Thematic mapping: 1. point symbols

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

Quantitative thematic point maps
Design focus: overall distribution

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

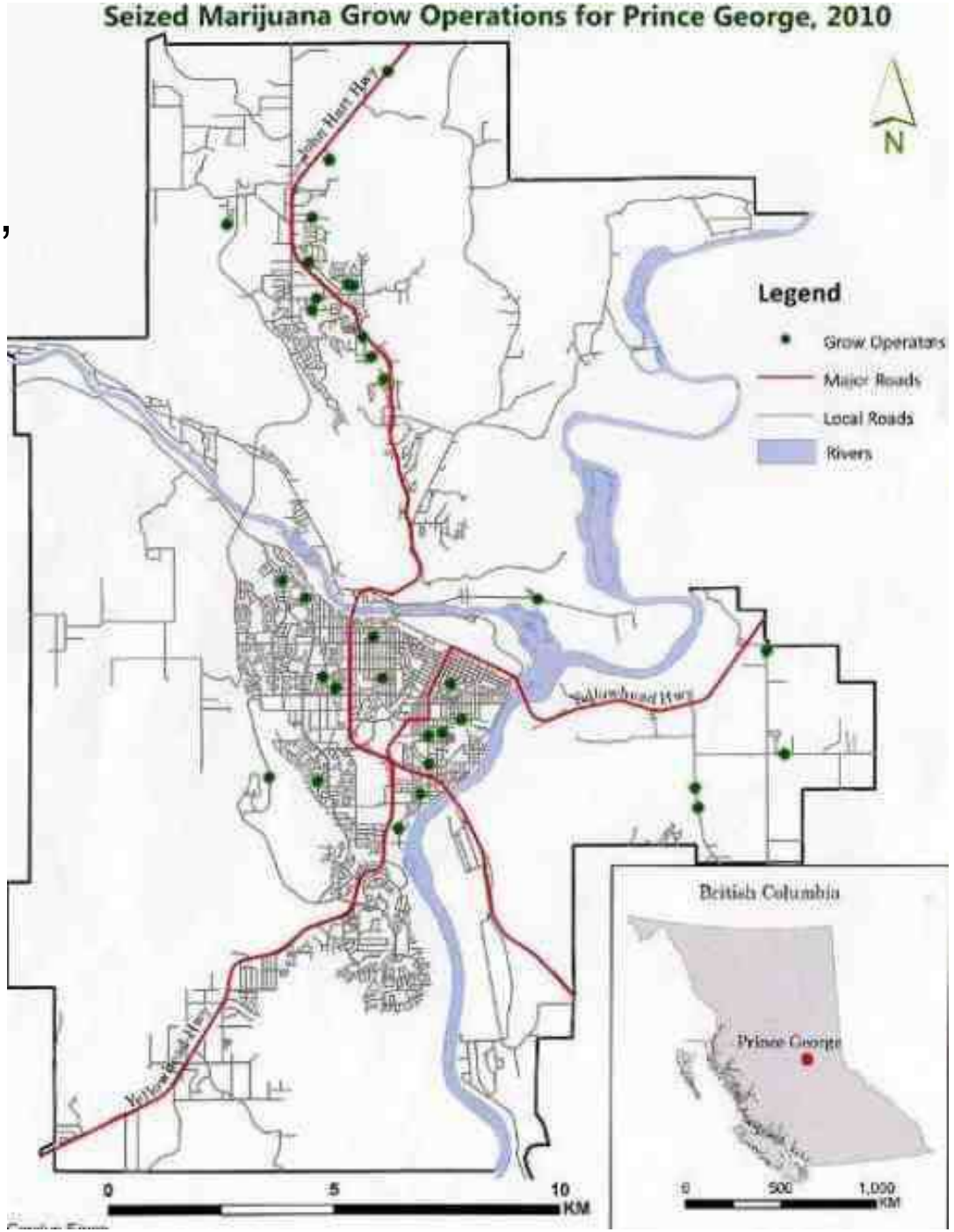
1. Dot maps

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.

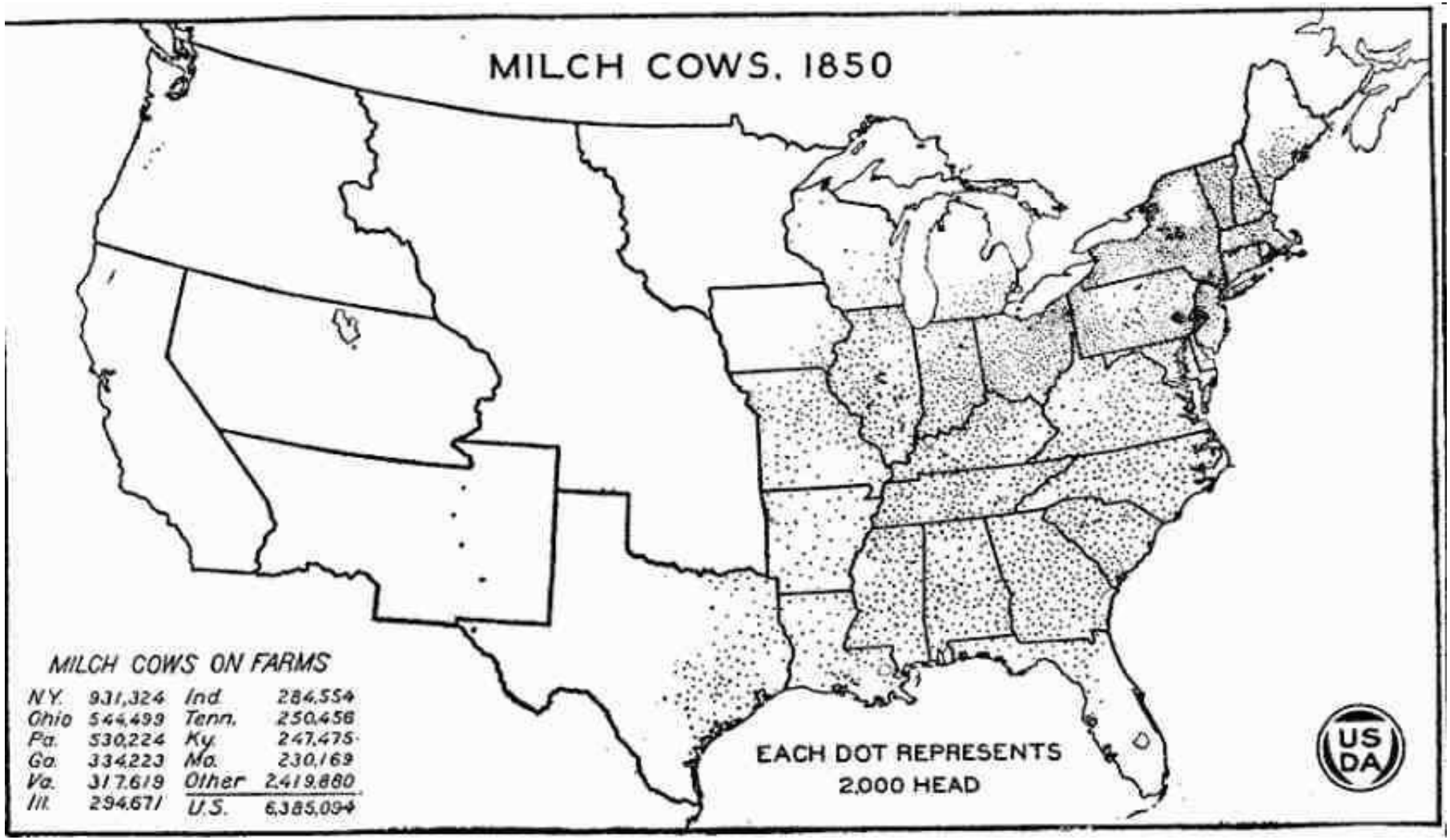
1 dot for each fatality

Example of a ‘dot map’

