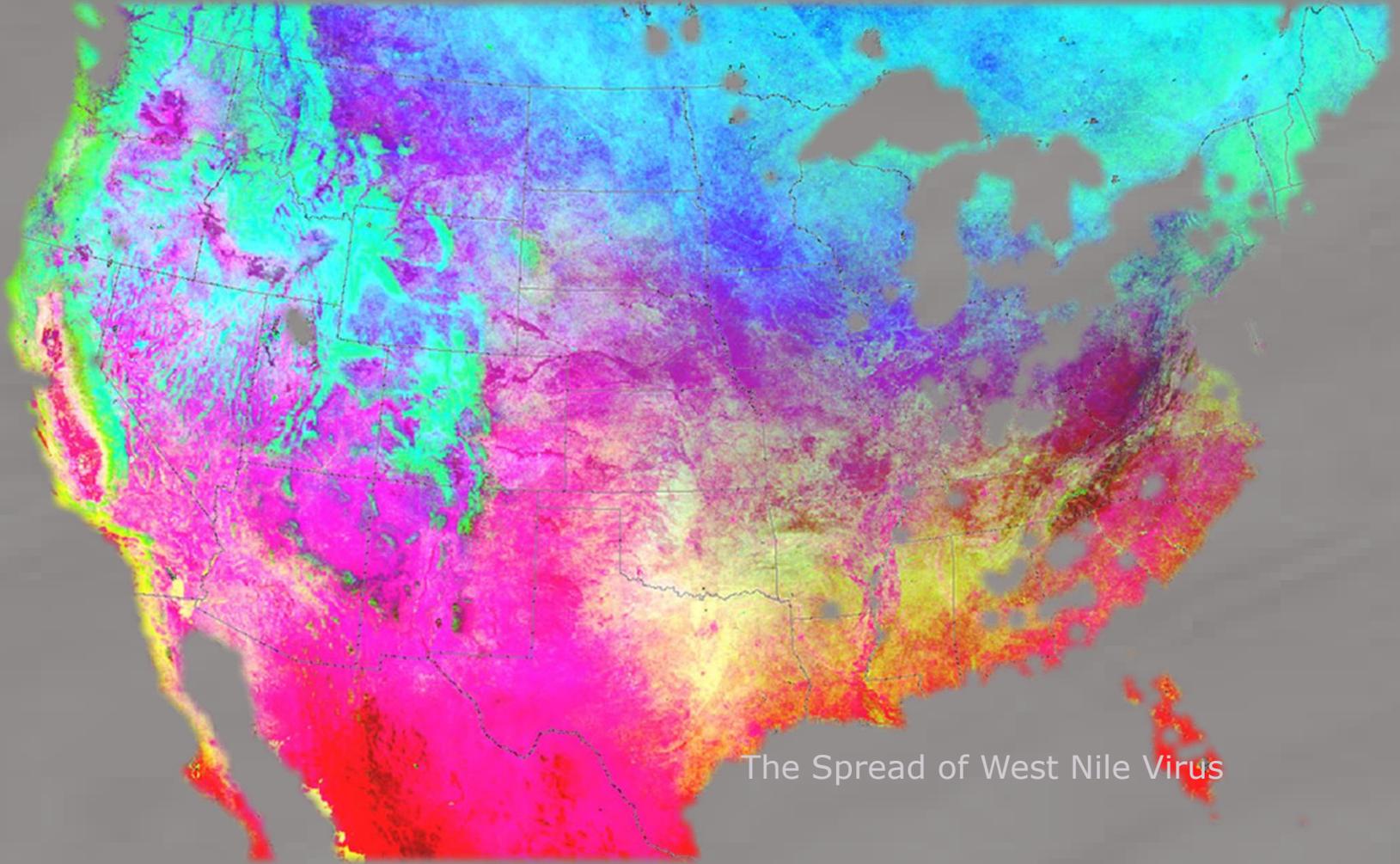


# Choropleth Map





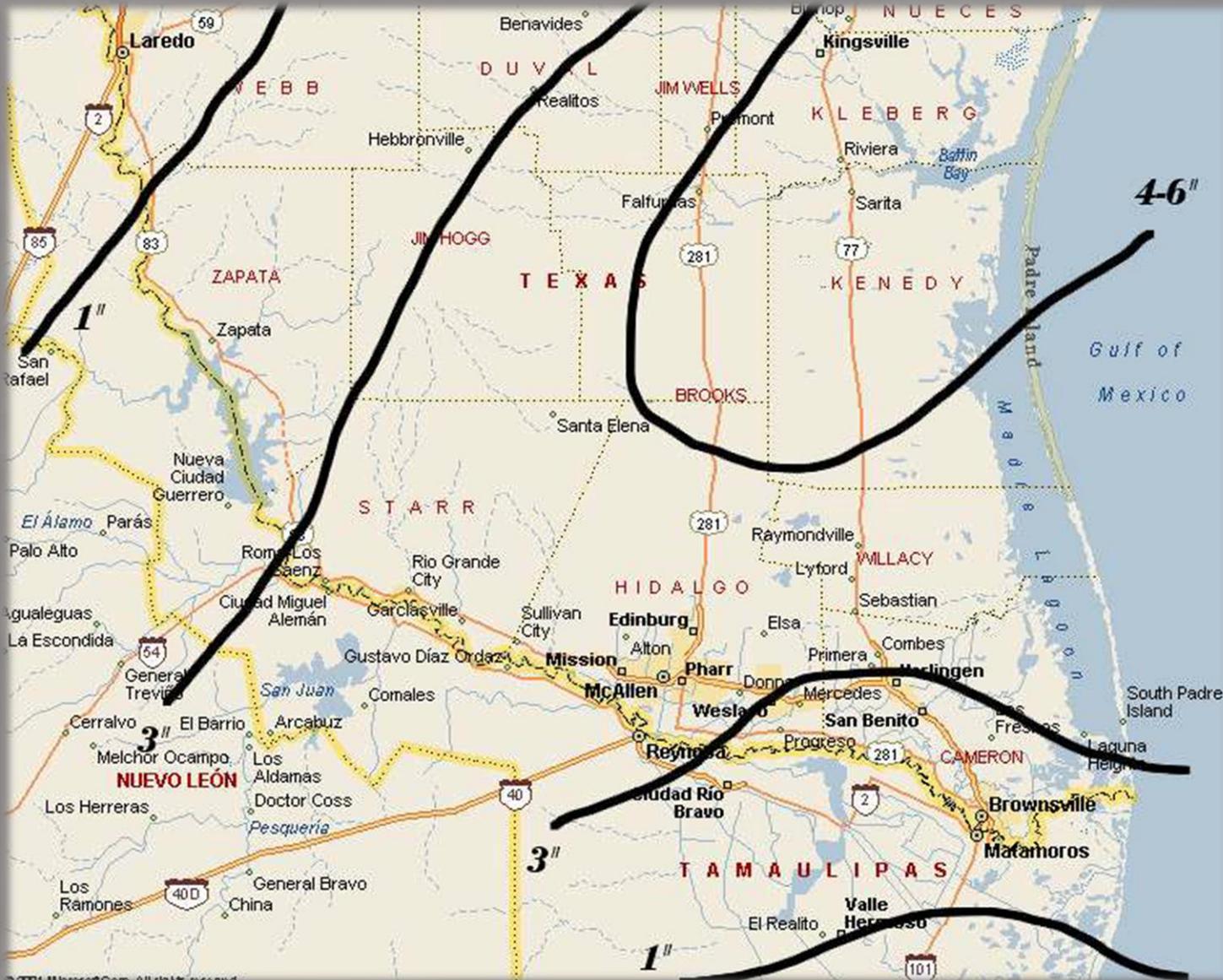
# Choropleth Map



The Spread