

# Thematic mapping:

'Qualitative point symbols' are similar to topographic (general) maps- Individual point locations are important



## 1. point symbols

Quantitative thematic point maps  
Design focus: overall distribution



Base layers are background for thematic maps: Map themes are 'special purpose'

# 1. Dot maps

Dr. John Snow used a dot map to identify the Broad Street Pump in London responsible for the spread of cholera - previously thought to be wind-borne.

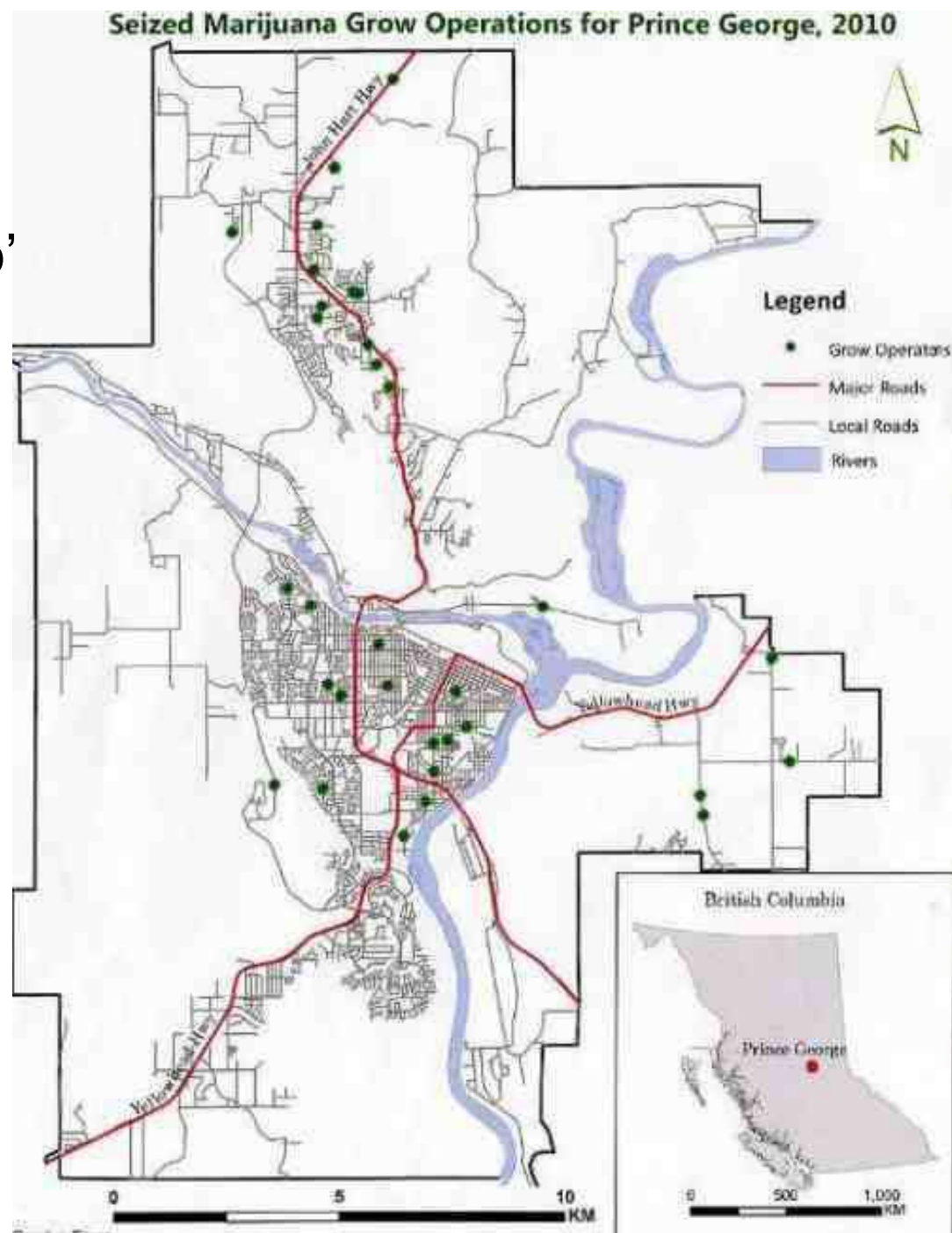


1 dot for each fatality

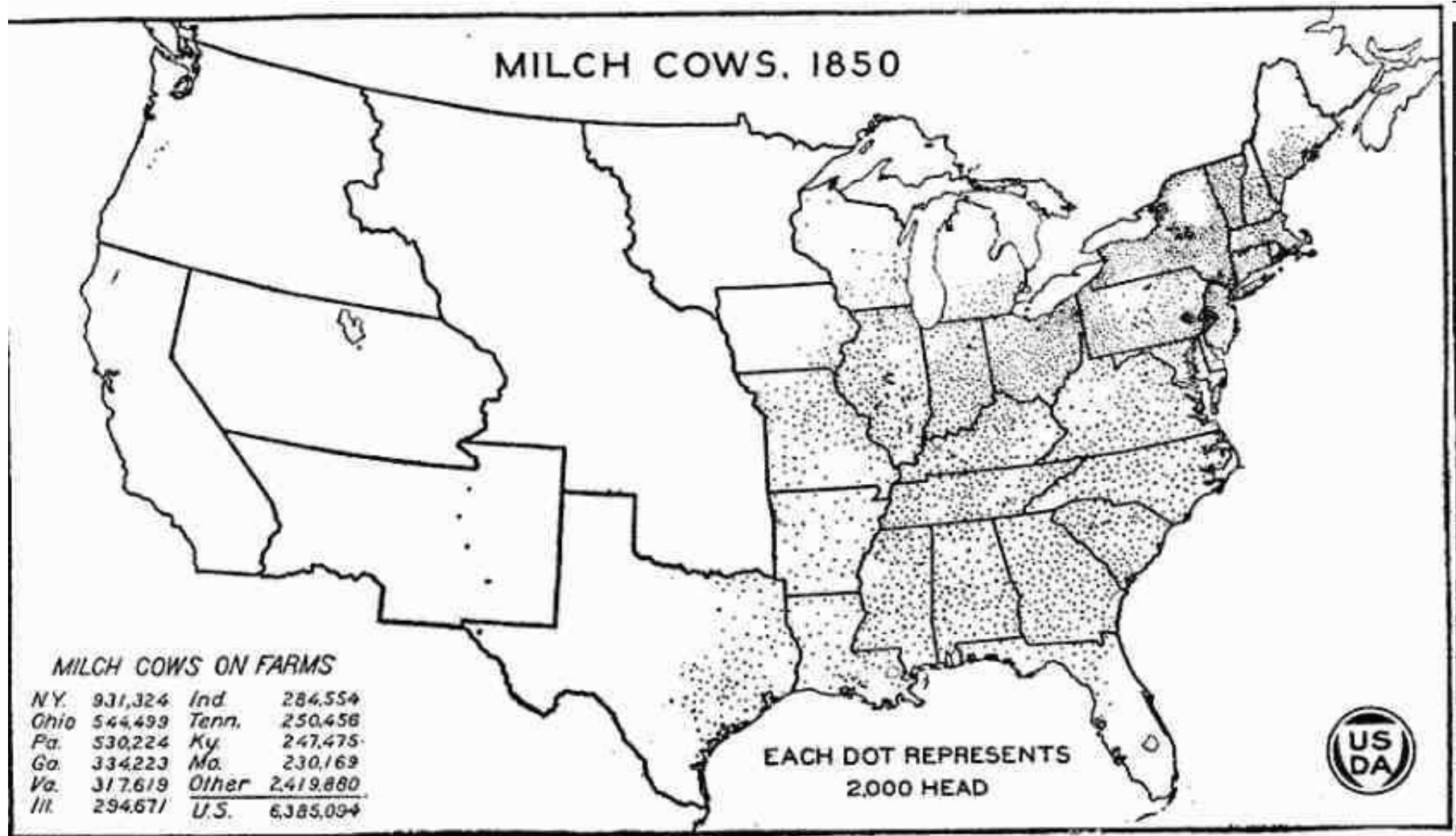


Example of a 'dot map'

1 dot for each event

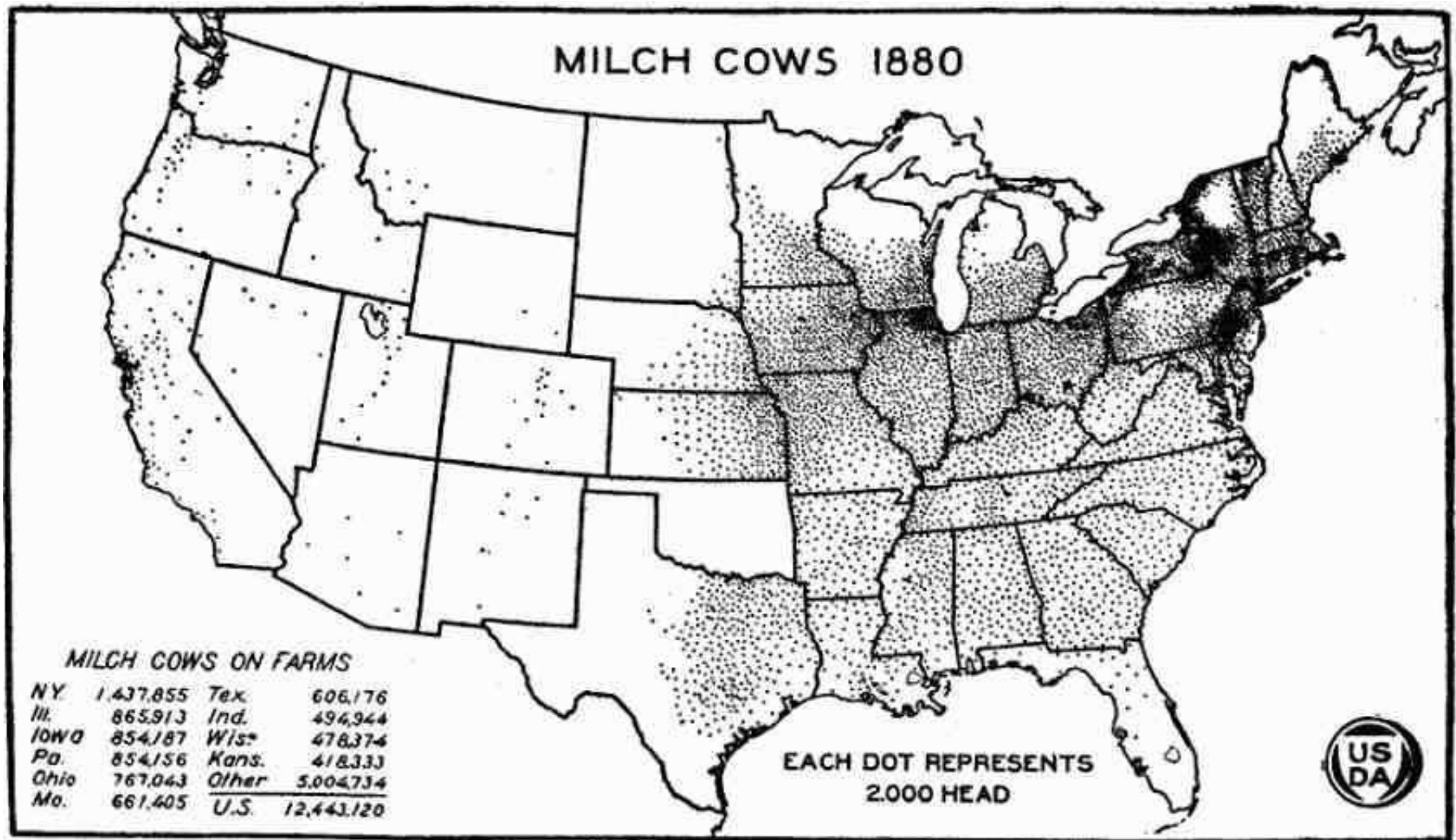


Using a dot scale (1 dot = 2000 cows)