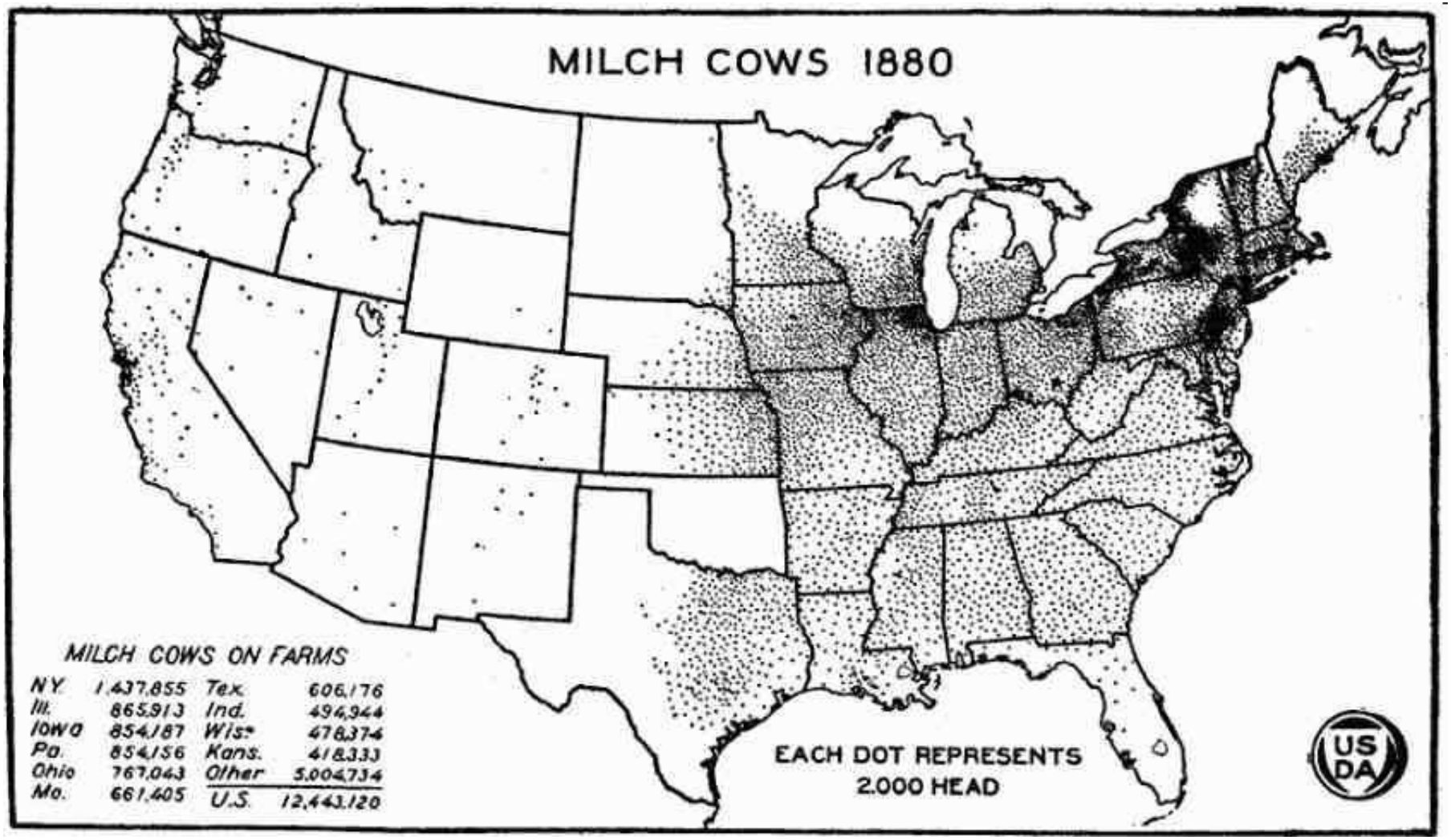
1 dot for each event



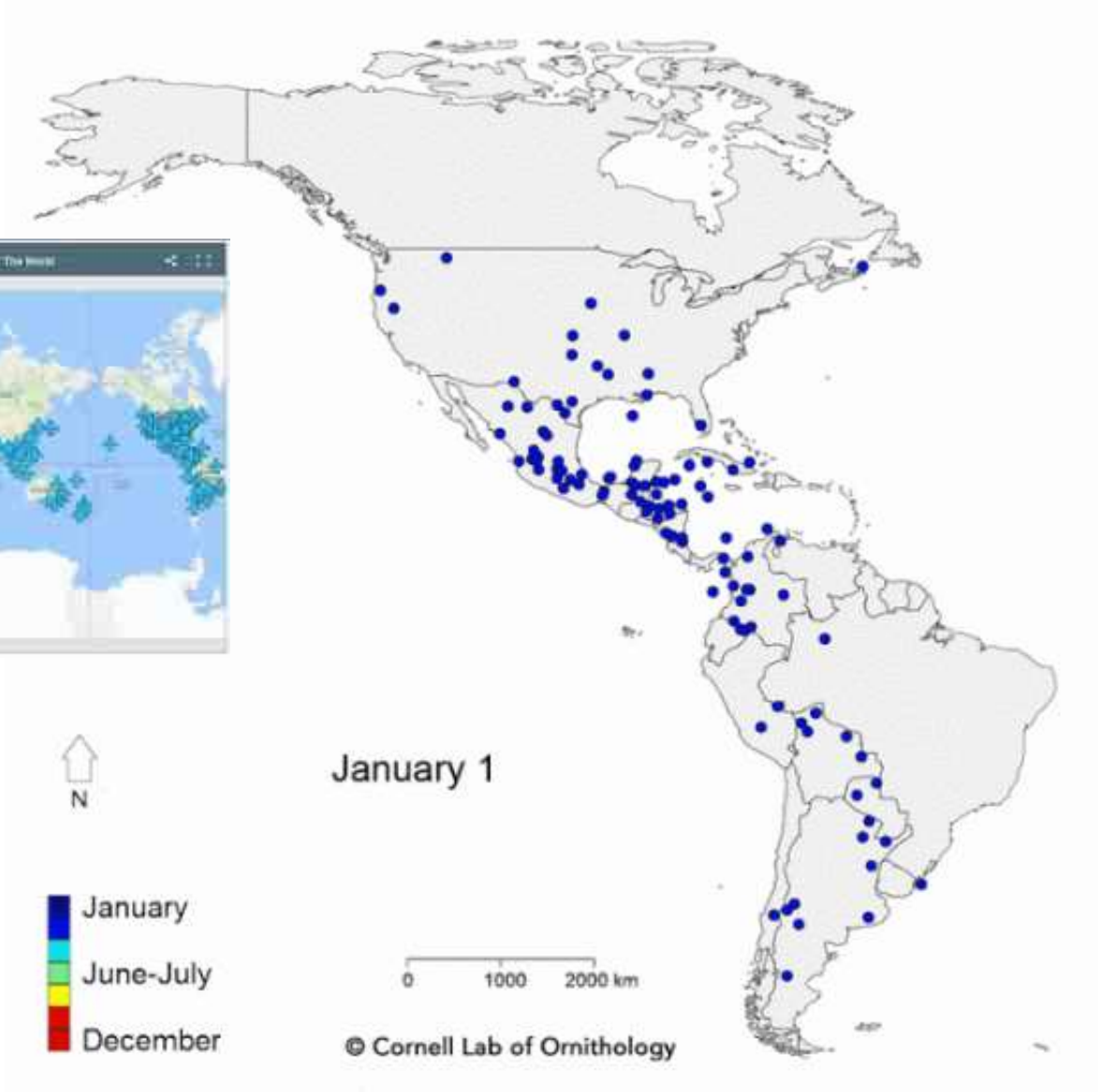
Using a dot scale (1 dot = 2000 cows)



Dot maps – easy to draw, simple to understand



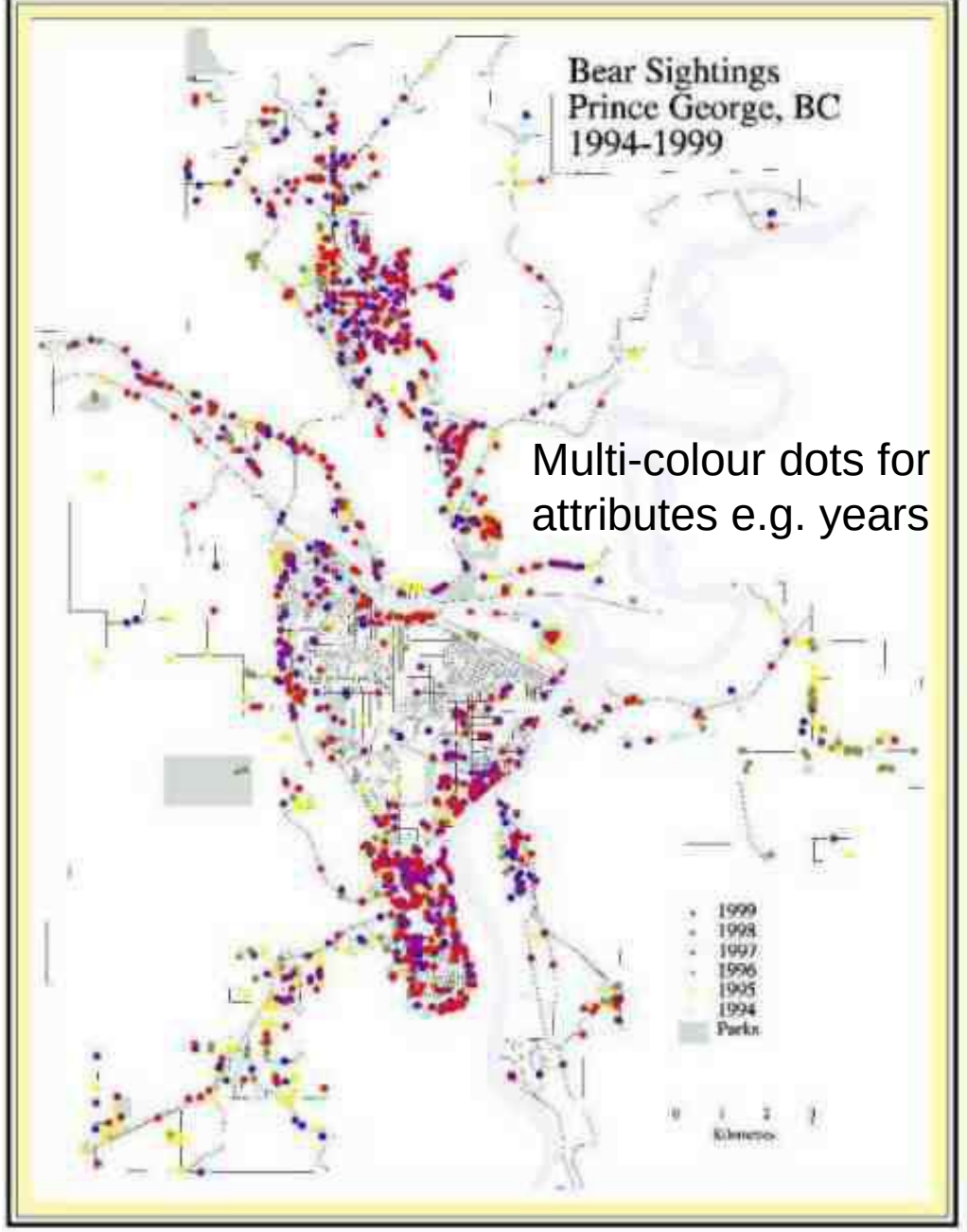
It gives a quick visual impression, but a poor estimate of actual numbers.