of West Nile Virus



# Isopleth Map

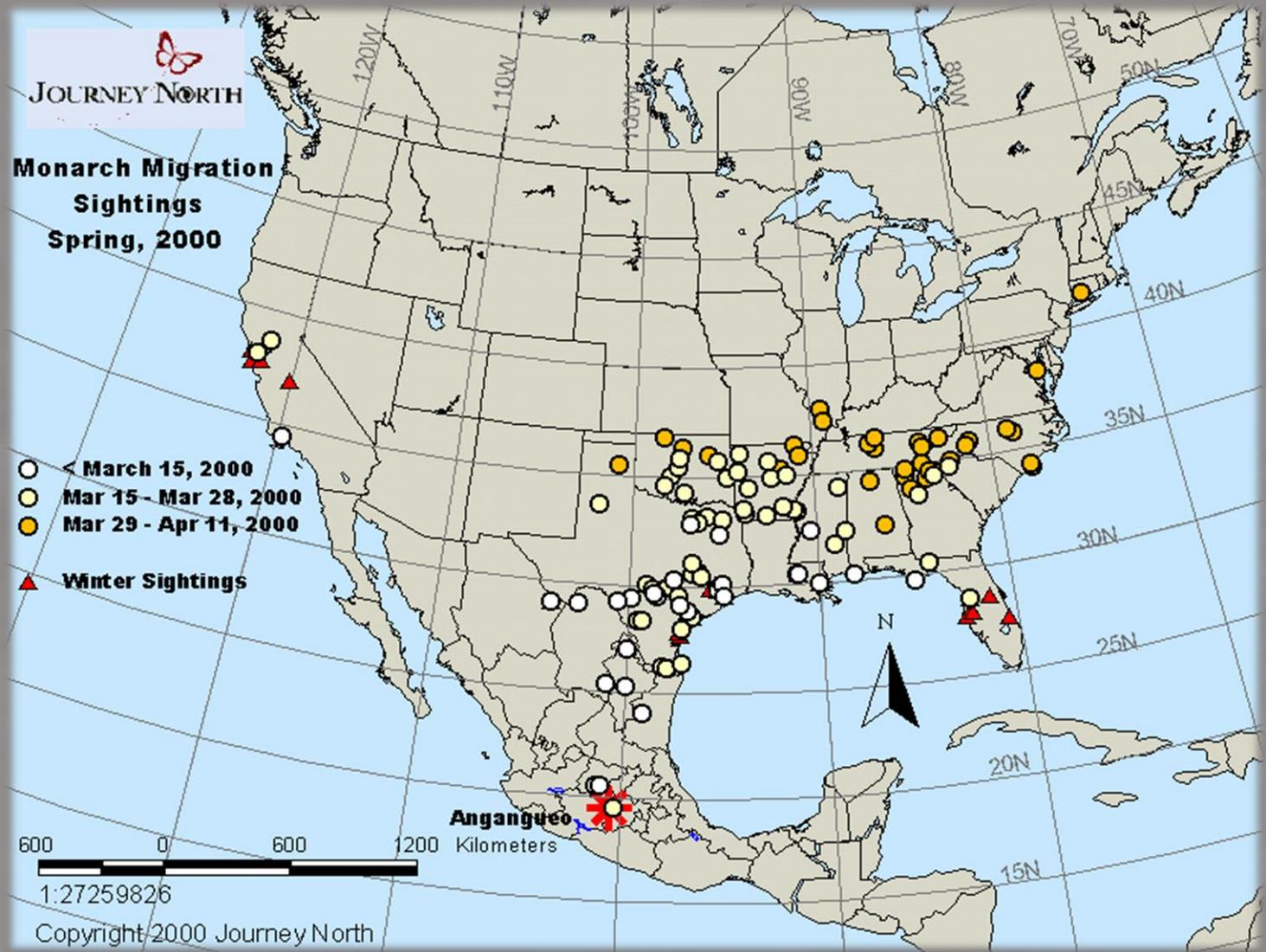


snowfall  
totals



# Isopleth Map

Monarch  
butterfly  