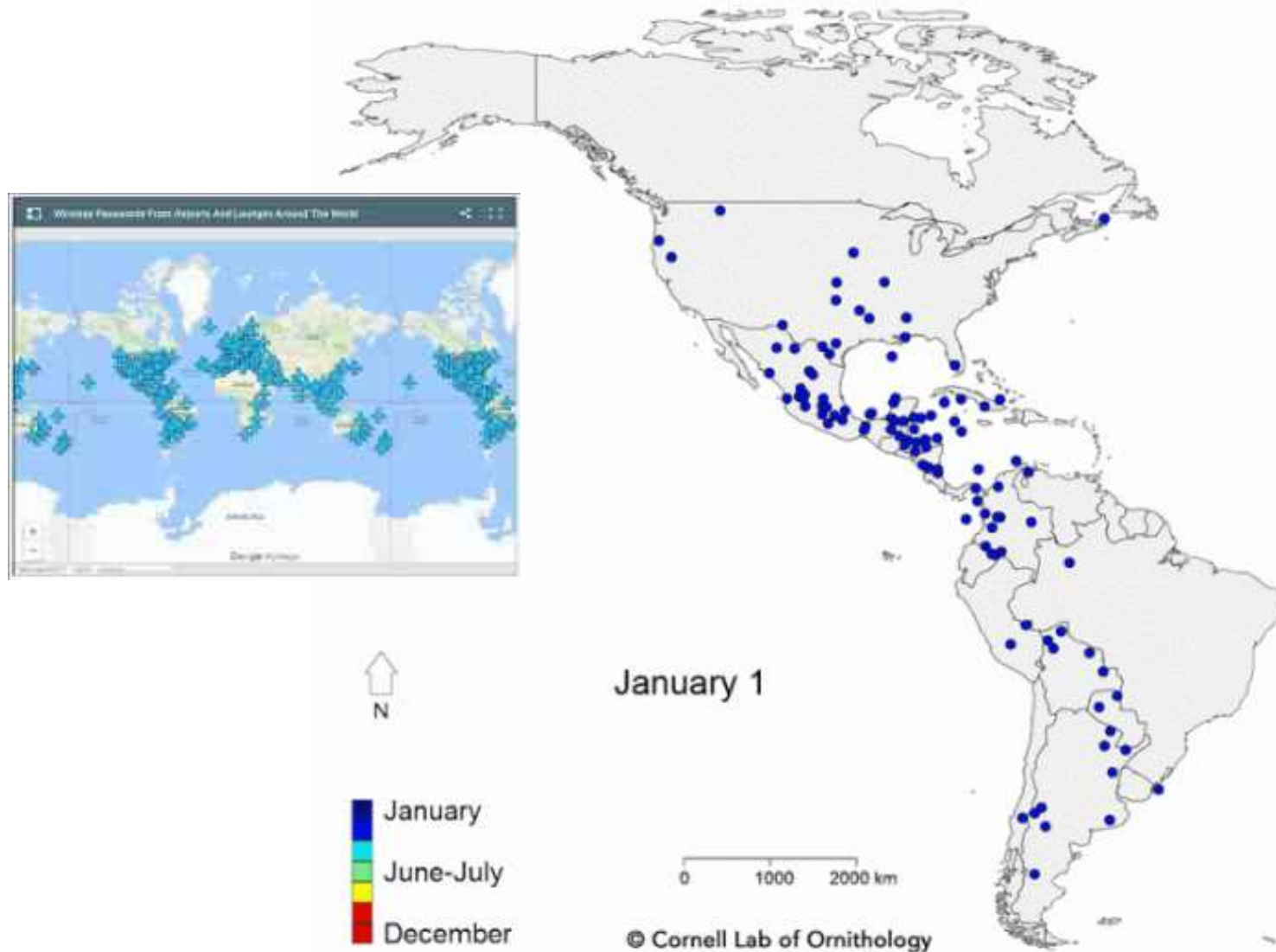


Dot maps – easy to draw, simple to understand





It gives a quick visual impression, but a poor estimate of actual numbers.

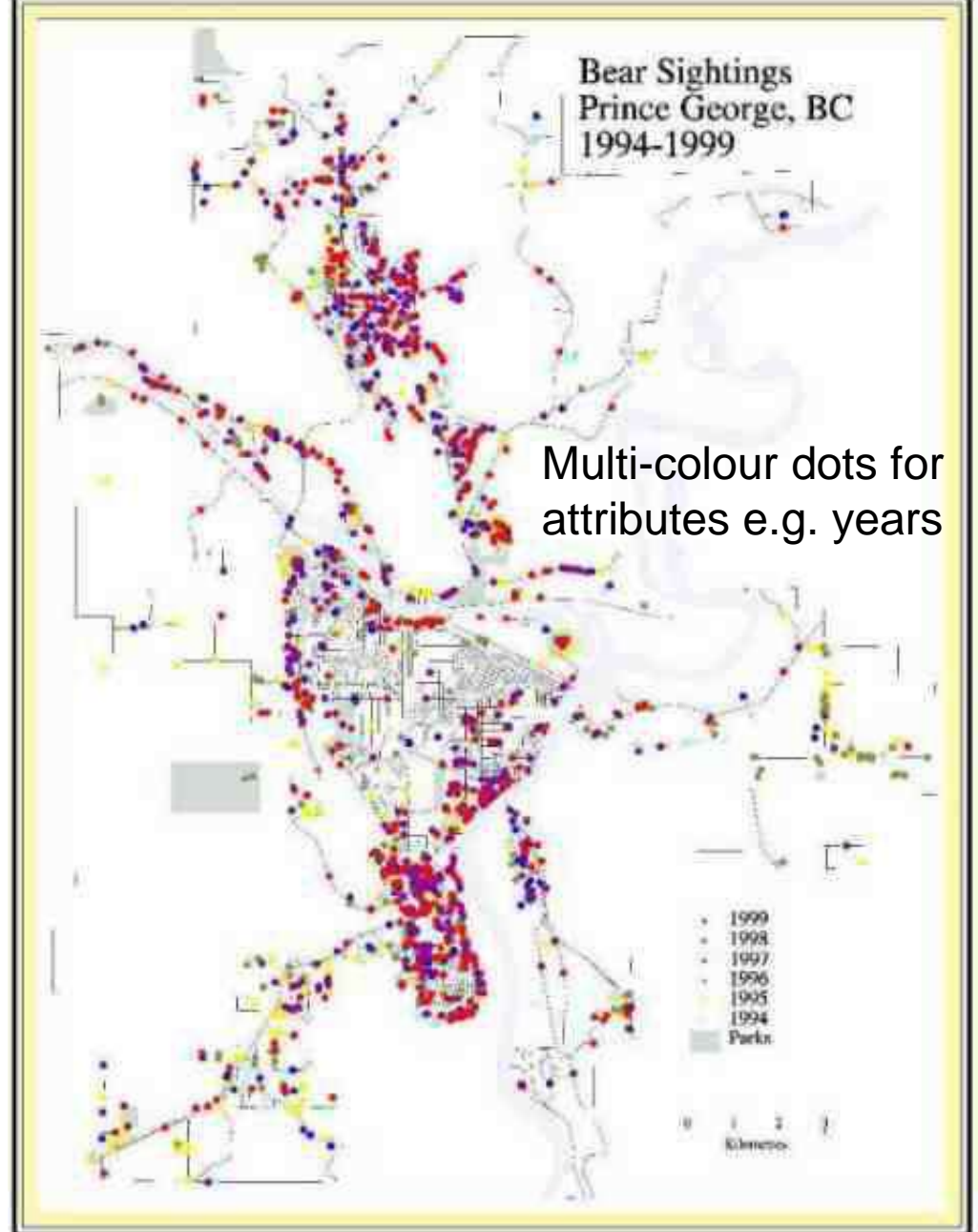


<https://www.allaboutbirds.org/mesmerizing-migration-watch-118-bird-species-migrate-across-a-map-of-the-western-hemisphere/>

# Black bear sightings, 2010

Yellow = sighting

Red = destroyed



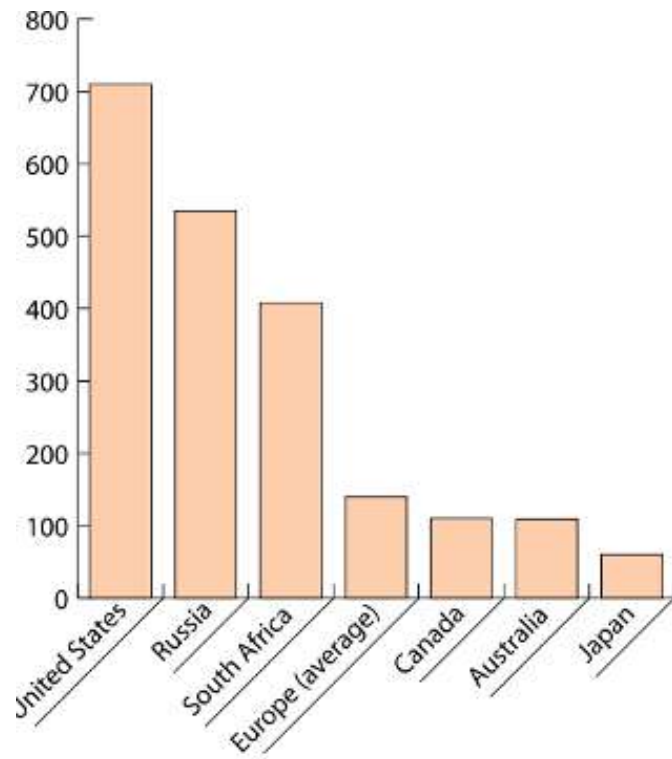
It breaks down when: exact locations are not feasible OR there are too many locations  
Then instead we use a variable size symbol, where size = number of occurrences

## 2. Proportional Symbols - bars

These indicate values at a point, or in an area. The simplest is a bar.

### Proportional bars:

The height of the bar is proportional to the value represented  
e.g. as in a bar chart





# NHL PLAYERS BY PROVINCE

Where the Canadian-born players for the 2013-14 season hailed from, and their average number of career points. New Brunswick, it's time to get in the game.

**Brad Richards,**  
Murray Harbour, P.E.I.



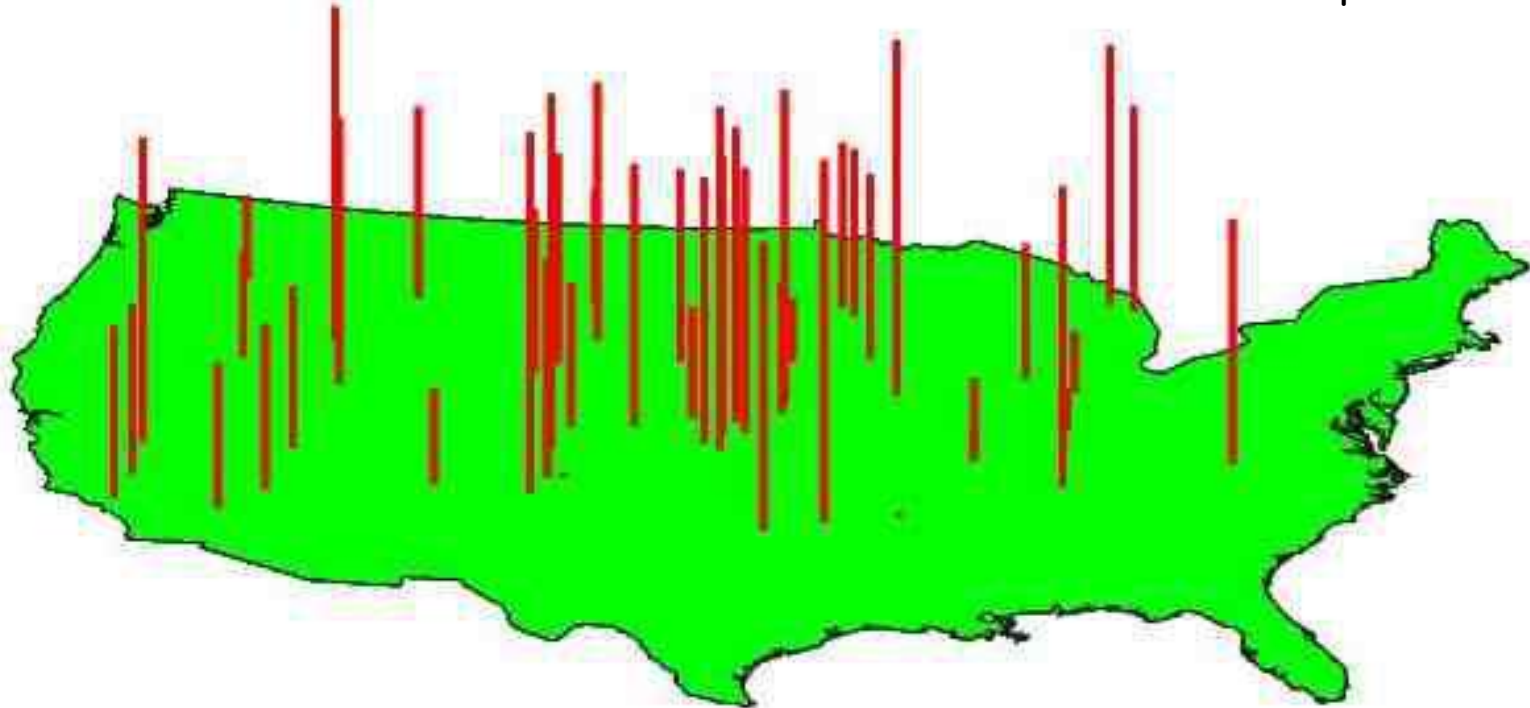
Source: QuantHockey.com;  
Maclean's 2014