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

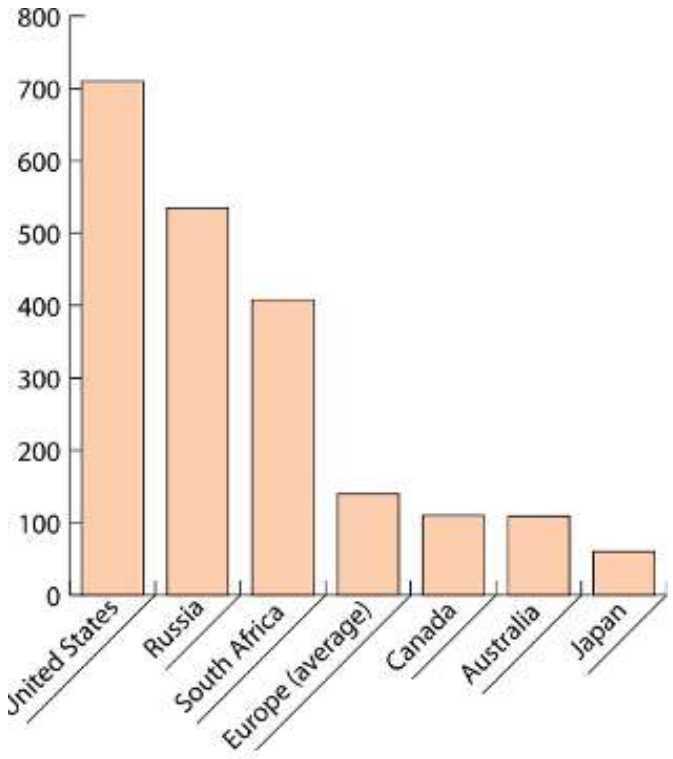


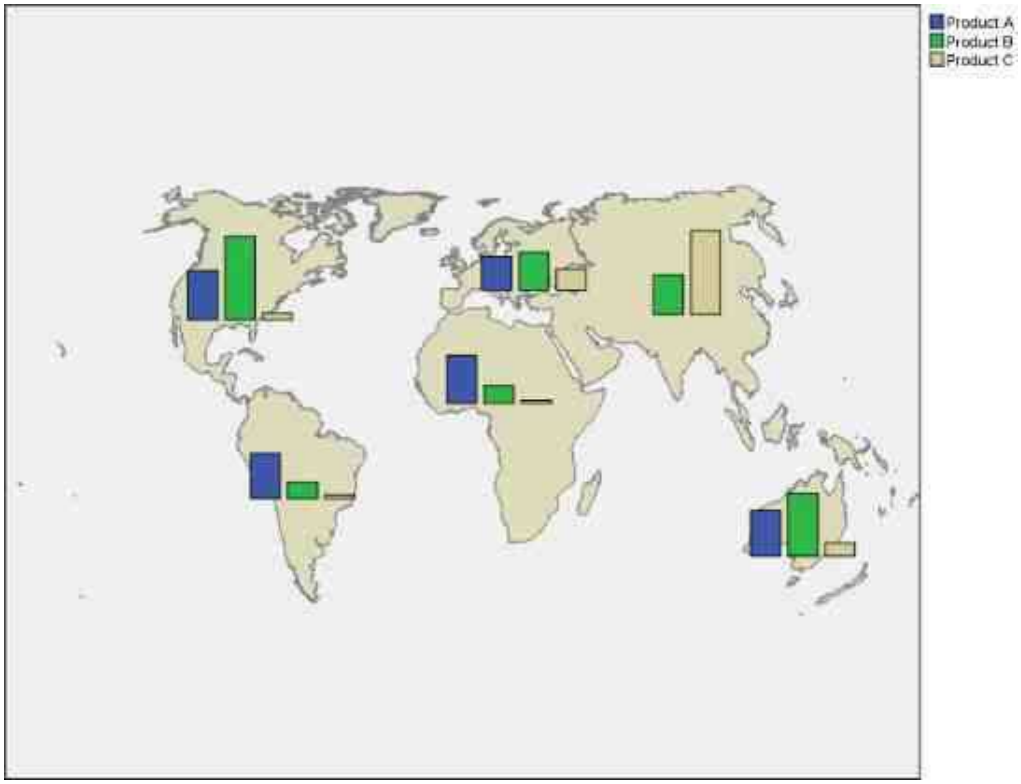
It breaks down when: exact locations are not feasible OR there are too many locations
Then instead we use a variable size symbol, where size = number of occurrences

2. Proportional Symbols - bars

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

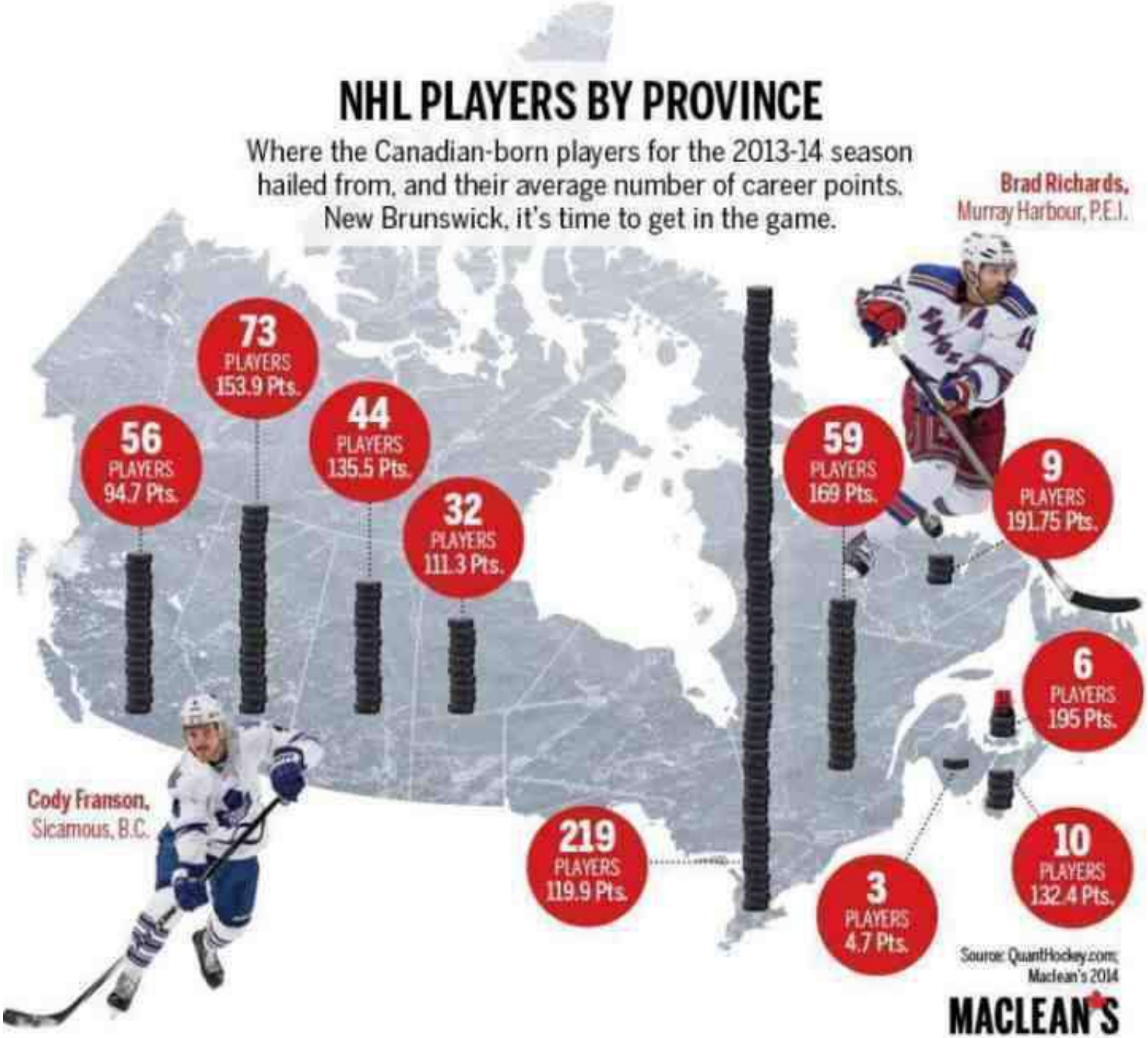
Proportional bars:
The height of the bar is proportional to the value represented
e.g. as in a bar chart





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.