migration  
routes





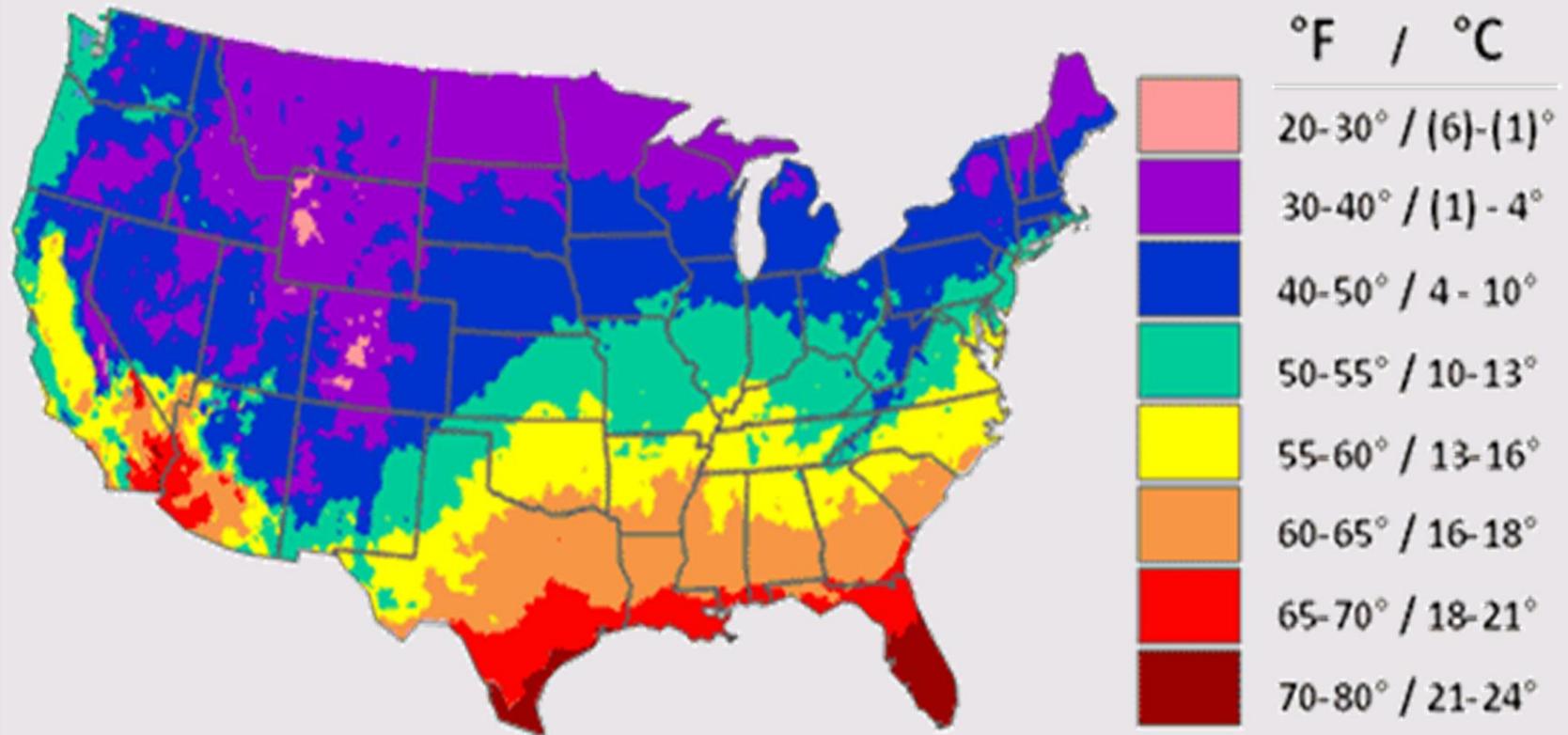
# Climate Maps

- Climate / Weather Maps are a type of thematic map.