**MACLEAN'S**

Height scale is designed to show the data range best

Smallest - visible;                      largest - not too big

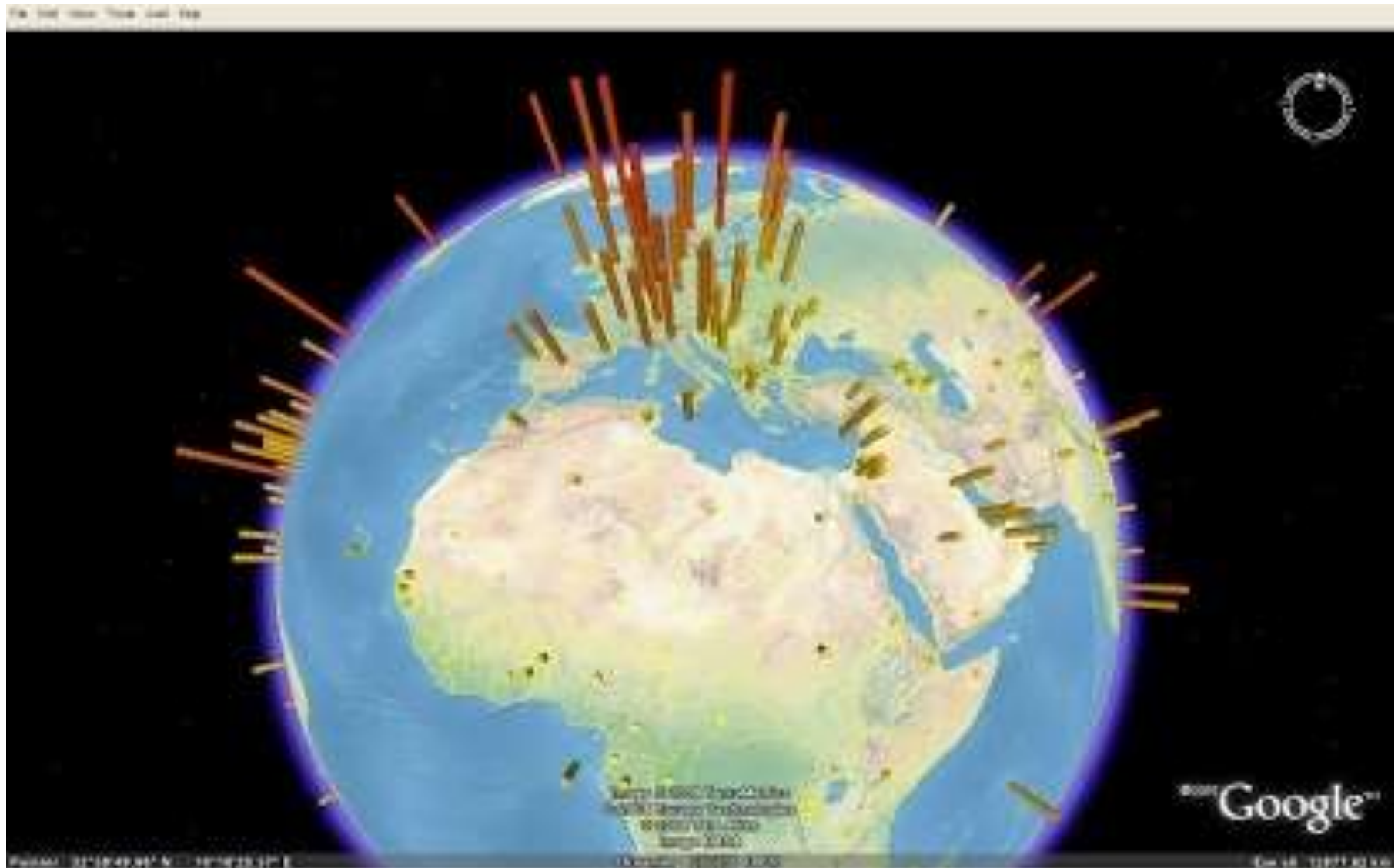
the base should be inside the area or centred at the base at the point



Bars break down with extreme data range: then we need to use a 2D symbol whose area is proportional to value, instead of height (only 1D). The most common is the circle....

<http://thematicmapping.org>

Making thematic maps with google earth « *Internet users per 100 population* »



### 3. Proportional (formerly 'Graduated') circles ....

#### **Britain comes first for Movember donations**

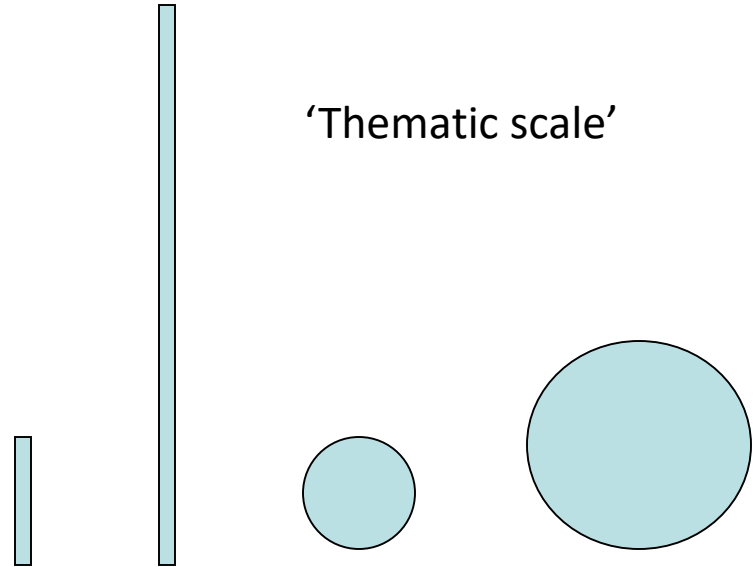
Funds raised by the Movember campaign in 2013 (in £ million)





# The advantage of circles over bars: (2D v 1D)

| Value | Square root |
|-------|-------------|
| 1     | 1           |
| 4     | 2           |
| 16    | 4           |
| 25    | 5           |
| 50    | 7.1         |
| 100   | 10          |
| 400   | 20          |