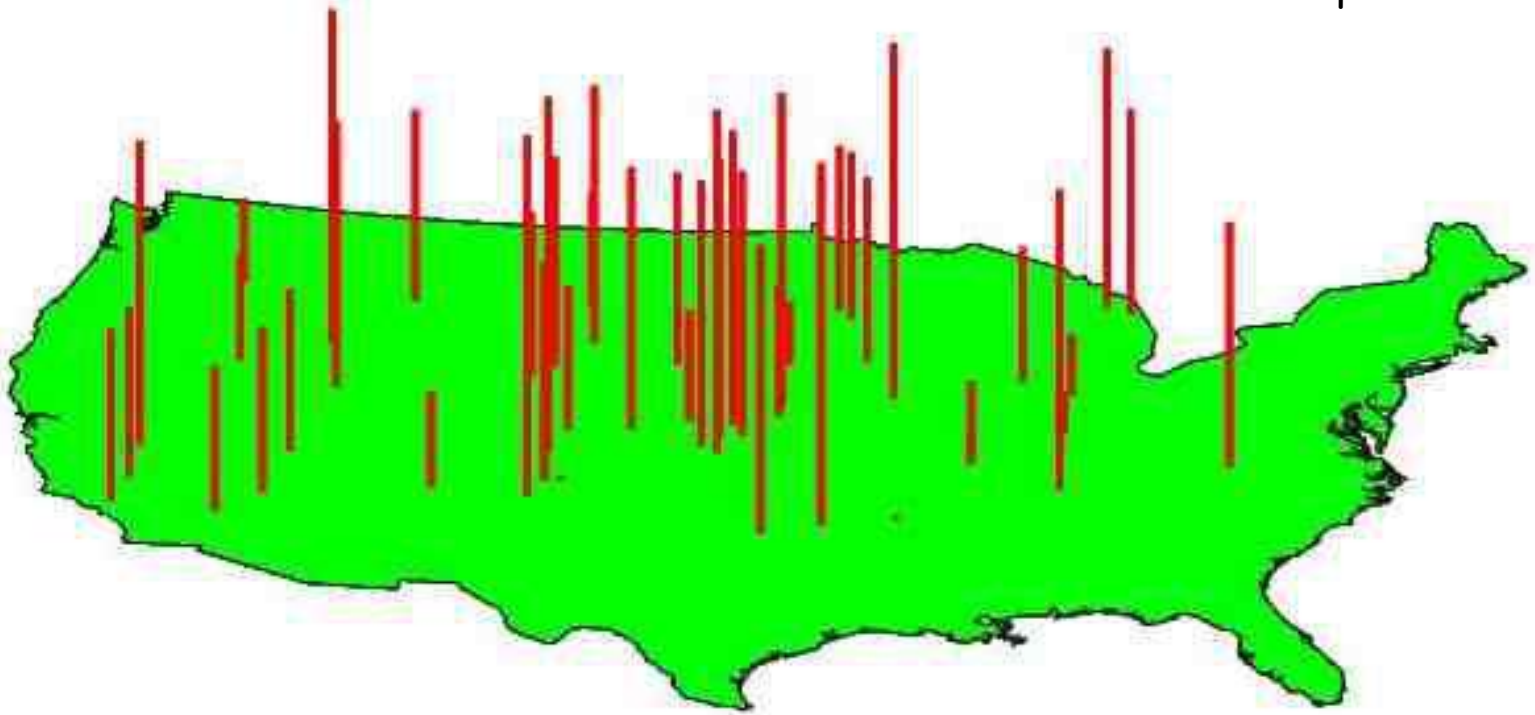
Source: QuantHockey.com; Maclean's 2014

MACLEAN'S

Height scale is designed to show the data range best

Smallest – visible; largest – not too big

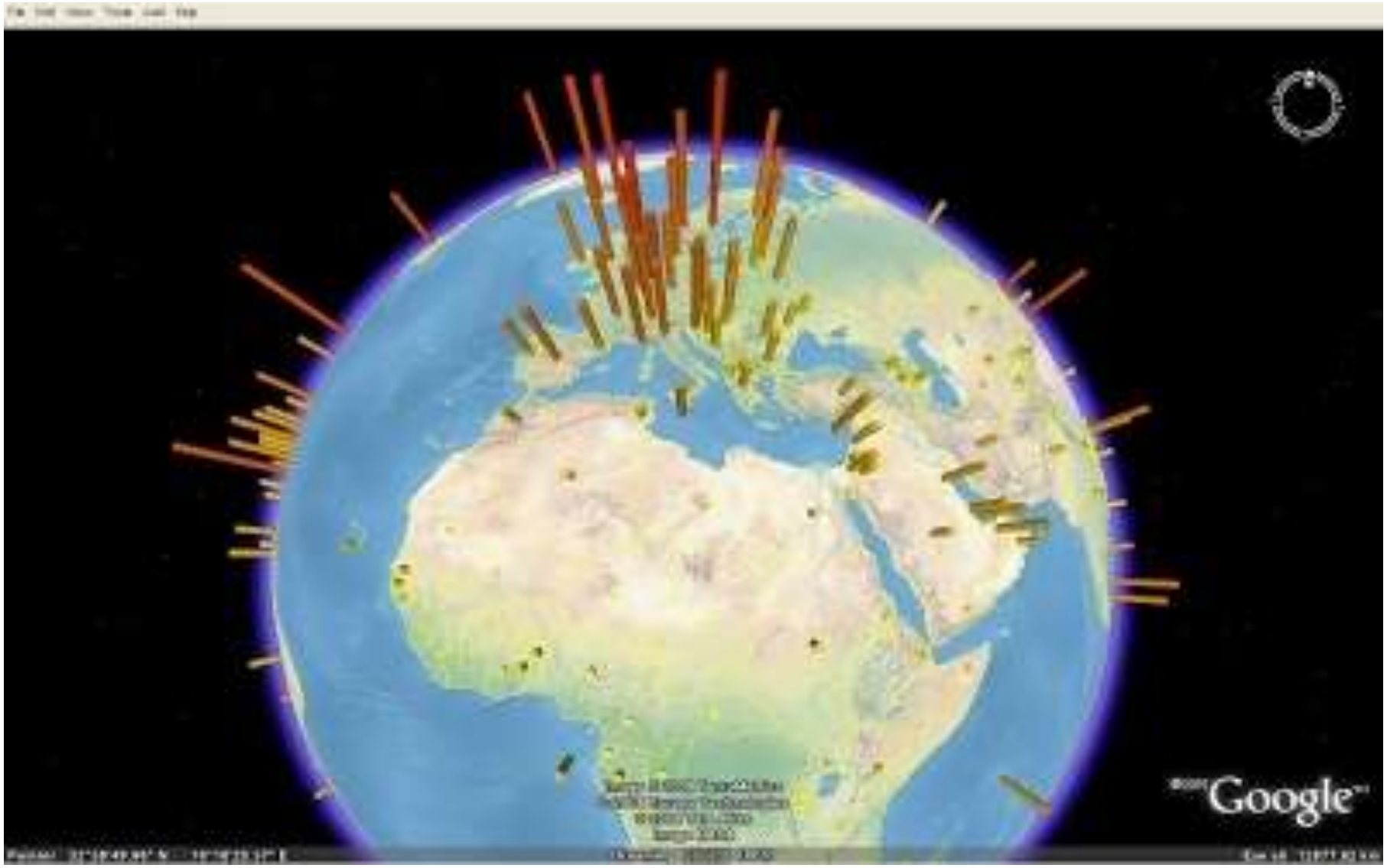
the base should be inside the area or centred at the base at the point



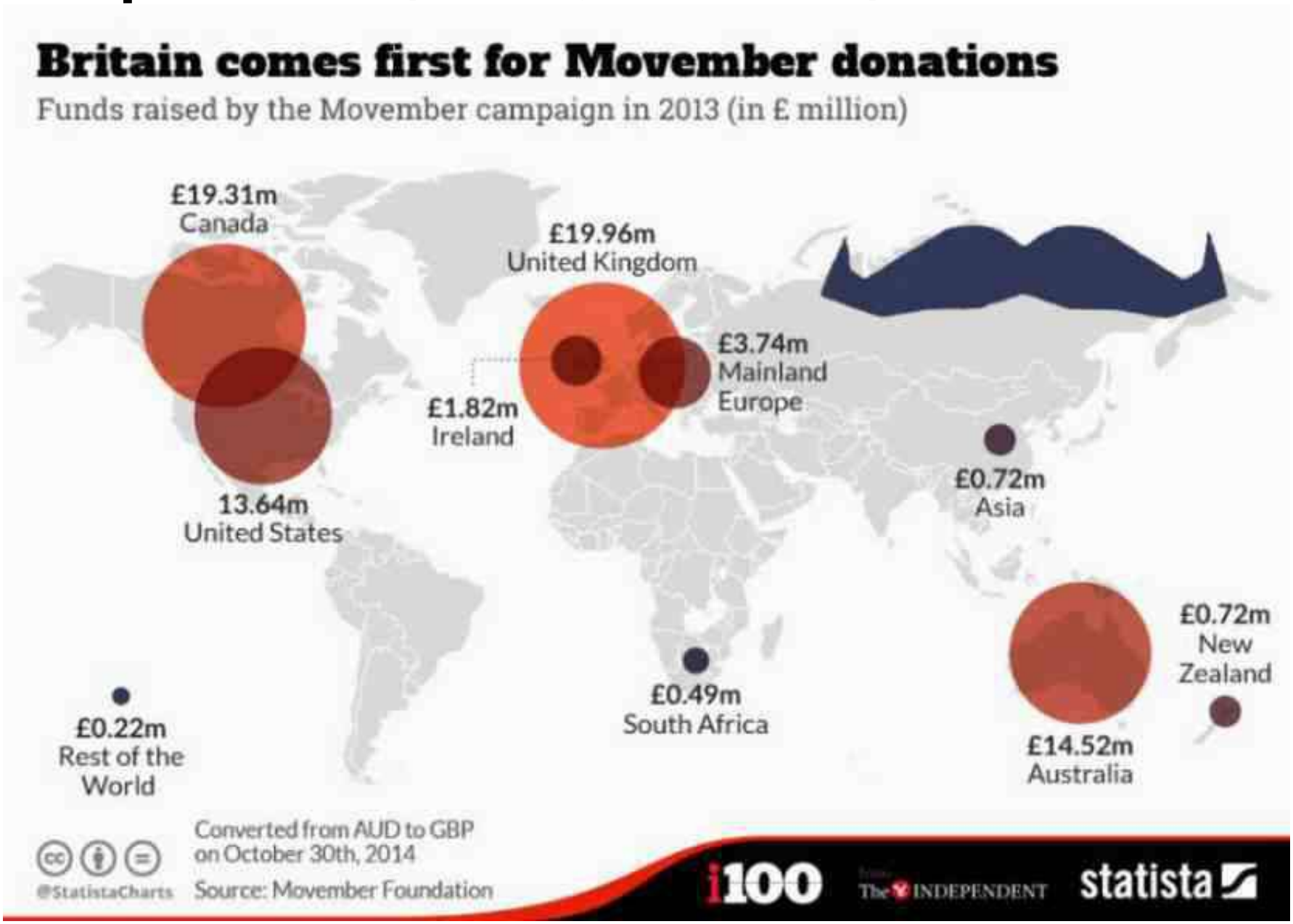
Bars break down with extreme data range: then we need to use a 2D symbol whose area is proportional to value, instead of height (only 1D). The most common is the circle….