- They present information about climate such as:
  - temperature
  - precipitation
  - hours of sunshine
  - growing season
  - climate regions
  - environmental concerns



# Climate Map

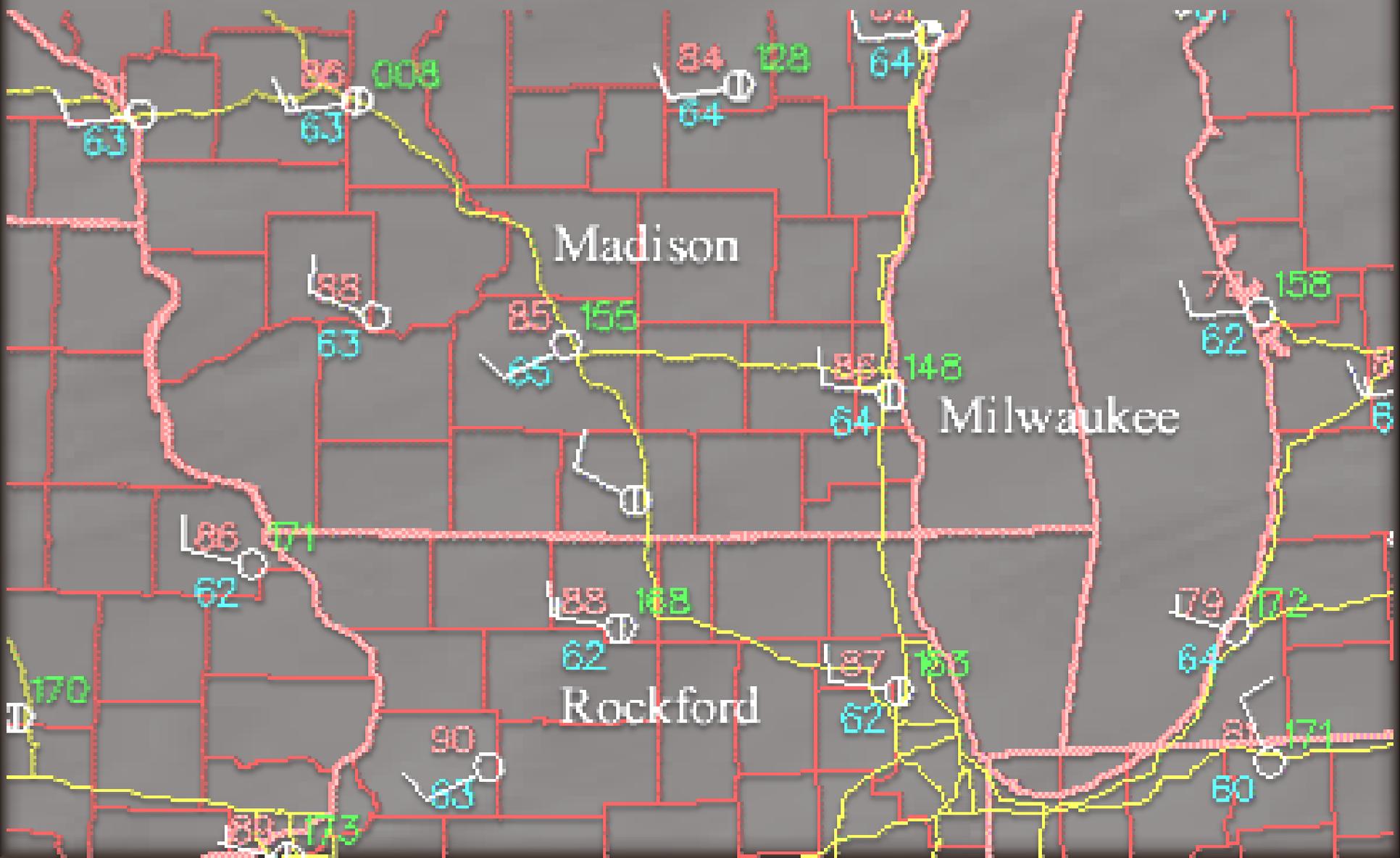
## Average Annual Nighttime Temperatures