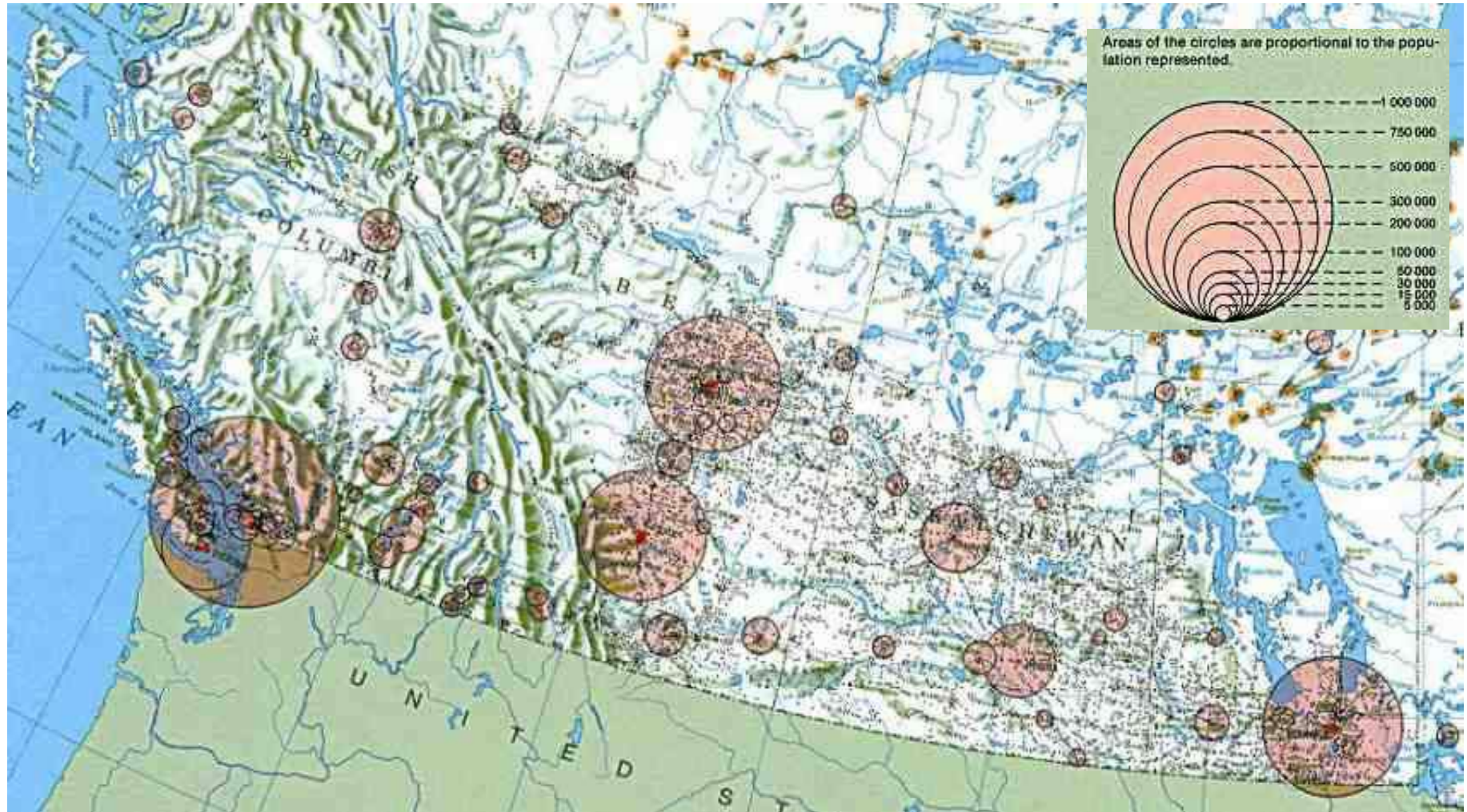


Bars are **proportional in height to the value**

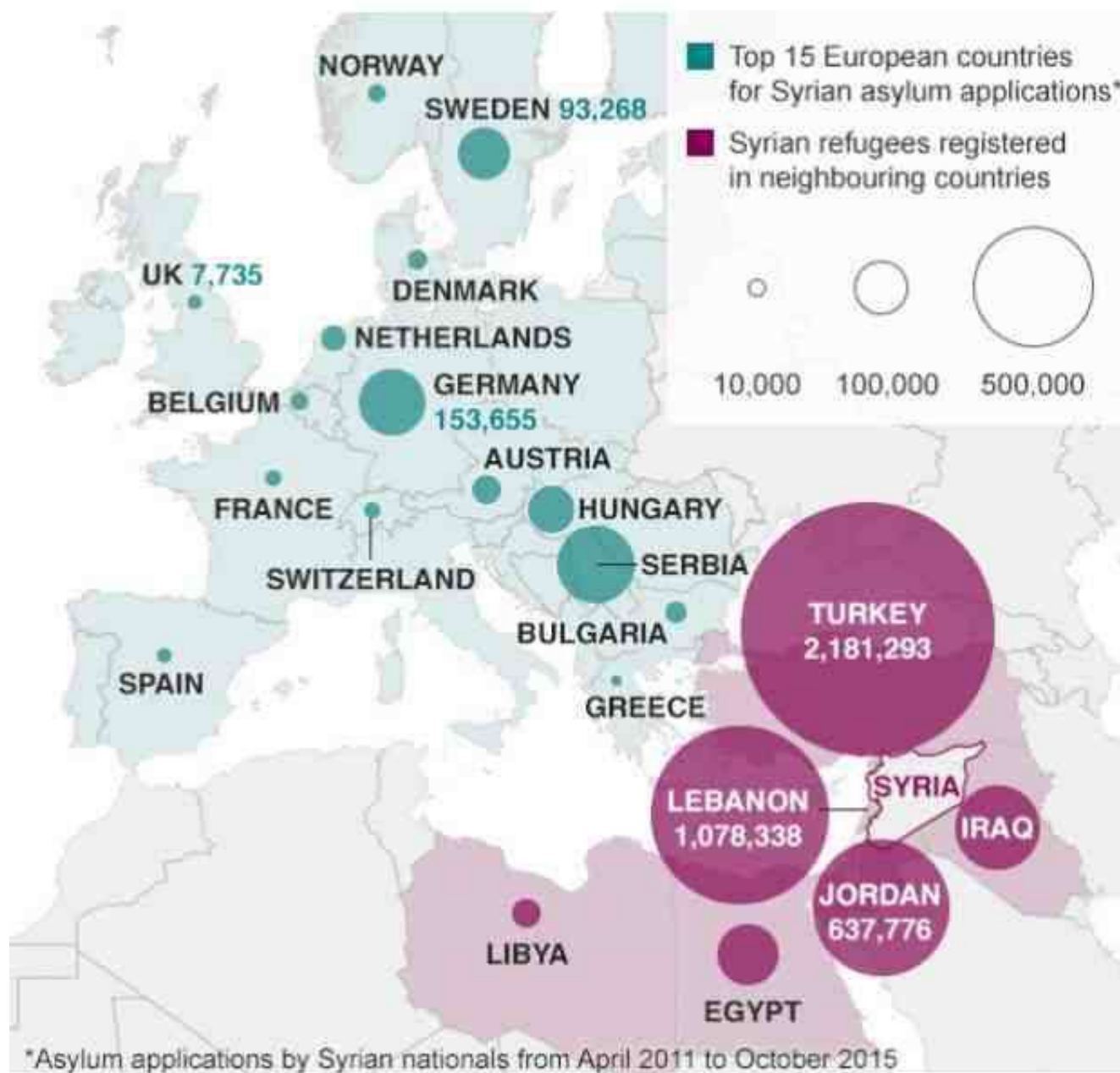
Circle **areas** are proportional to the value -  
...the radius is proportional to **square root of the value**