http://thematicmapping.org

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

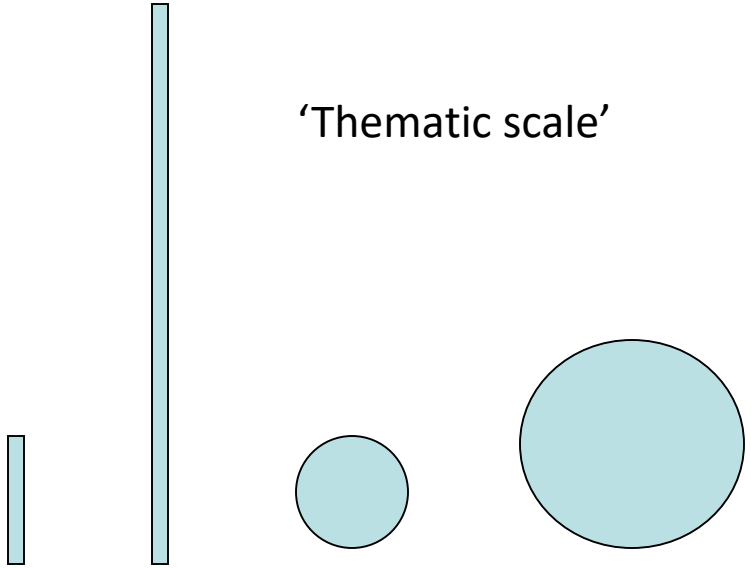


3. Proportional (formerly 'Graduated') circles ....



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

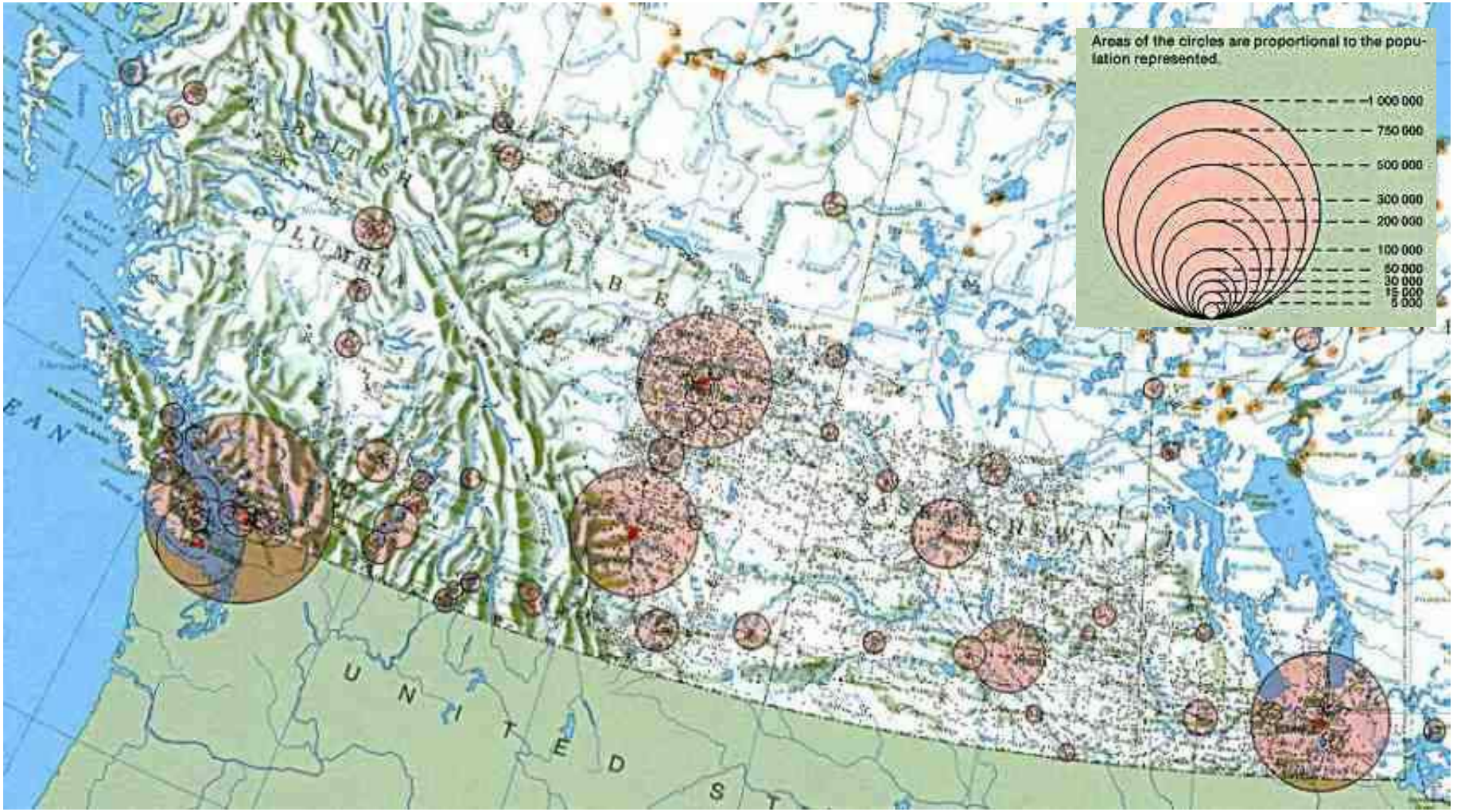


Bars are **proportional in height to the value**

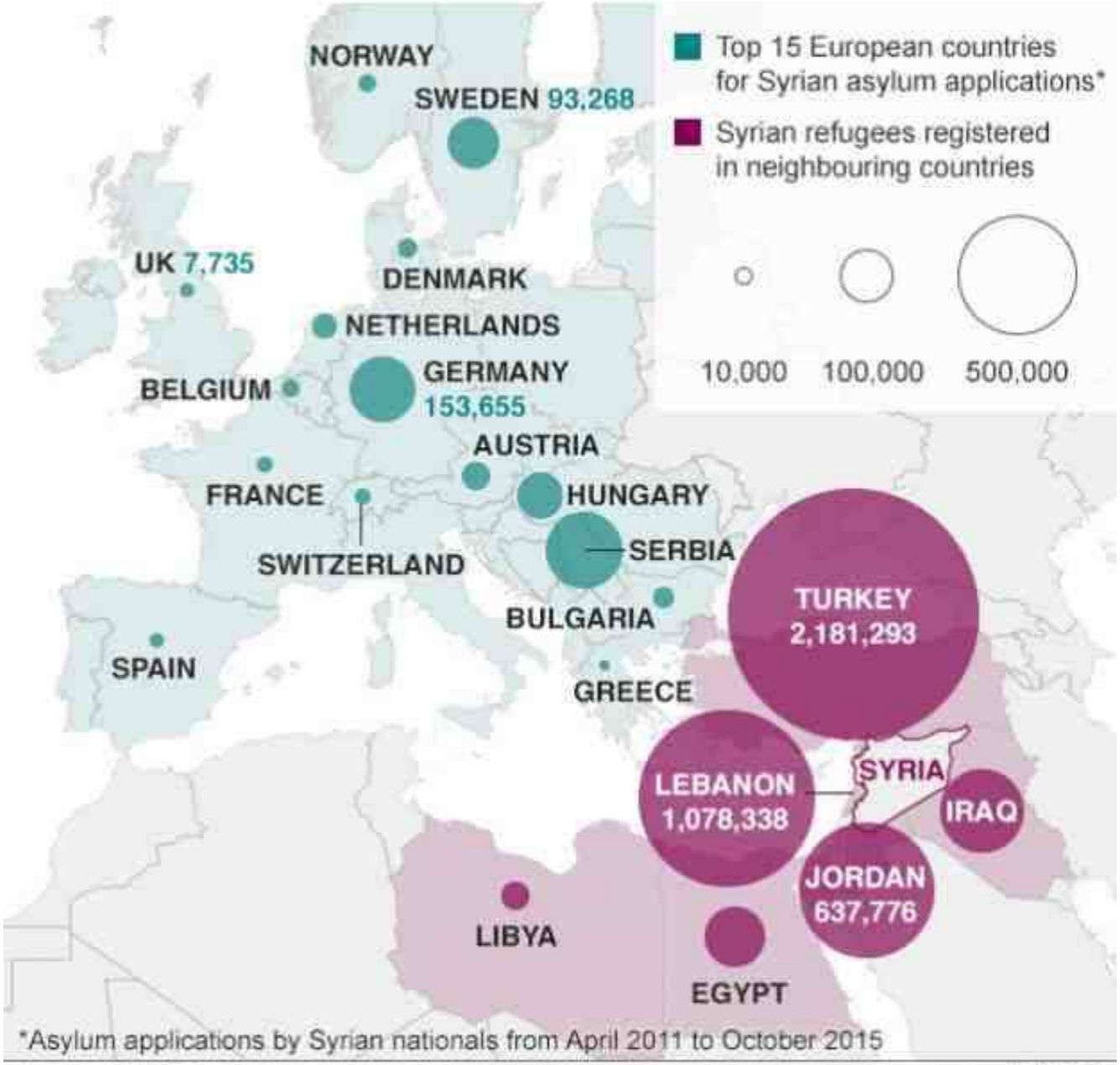
Circle **areas** are proportional to the value –
…the radius is proportional to **square root of the value**

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



*Asylum applications by Syrian nationals from April 2011 to October 2015

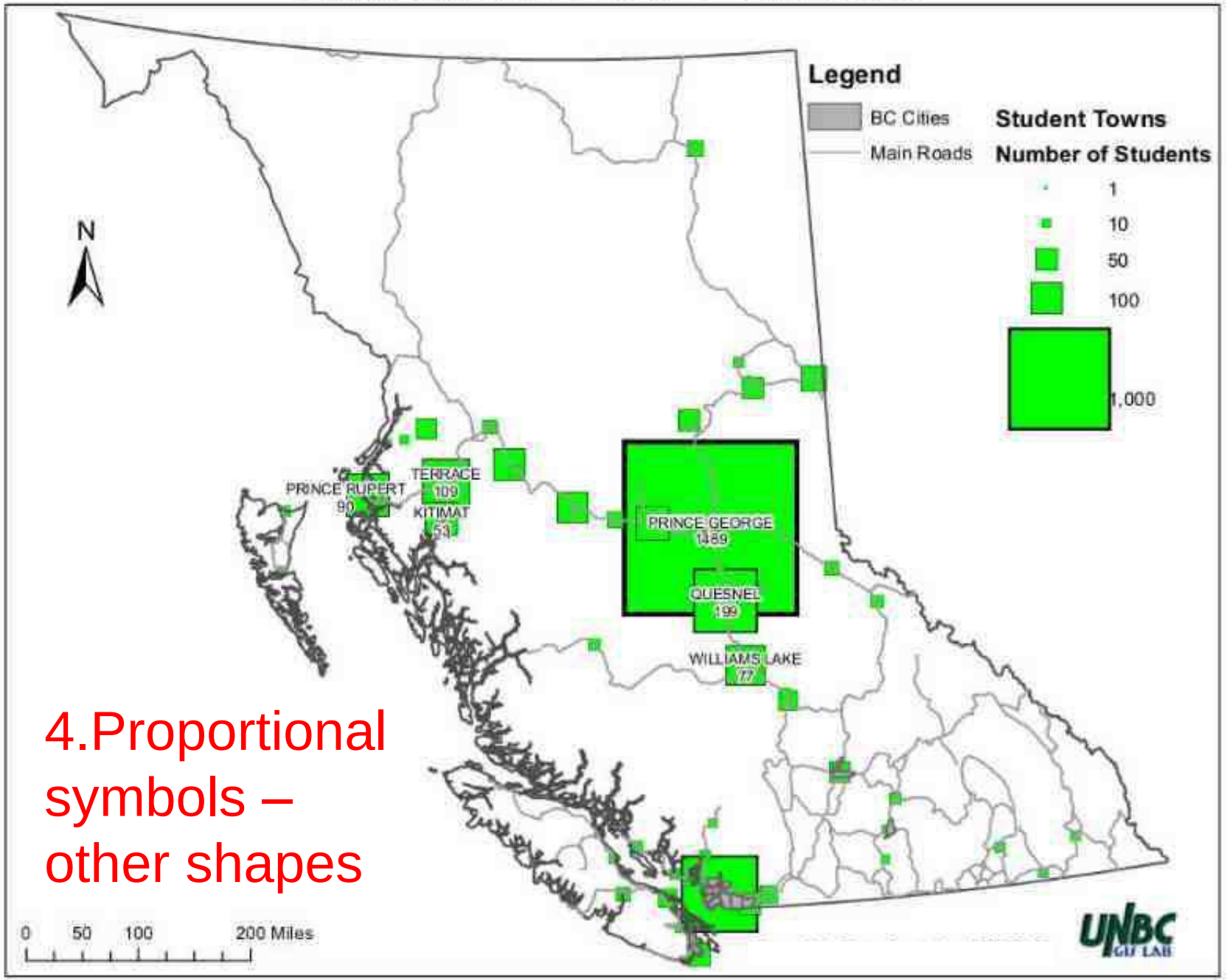
Source: UNHCR

BBC

Coronavirus websites

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

Distribution of UNBC Students



4.Proportional symbols – other shapes

USA election results 2016 (hexagons)