Source: National Climatic Data Center, U.S. Department of Commerce



# Weather Map





# Standard Map Features

All maps have (or should have) certain basic features. At the minimum, maps should include the following.

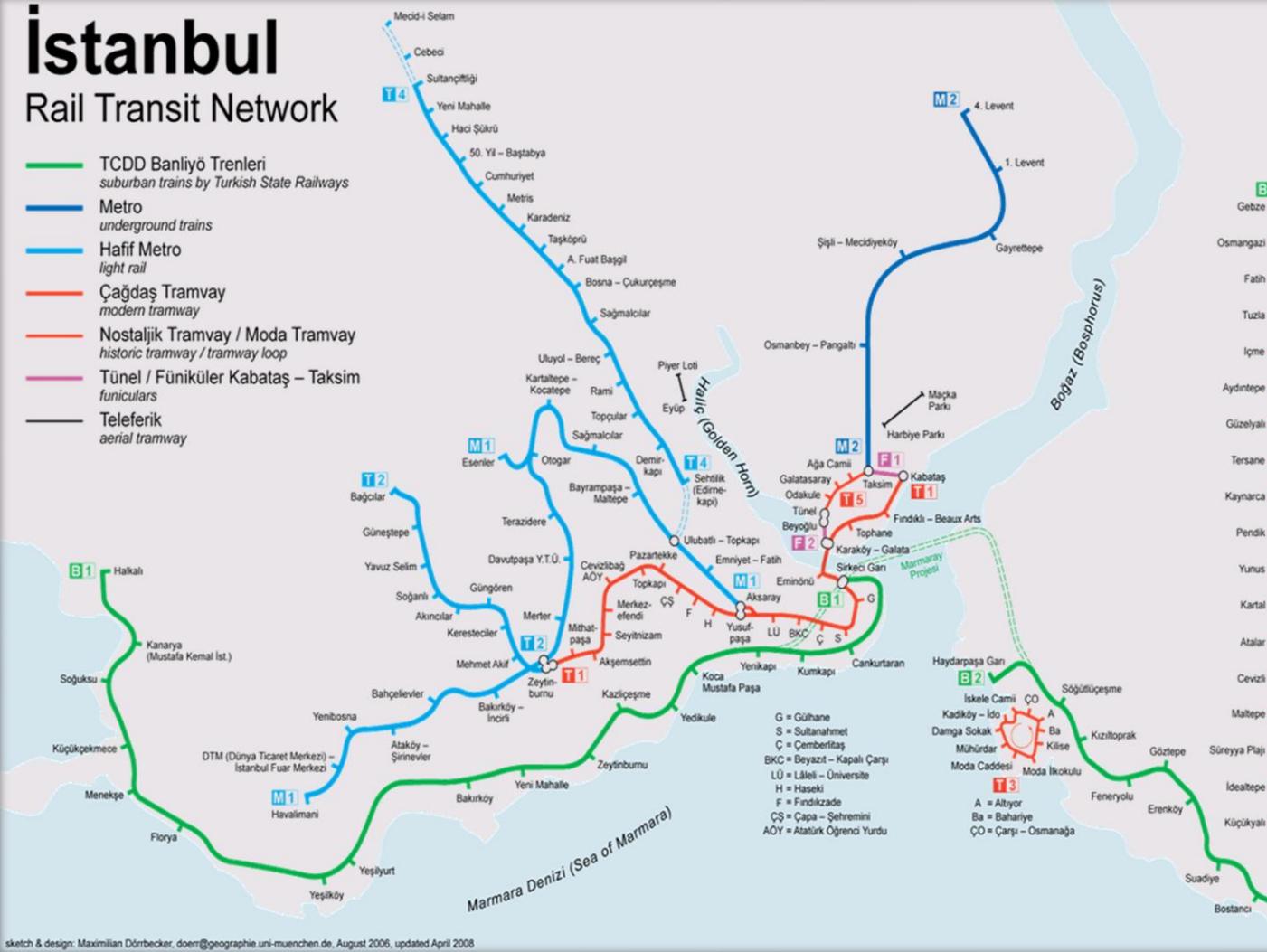
- Title
- Scale
- Orientation
- Legend



# Title

## İstanbul Rail Transit Network

- TCDD Banliyö Trenleri  
*suburban trains by Turkish State Railways*
- Metro  
*underground trains*
- Hafif Metro  
*light rail*
- Çağdaş Tramvay  
*modern tramway*
- Nostaljik Tramvay / Moda Tramvay  
*historic tramway / tramway loop*
- Tünel / Füniküler Kabataş – Taksim  
*funiculars*
- Teleferik  
*aerial tramway*



The title of a map indicates what the map is about. This is always the first part of a map you should look at. What does this map show?



# Map Scale

Map scale relates distance on a map to distance on the earth, thus a smaller scale represents a larger area.

## Small Scale

- shows large area
- 1:10,000,000 would represent about  $\frac{1}{2}$  of the US on a single page of paper.

## Large Scale

- shows small area
- 1:63,360 would represent a small town on a single page of paper.

**What is the largest scale map possible?**



# Map Scale

Which end of the spectrum is most accurate?

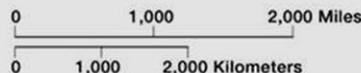
Which end requires you to generalize more?

Which end shows the largest amount of land?