Thus it can handle greater data ranges than the bar,

Legend: sample circles, nested or strung out, use round numbers



## Syrians in neighbouring countries and Europe





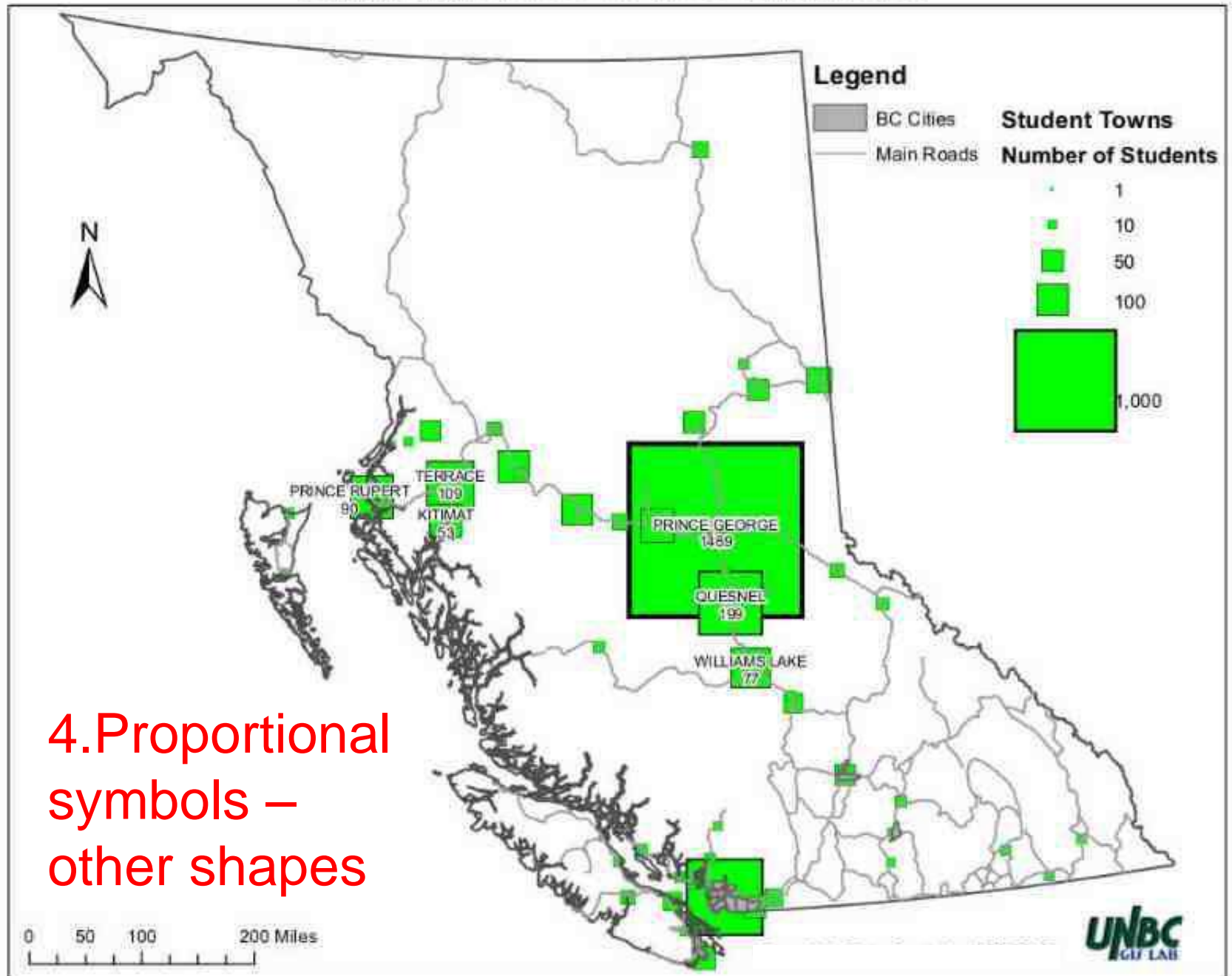
# Coronavirus websites



<https://news.google.com/covid19/map>

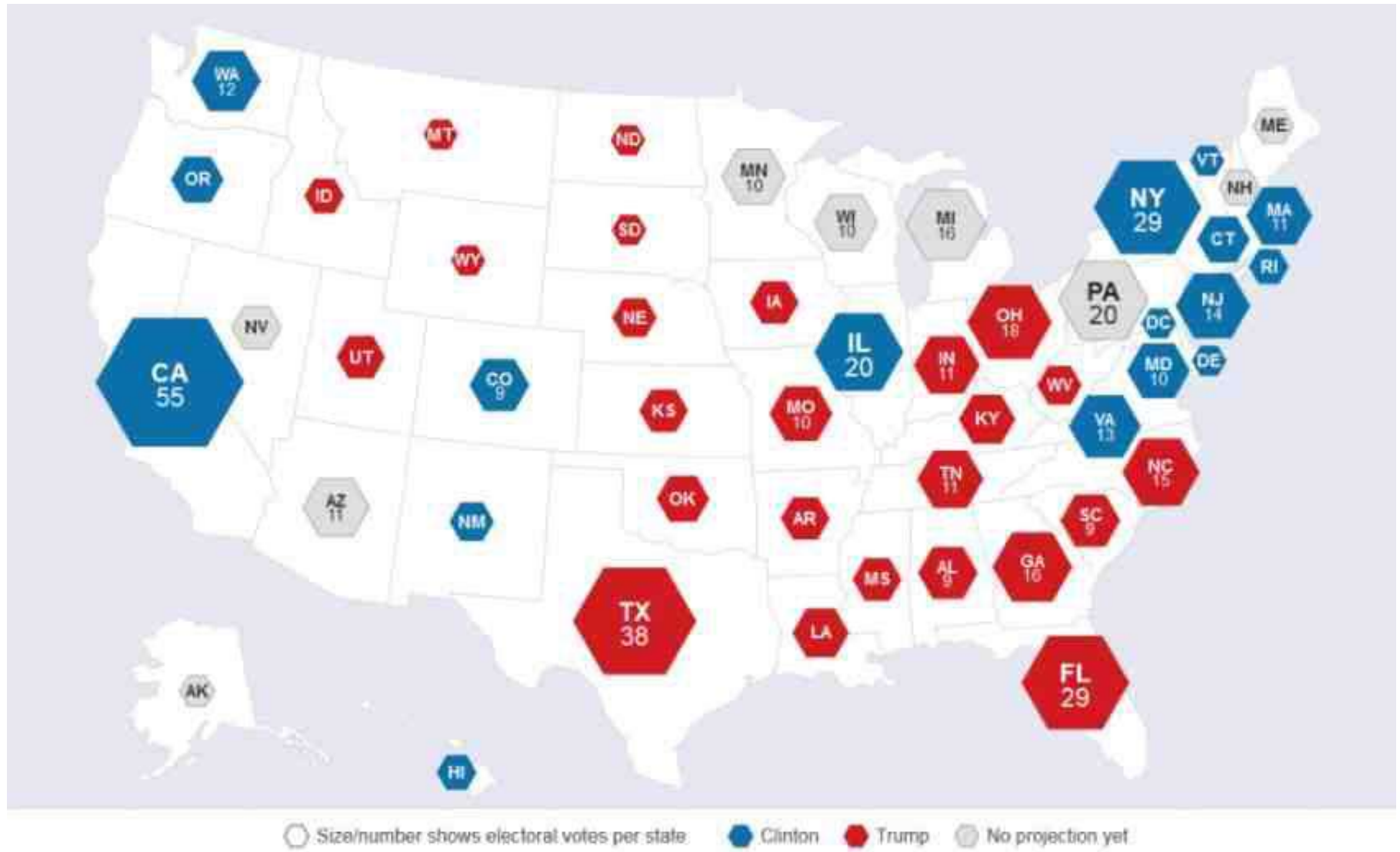


# Distribution of UNBC Students



4. Proportional  
symbols –  
other shapes

# USA election results 2016 (hexagons)



# Facing the Presidential Election 2004



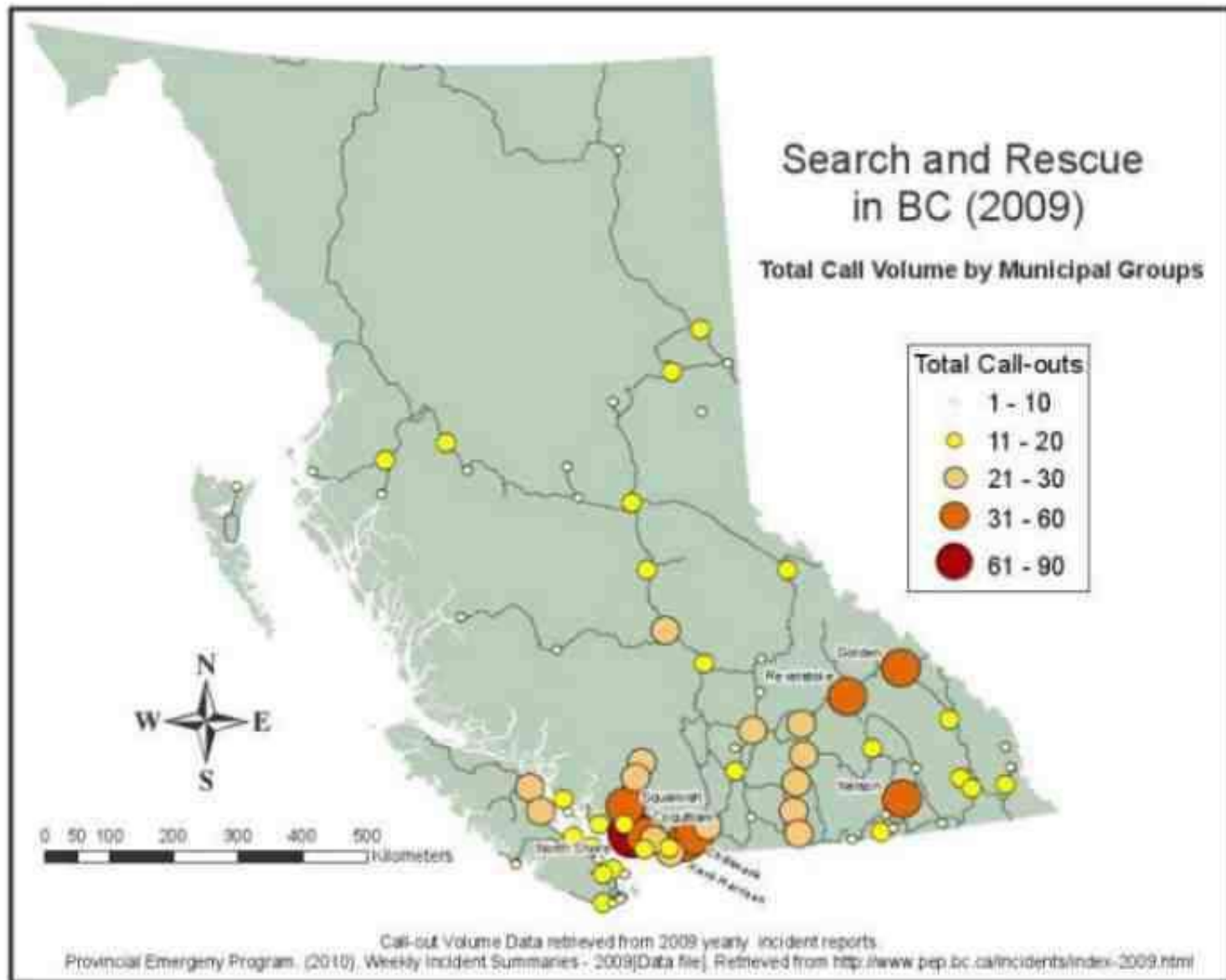
© sara i. febrinkant, 2004

<http://www.geog.ucsb.edu/~sara/html/mapping/election/election04/election.html>

data source: ESRI, New York Times

\* resemblance with a Hollywood actor is pure conspiracy theory

## 5. Graduated ('Range Graded') Symbols: grouped in classes

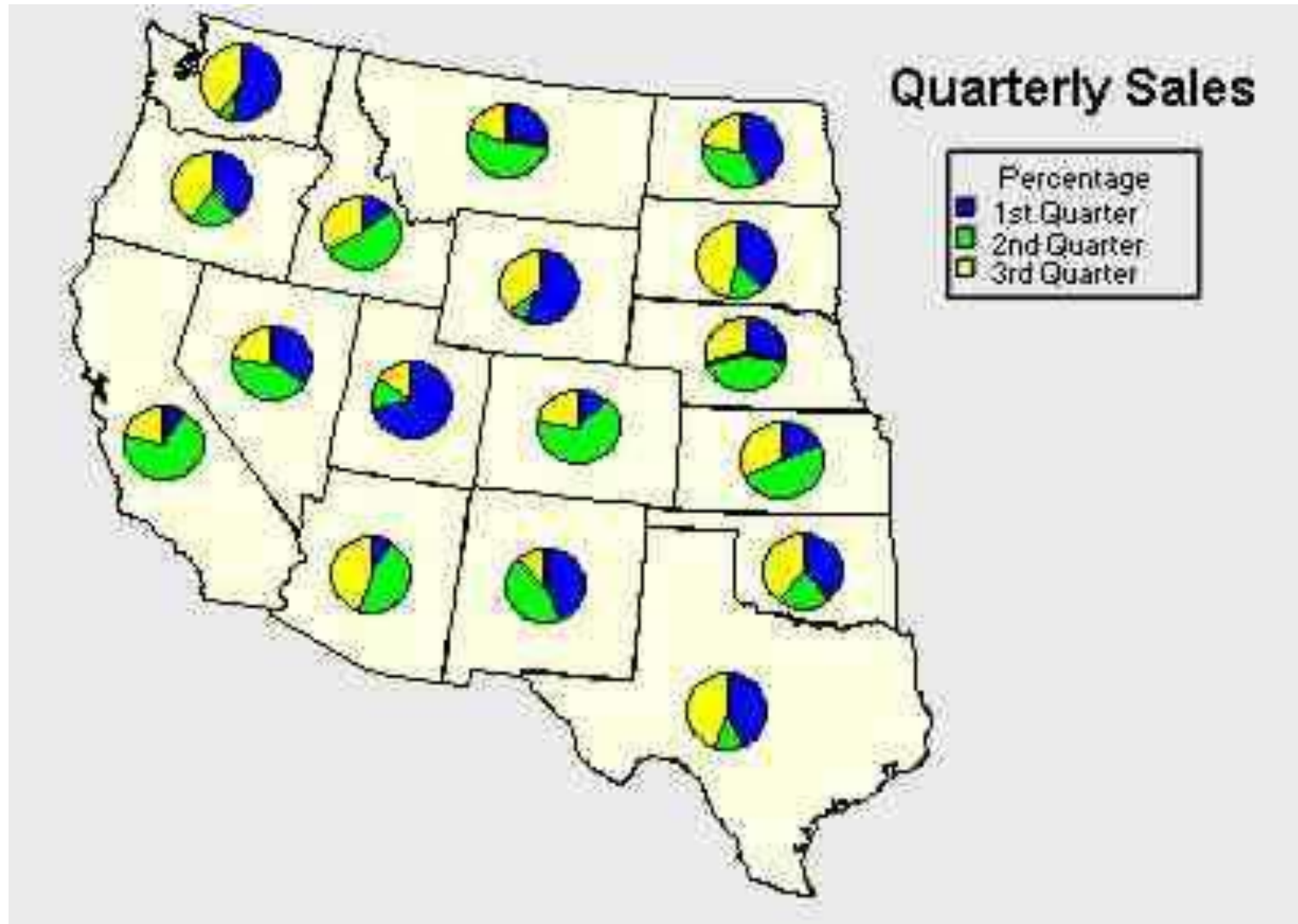


Where it is not feasible to keep all symbols individually proportional to their values, they can be grouped into classes and shown by a symbol size ~proportional to the class range central value. The design of these classes should be based on grouping similar values.

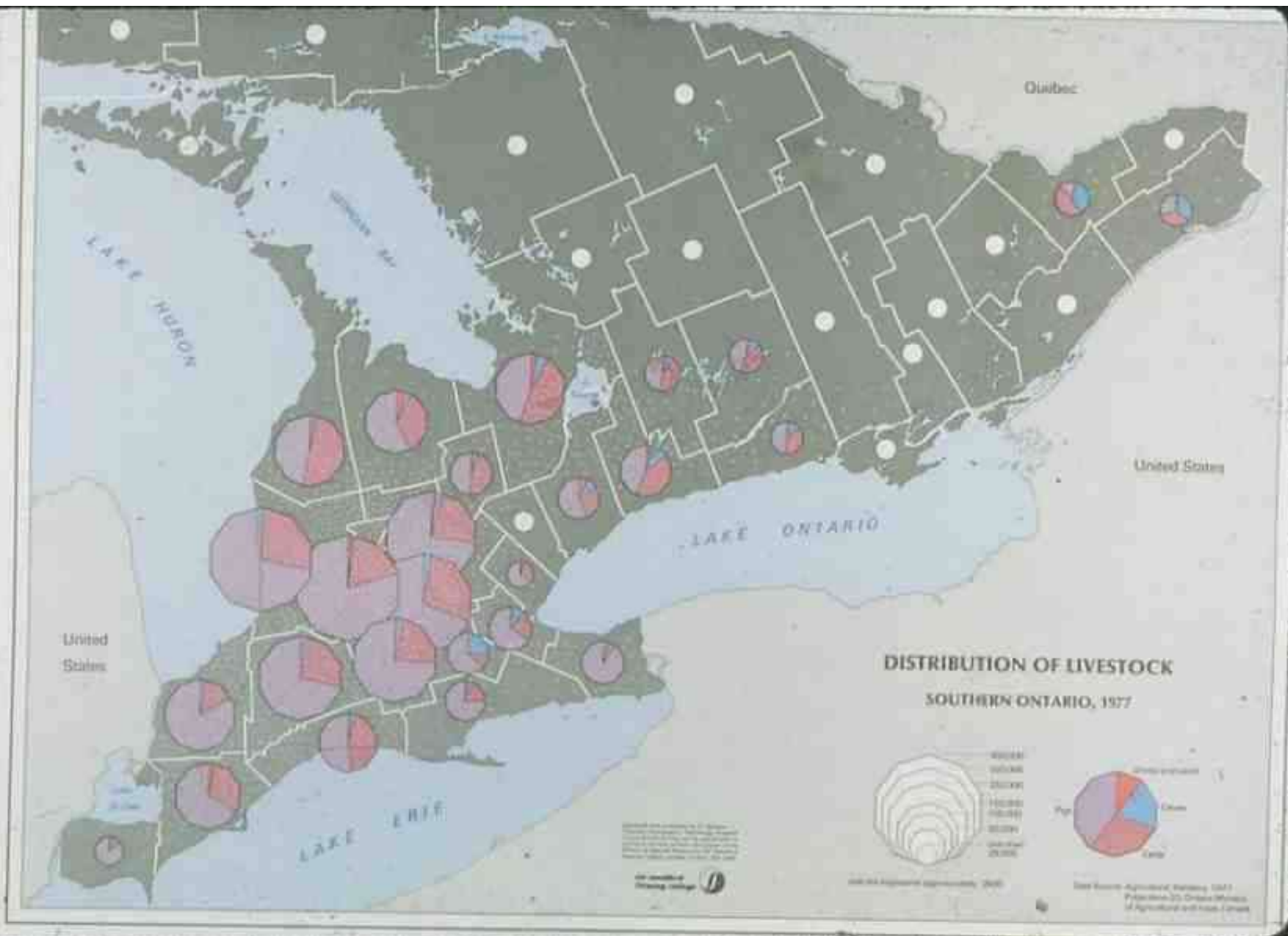


## 6. Segmented Proportional Symbols

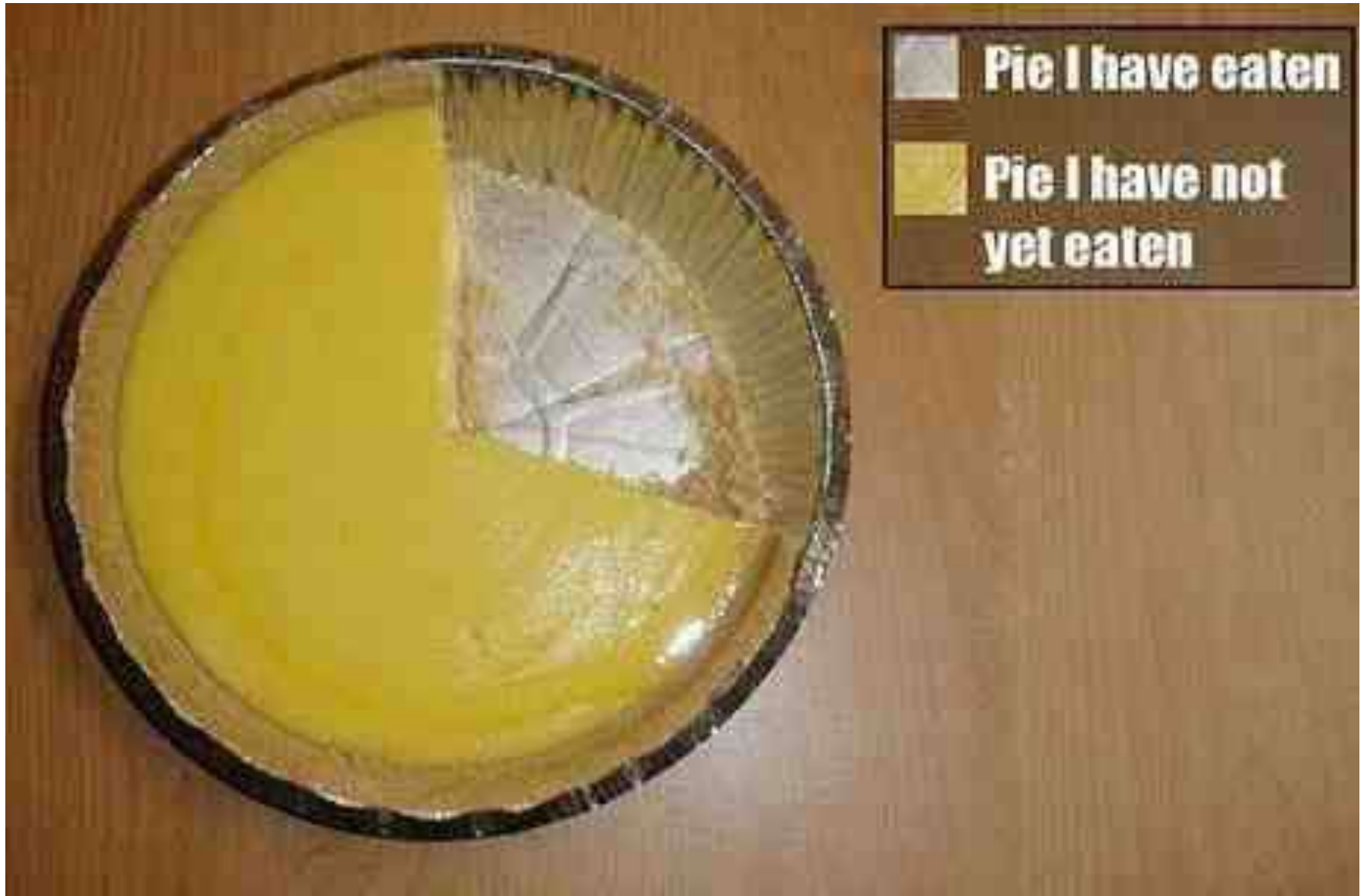
Circles are divided into 'pie' sections, starting at the '12 o'clock' position and progressing clockwise round, always in the same sequence for the subdivisions.