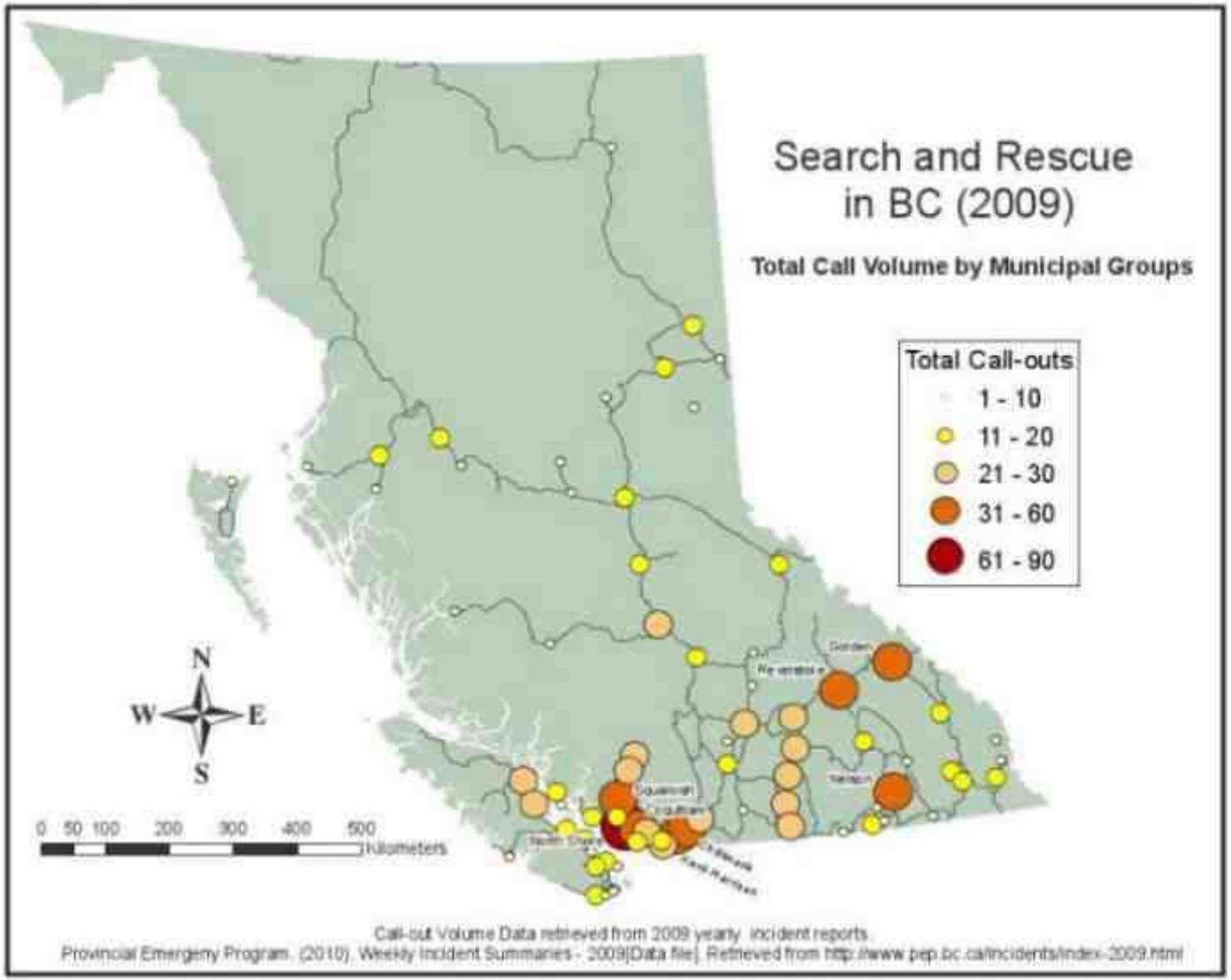
Facing the Presidential Election 2004

http://www.geog.ucsb.edu/~sara/html/mapping/electionVelection04/election.html

data source: ESRI, New York Times

* resemblance with a Hollywood actor is pure conspiracy theory

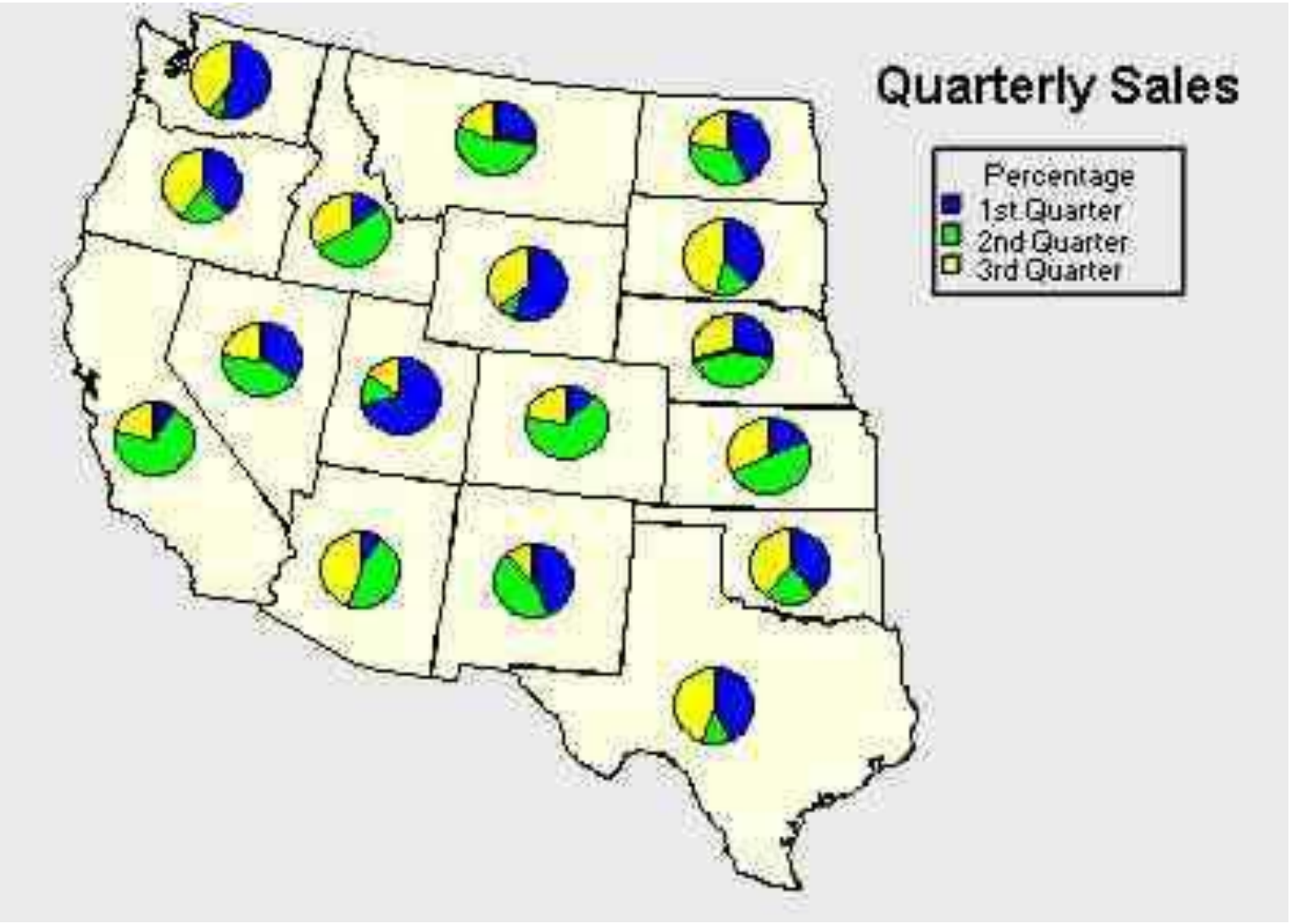
5. Graduated ('Range Graded') Symbols: grouped in classes



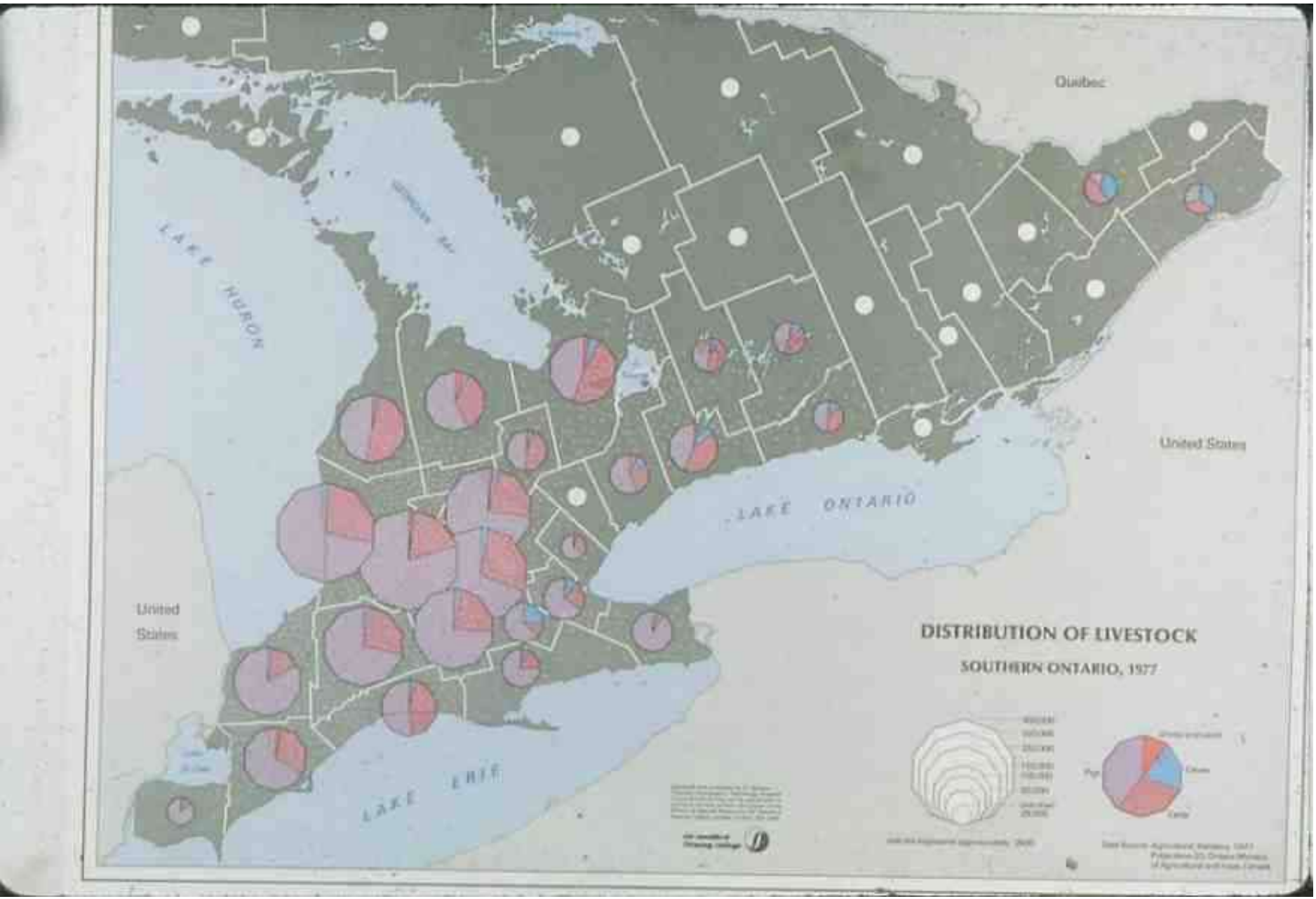
Where it is not feasible to keep all symbols individually proportional to their values, they can be grouped into classes and shown by a symbol size ~proportional to the class range central value. The design of these classes should be based on grouping similar values.