Fractional Scale

$$\frac{1}{95,000,000}$$

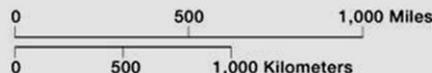


Verbal Scale

1 in. = 1,500 mi  
1 cm = 950 km

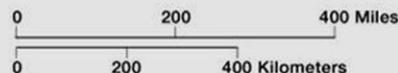
Small scale

$$\frac{1}{38,000,000}$$



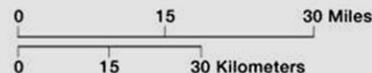
1 in. = 600 mi  
1 cm = 380 km

$$\frac{1}{16,000,000}$$



1 in. = 250 mi  
1 cm = 160 km

$$\frac{1}{1,300,000}$$



1 in. = 21 mi  
1 cm = 13 km

Large scale



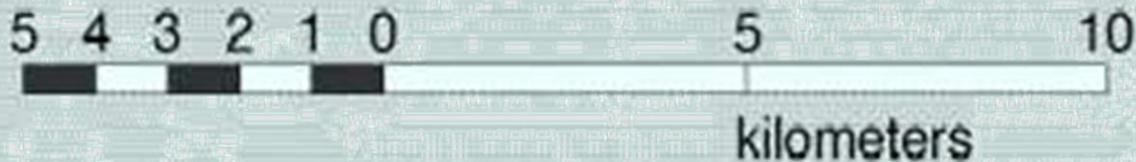


# Types of Map Scales

**1 Written scale**  
One inch equals four miles  
(English units in U.S.)

**2 Representative fraction**  
1:250,000 or  $\frac{1}{250,000}$

**3 Graphic scale**

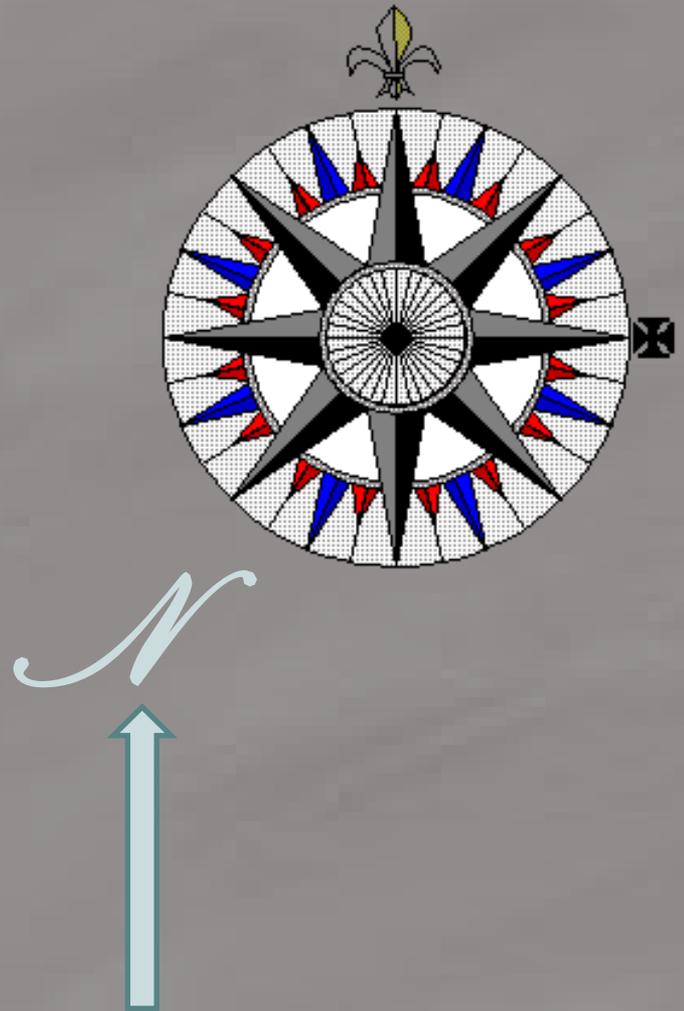




# Orientation or Direction

## North Arrow / Compass Rose

European maps of the dark ages, prior to European acceptance (1500s) of the magnetic compass, were *oriented to the east*. With the compass it made more sense to place north at the top during use. The direction of north was noted on maps using a north arrow or a compass rose.

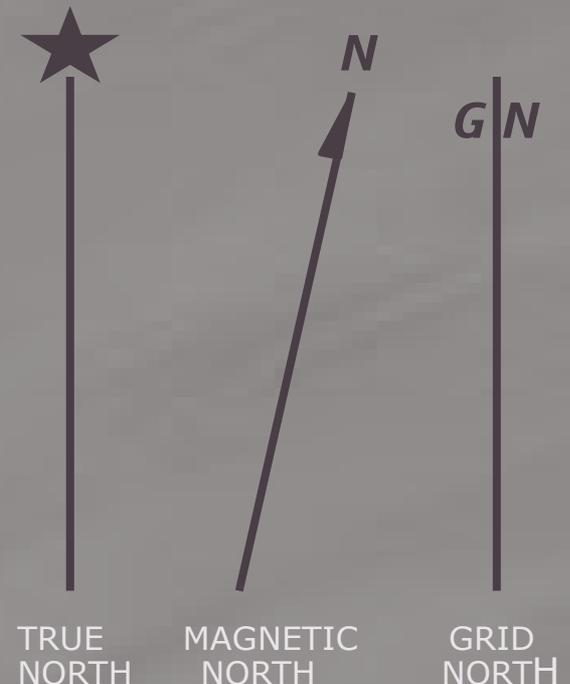




# Baselines

In order to measure something,  
there must always be a starting point.  
To measure direction, there are 3 base lines.