# Segmented proportional symbols - decagons (loonies?)



## Segmented symbols / Pie chart humour



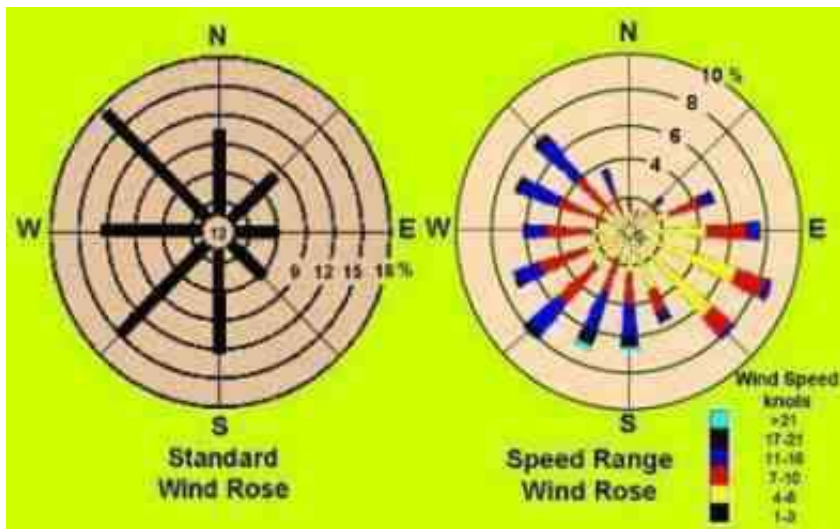


# Alternative segmented circles

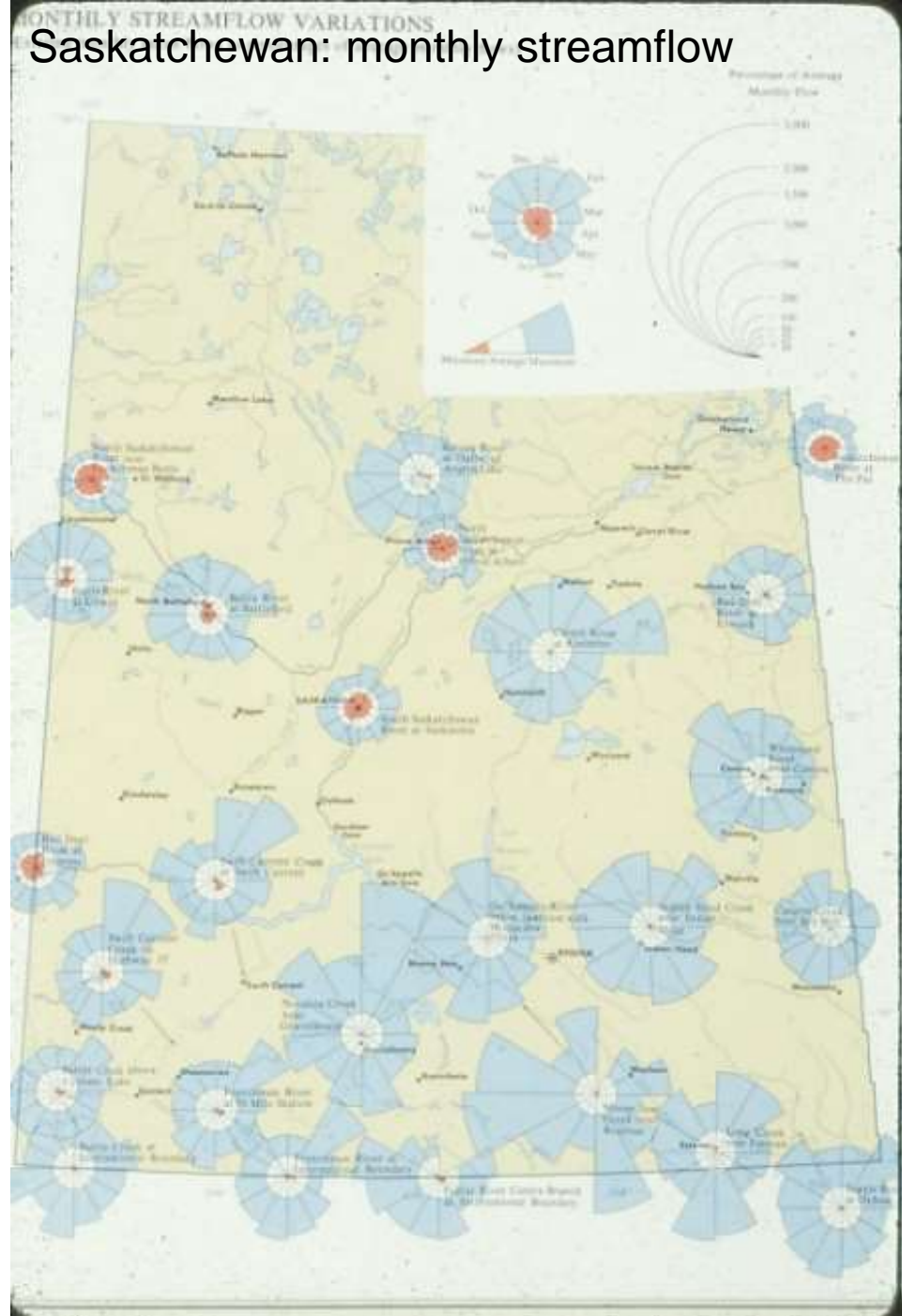
## 'polar diagrams'

'pie sections' are kept equal in number of degrees, but vary in radius, according to the value.

This is used where it is important to directly compare the constituent values, e.g. [river flow](#) over 12 months, or wind speeds from the 8 cardinal directions (a 'wind rose').



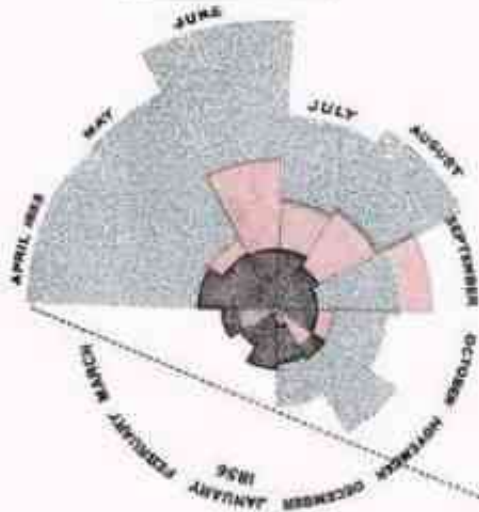
## Saskatchewan: monthly streamflow



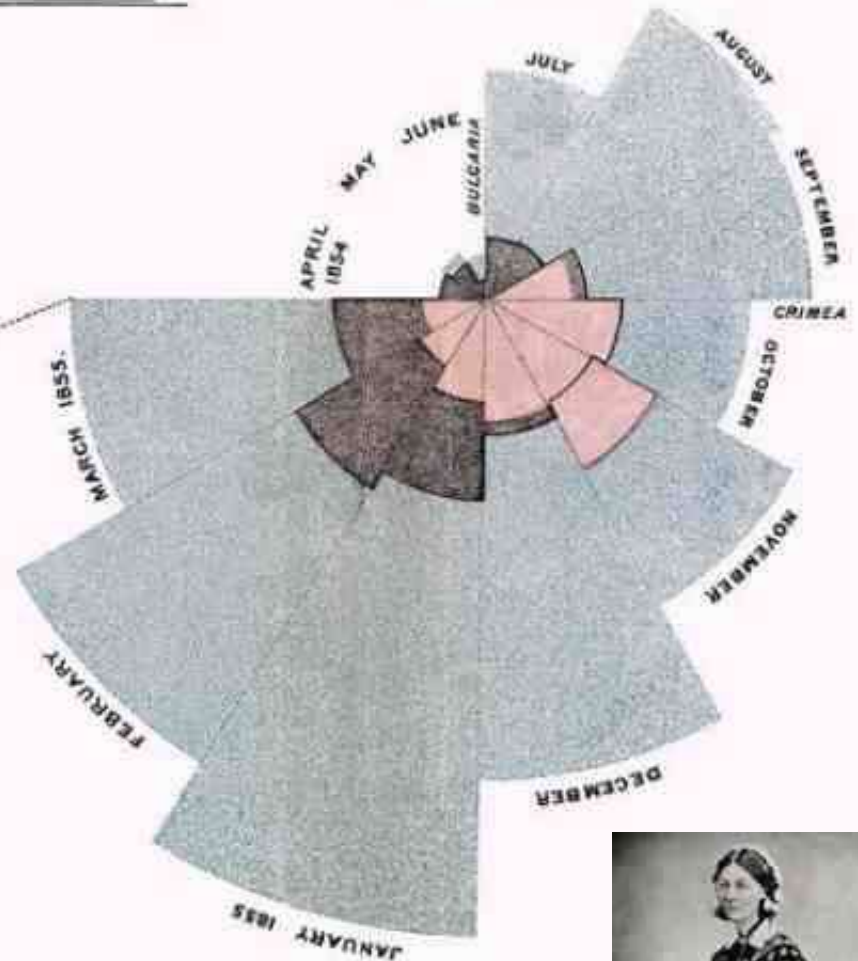


# DIAGRAM OF THE CAUSES OF MORTALITY IN THE ARMY IN THE EAST.

APRIL 1855 TO MARCH 1856.



APRIL 1854 TO MARCH 1855.



The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.

The blue wedges measured from the centre of the circle represent area for area the deaths from Preventable or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes.

The black line across the red triangle in Nov' 1854 marks the boundary of the deaths from all other causes during the month.

In October 1854, & April 1855, the black area coincides with the red; in January & February 1856, the blue coincides with the black.

The entire areas may be compared by following the blue, the red & the black lines enclosing them.