6. Segmented Proportional Symbols

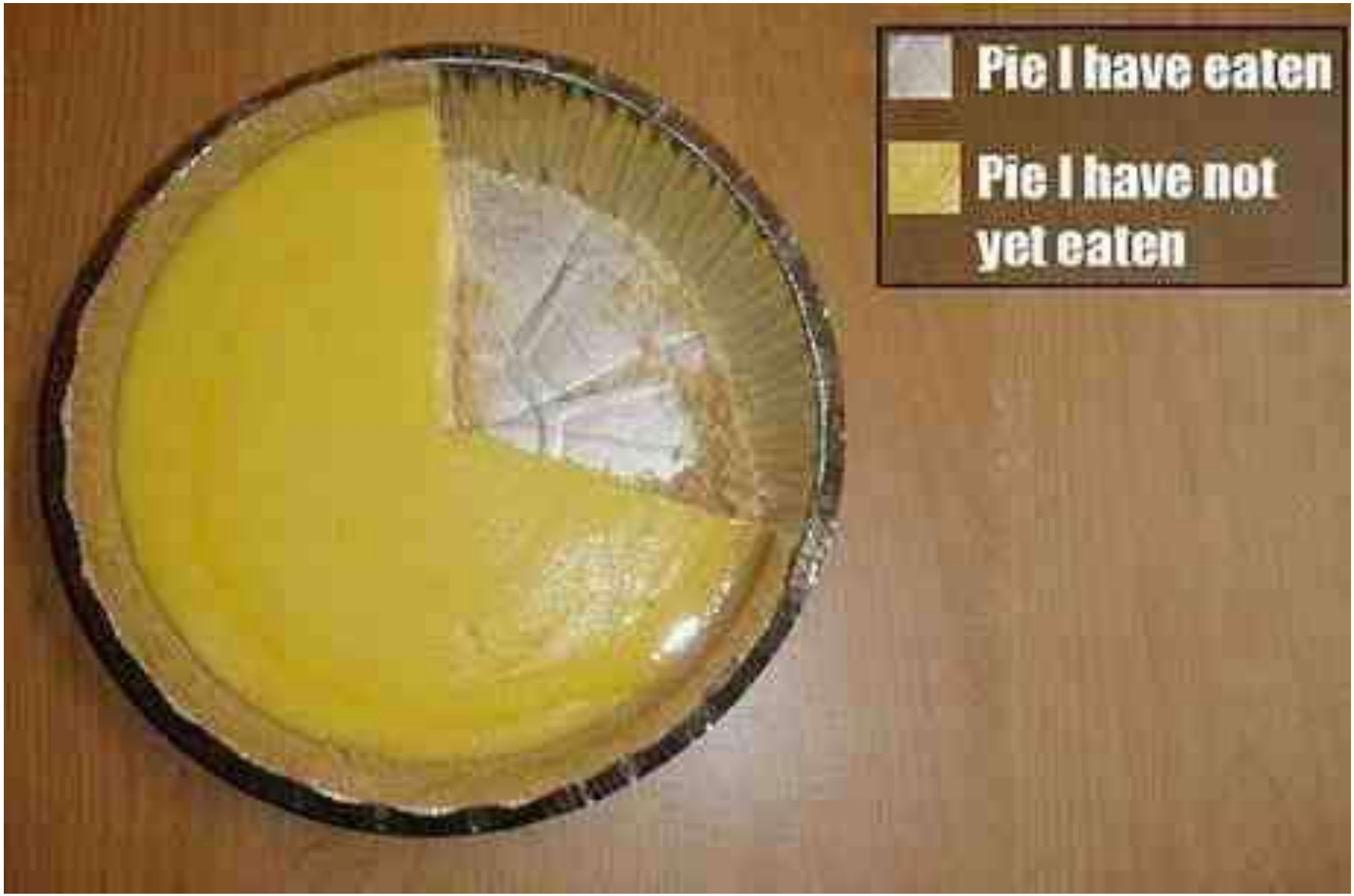
Circles are divided into 'pie' sections, starting at the '12 o'clock' position and progressing clockwise round, always in the same sequence for the subdivisions.



Segmented proportional symbols – decagons (loonies?)



Segmented symbols / Pie chart humour

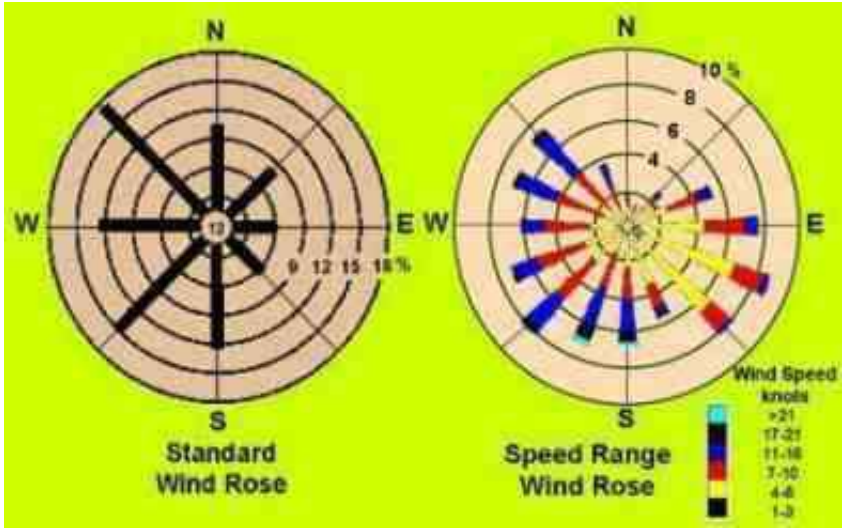


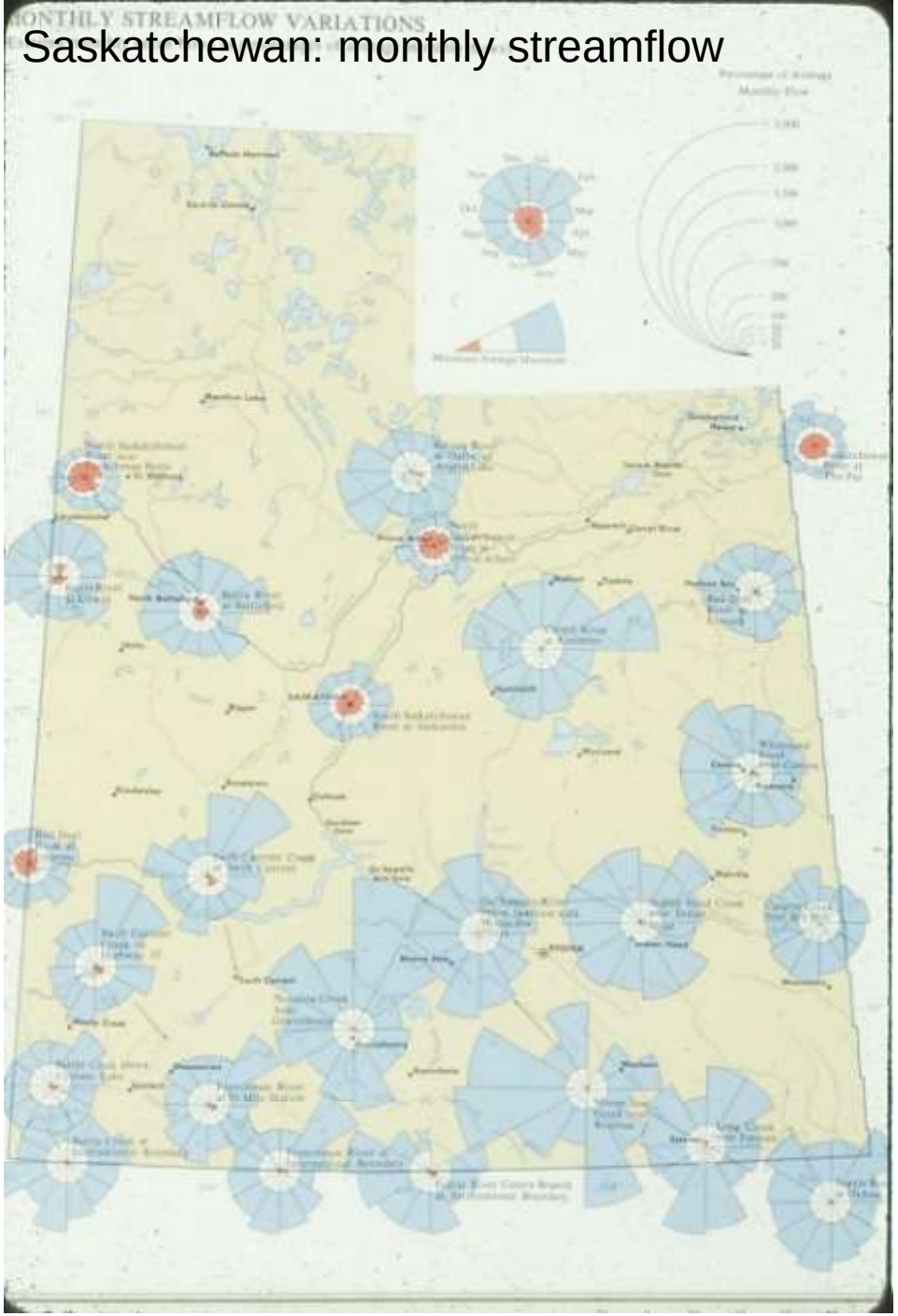
Alternative segmented circles

'polar diagrams'