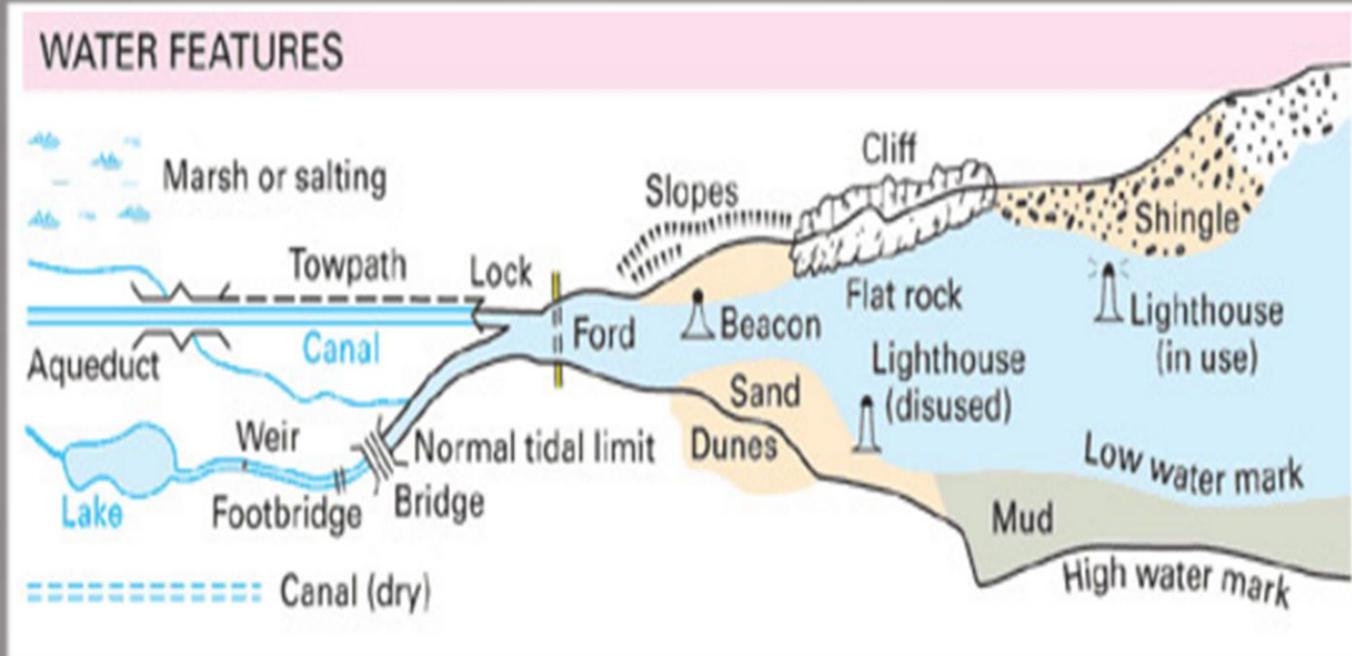
- ❑ true north – a line from any point on the earth's surface to the north pole. All lines of longitude are true north lines. Usually represented by a star.
- ❑ magnetic north – the direction to the north magnetic pole, as indicated by the north-seeking needle of a magnetic instrument. Usually symbolized by a line ending with half an arrowhead.
- ❑ grid north – the north that is established by using the vertical grid lines on the map. May be symbolized by the letters GN or the letter Y.





# Map Key or Legend

- ❑ All maps have a legend or key.
- ❑ Maps often use **symbols** instead of words to label real-life features and make maps clearer.





# Map Key or Legend

- Symbols can be small pictures, letters, lines or colored areas.
- The legend on a map shows what the symbols represent.

**KEY**

- CONTOUR LINES
- LOCN
- RIVER
- FOREST
- MOORLAND
- MOUNTAIN PEAK
- BEACH
- CLIFFS
- HOUSES
- LOG CABIN
- FERRY
- BRIDGE
- ROAD

**KEY**

- Art Gallery
- ATM
- Bar
- Hotel
- Museum
- Poultry
- Real Estate
- Restaurant
- Shopping
- Snacks
- Subway
- Synagogue

- Federal multi-lane divided access fully controlled highway
- Region multi-lane divided access fully controlled highway
- Region multi-lane undivided highway
- Region 2-lane undivided road
- County 2-lane paved road
- District 2-lane paved road
- Unpaved road
- Railway

- 4 Federal highway
- 172 Region highway
- International airport
- Scheduled service airport
- Airport, aerodrome
- Port, ferry point
- Military installation
- Recreational area, full service
- Recreational area, part service
- Recreational area, no service
- Place of interest
- NORMER District name District border
- ZANLAD County name County border
- GARAND Region name Region border

**Populated Places**

- 1.000 - people
- ◉ 1.000 - 5.000
- ◉ 5.000 - 10.000
- ◉ 10.000 - 30.000
- ◉ 30.000 - 50.000
- ◉ 50.000 - 100.000
- ◉ 100.000 - 300.000
- ◉ 300.000 - 500.000
- ◉ 500.000 - 1.000.000
- ◉ 1.000.000+ people
- Urbanized area
- Krosvald 0,84 Place name with population in thousand people

**Legend**

- Interstate
- US and State Highway
- Local Thoroughfare
- Toll Road
- Ramp
- Railroad
- USGS 100K Index
- Municipal Boundary
- Water Bodies
- Rivers
- NPDES Facilities
- Dams
- ESA Points
- State Boundary
- Public School
- Private School
- Airports
- ESA
- Tribal Land
- USCG Jurisdiction

- Level interchange
- Distance in km between cities, interchanges and points
- Accumulated distance in km between points
- Tunnels
- Roads under construction
- Auto ferry





## Savage Chickens

by Doug Savage



[www.savagechickens.com](http://www.savagechickens.com)

Continued in  
Introduction to Cartography  
Part II