## Polar diagrams

Florence Nightingale



## 7. Volumetric graduated symbols:

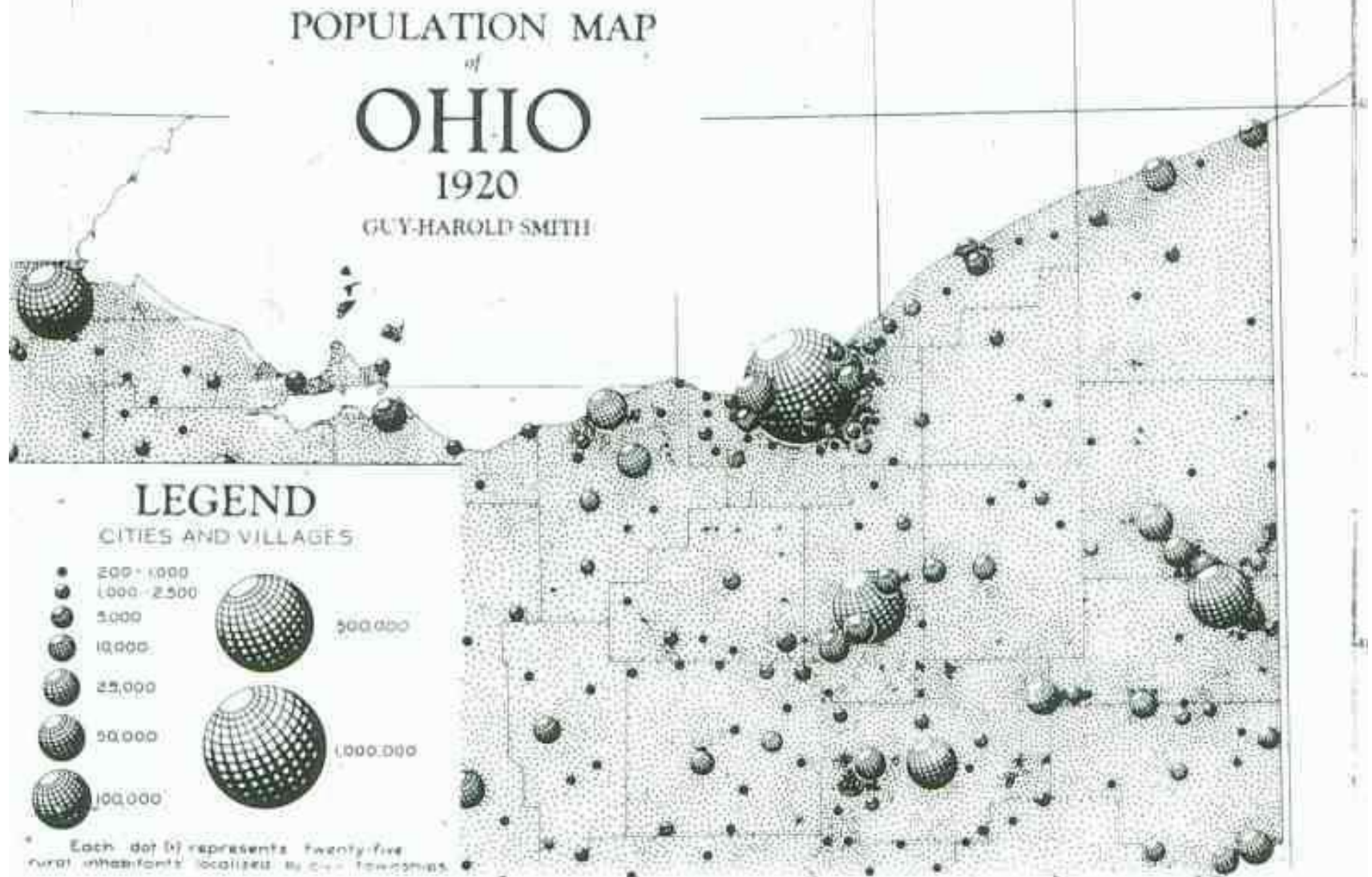


Figure 6.13 A portion of a population map of Ohio (1920) drawn by Guy-Harold Smith. Compare with Fig. 6.8. (Courtesy of the author and *The Geographical Review*, published by the American Geographical Society of New York.)



They are visually 3D, and apply a value proportional to perceived volume.



These can handle even greater data range than circles, -> a sphere radius is proportional to the cubed root of values e.g. 1:1000 becomes 1:10.

# Infographic: Other shapes are possible: cubes, any 3D shape



Not easily segmented

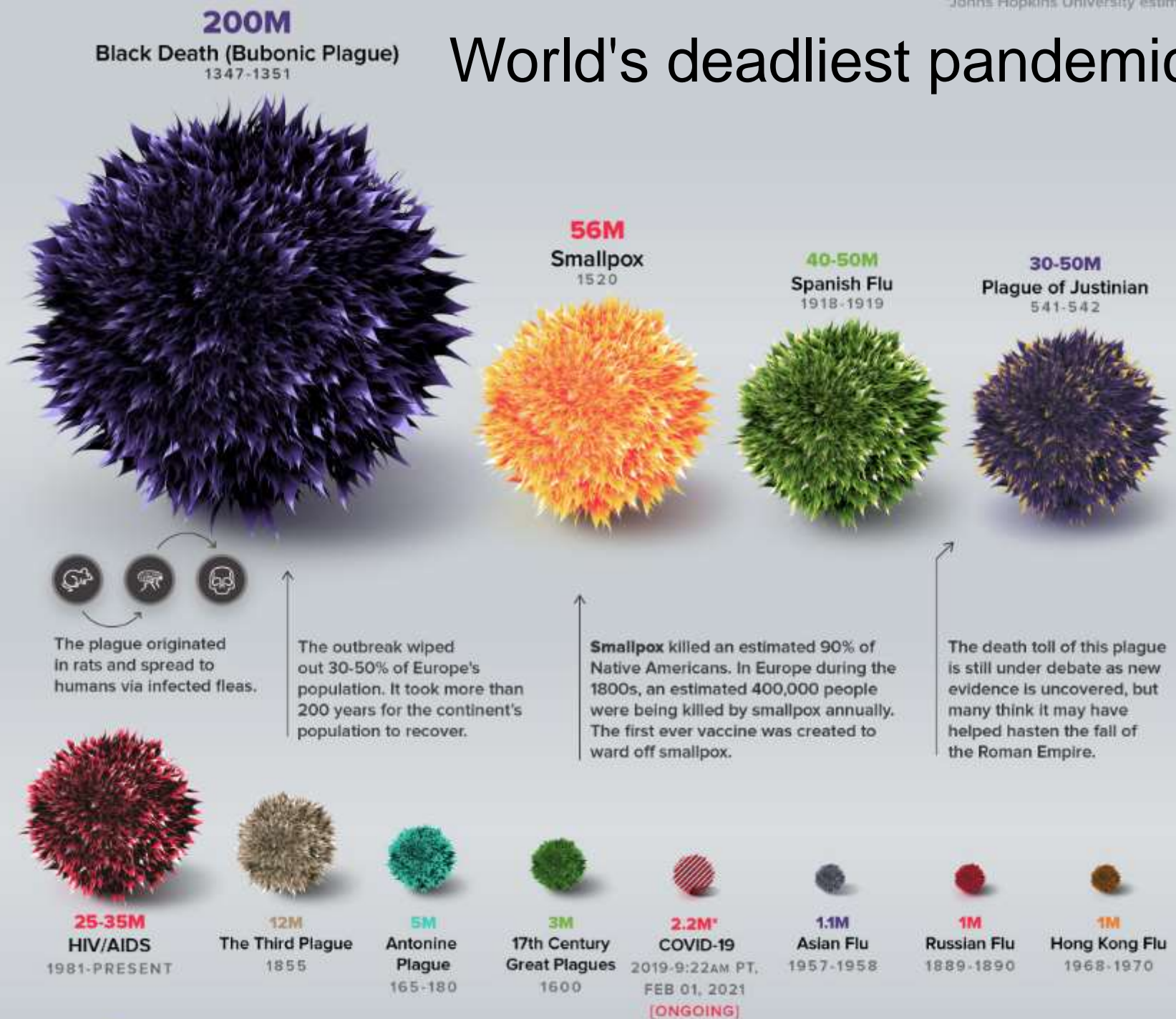


# Infographic

## English Wine Cask Units



# World's deadliest pandemics



'Thematic  
← Scale'

# Summary – thematic point techniques

- Dot maps (and other same-size shapes)

## Graduated symbols

Bar – linear (1D) proportional symbol

Circle – 2D proportional symbol (and other shapes)

- Range graded symbols – classed by size
- Segmented symbols – subdivided by subcategories

Spheres – 3D proportional (volumetric) symbol

# Line techniques: 1. Graduated line symbols:

are used to indicate movement or FLOW (line width = amount)

36 Chapter Six

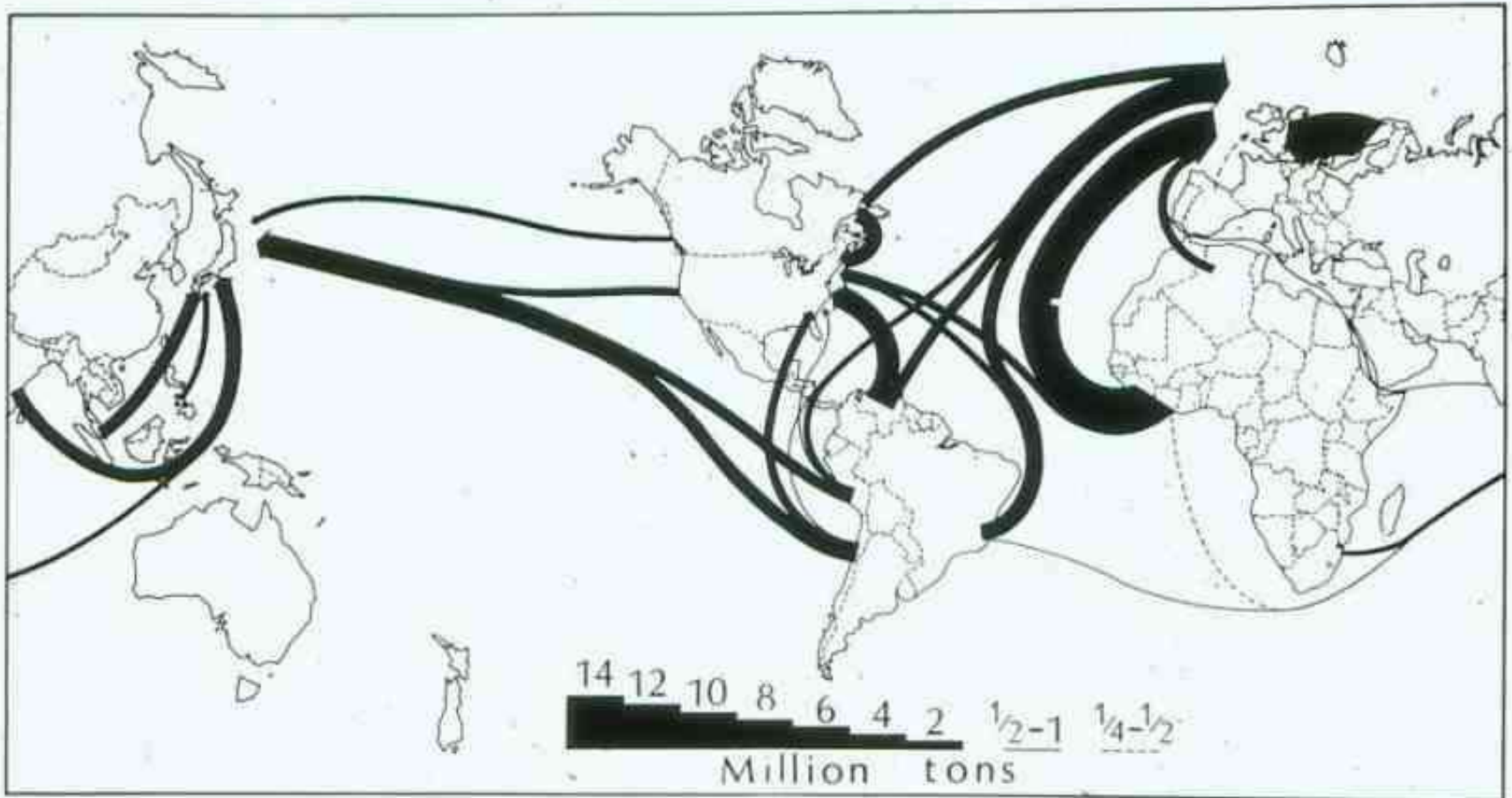
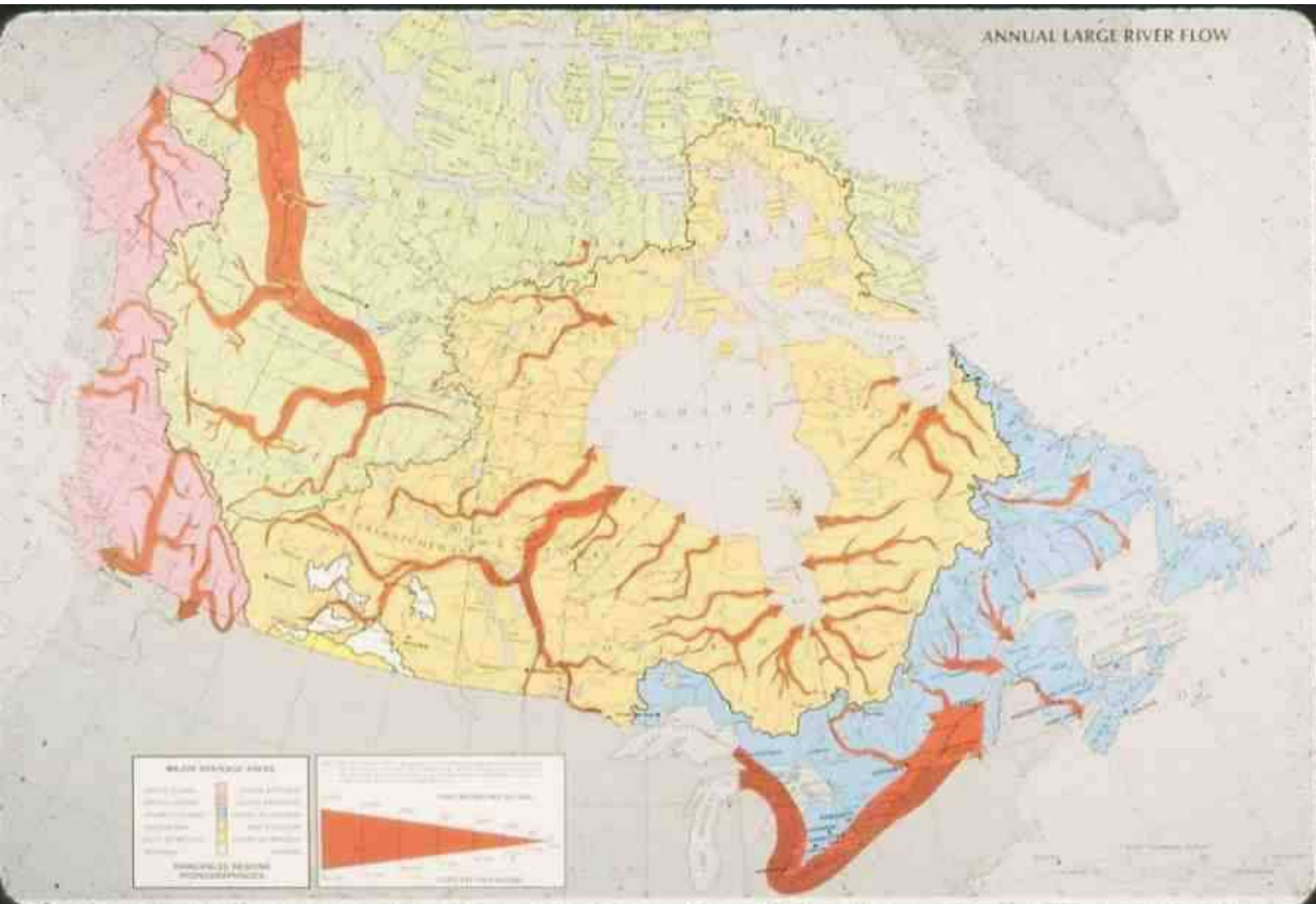


Figure 6.21 A portion of a flow-line map showing the movement of iron ore. Map by G. B. Lewis. (From G. Manners, "Transport Costs, Freight Rates, and the Changing Economic Geography of Iron Ore", *Geography*, 52 (1967), 260-279.)



# River volume – Canada 'flow'



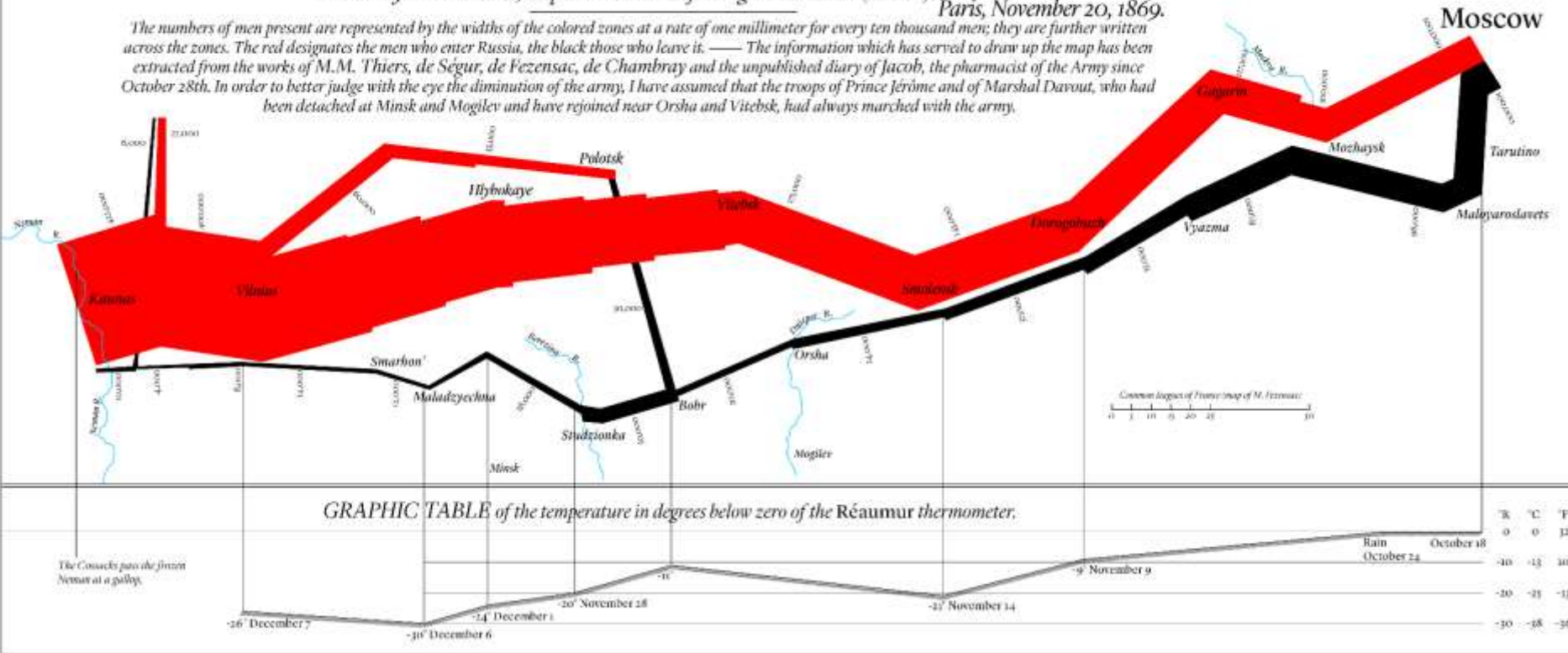
# Napoleon's retreat from Moscow

## Figurative Map of the successive losses in men of the French Army in the Russian campaign 1812 ~ 1813

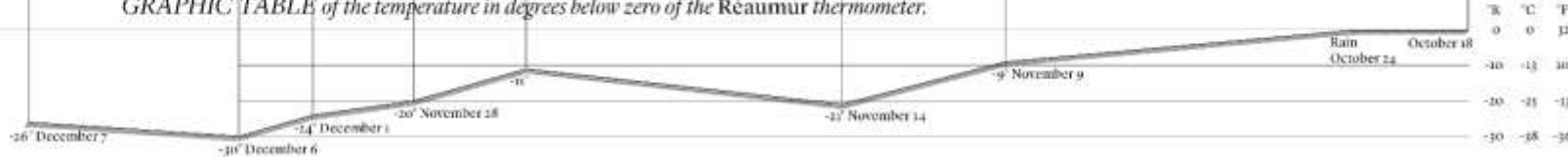
Drawn by M. Minard, Inspector General of Bridges and Roads (retired).

Paris, November 20, 1869.

The numbers of men present are represented by the widths of the colored zones at a rate of one millimeter for every ten thousand men; they are further written across the zones. The red designates the men who enter Russia, the black those who leave it. — The information which has served to draw up the map has been extracted from the works of M.M. Thiers, de Ségur, de Fezensac, de Chambray and the unpublished diary of Jacob, the pharmacist of the Army since October 28th. In order to better judge with the eye the diminution of the army, I have assumed that the troops of Prince Jérôme and of Marshal Davout, who had been detached at Minsk and Mogilev and have rejoined near Orsha and Vitebsk, had always marched with the army.



## GRAPHIC TABLE of the temperature in degrees below zero of the Réaumur thermometer.

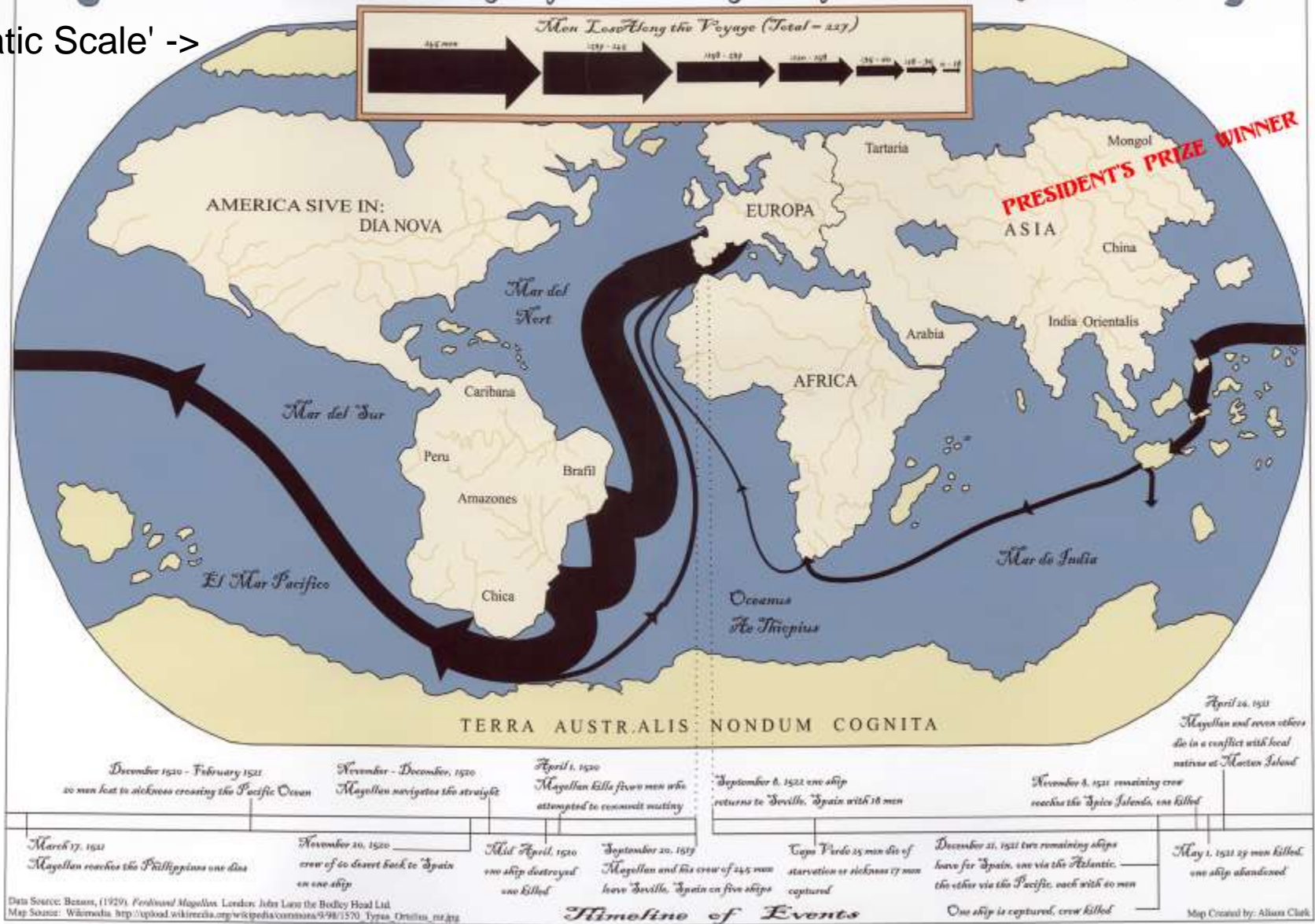


The Cossacks pass the frozen Niemen at a gallop.



# Peril at Sea: The men lost during the first circumnavigation of the world, Magellan 1519 - 1522

'Thematic Scale' ->



# Softwood Lumber Exports from British Columbia in 2014