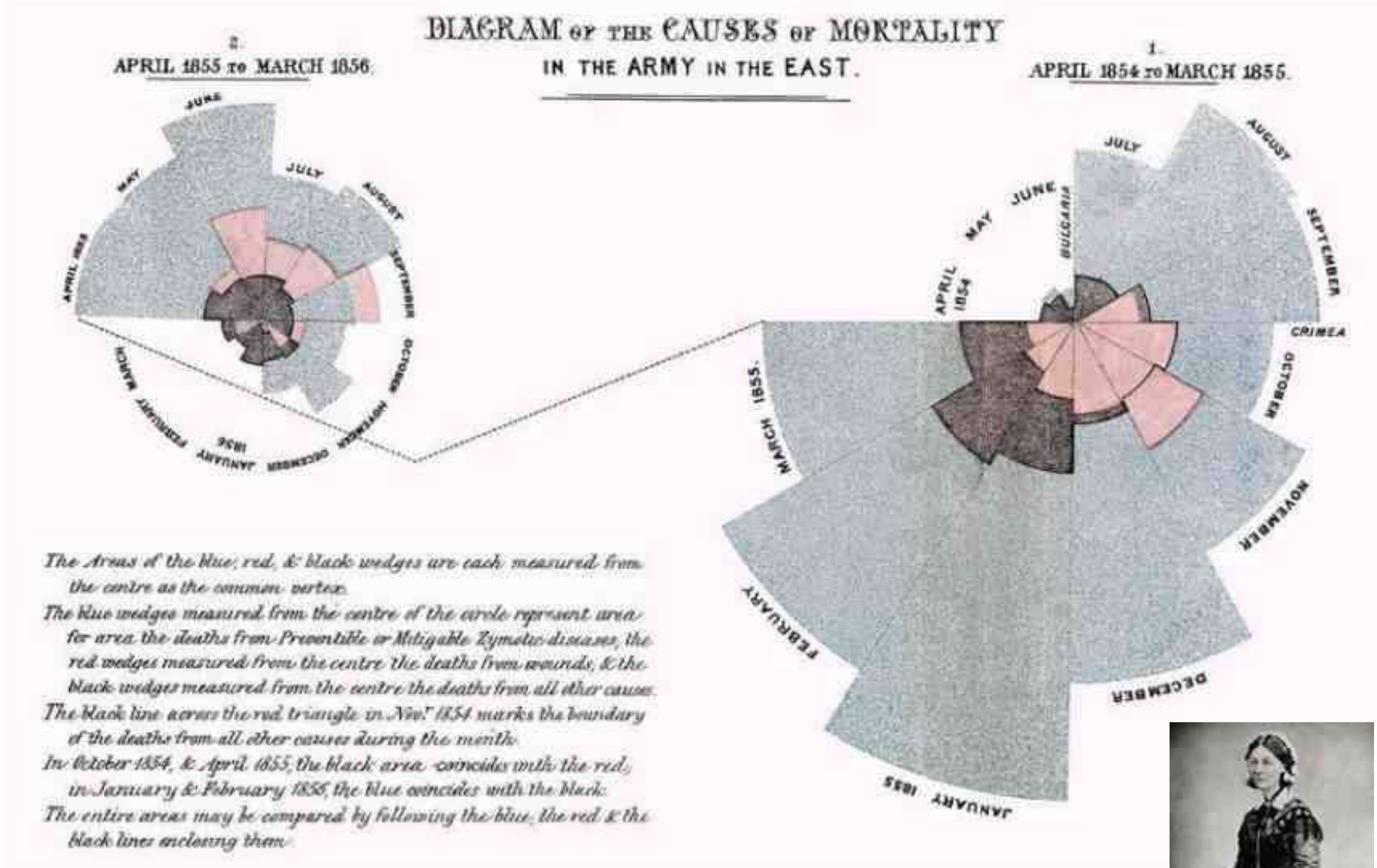
'pie sections' are kept equal in number of degrees, but vary in radius, according to the value.

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



Polar diagrams

Florence Nightingale

7. Volumetric graduated symbols:

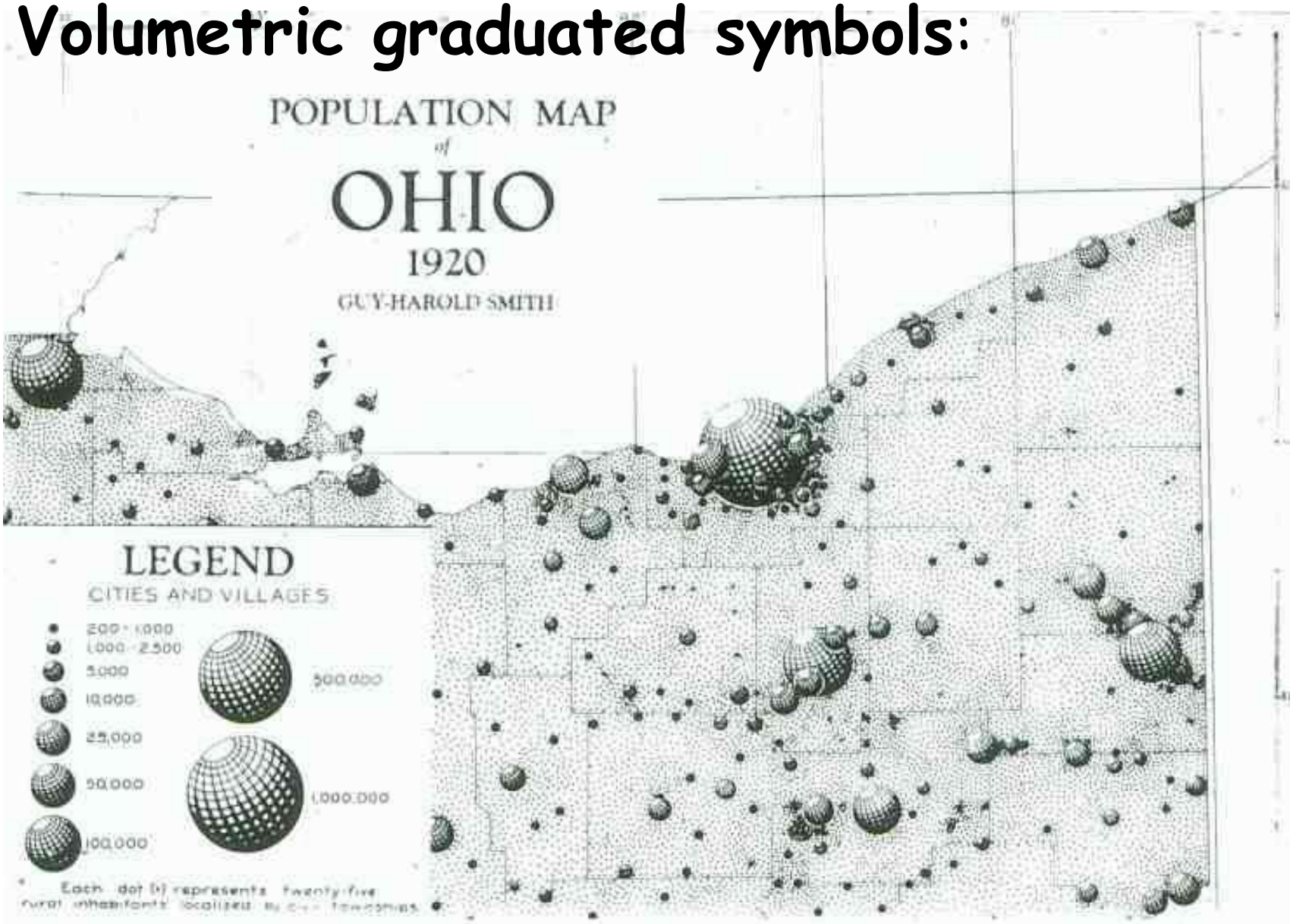
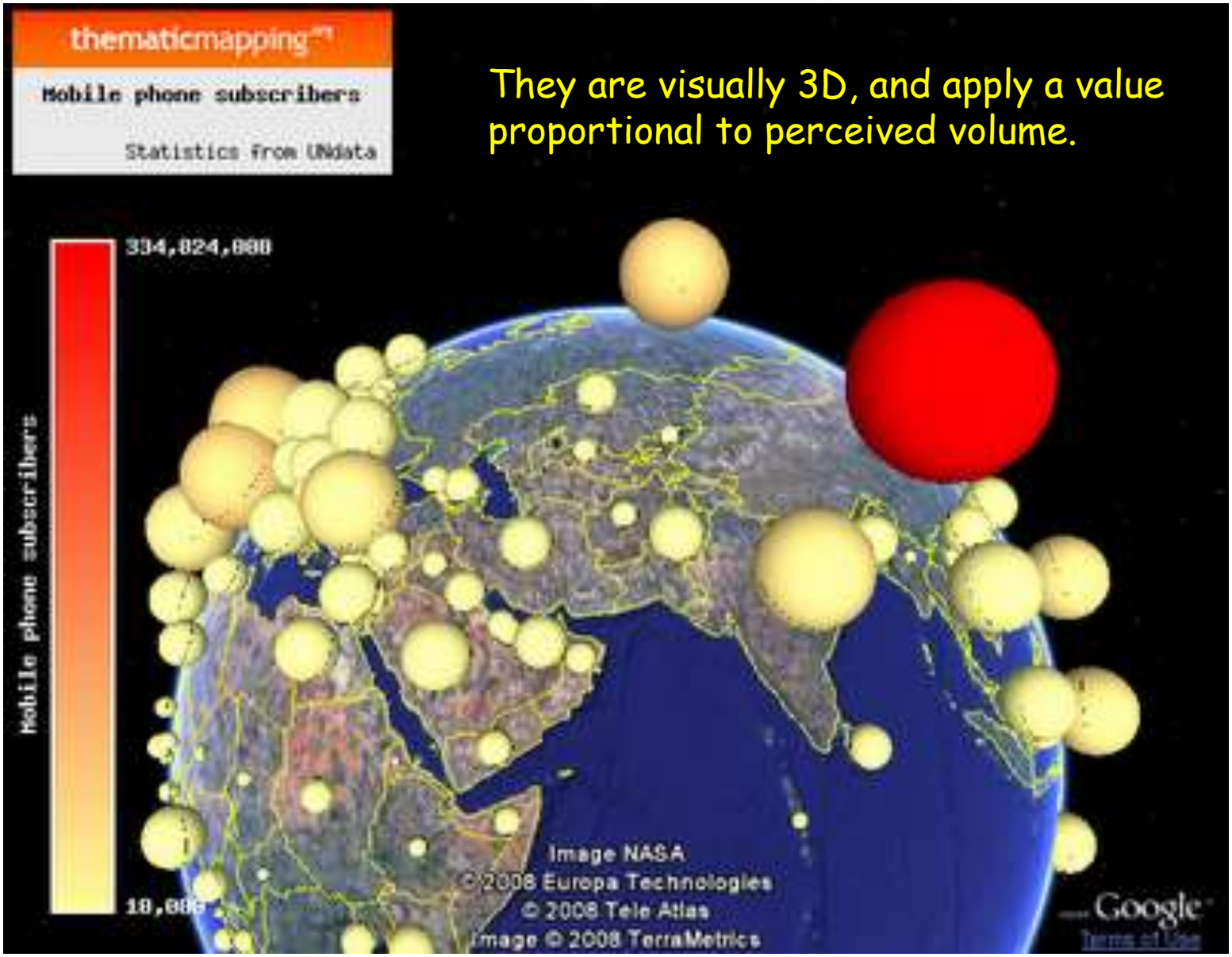
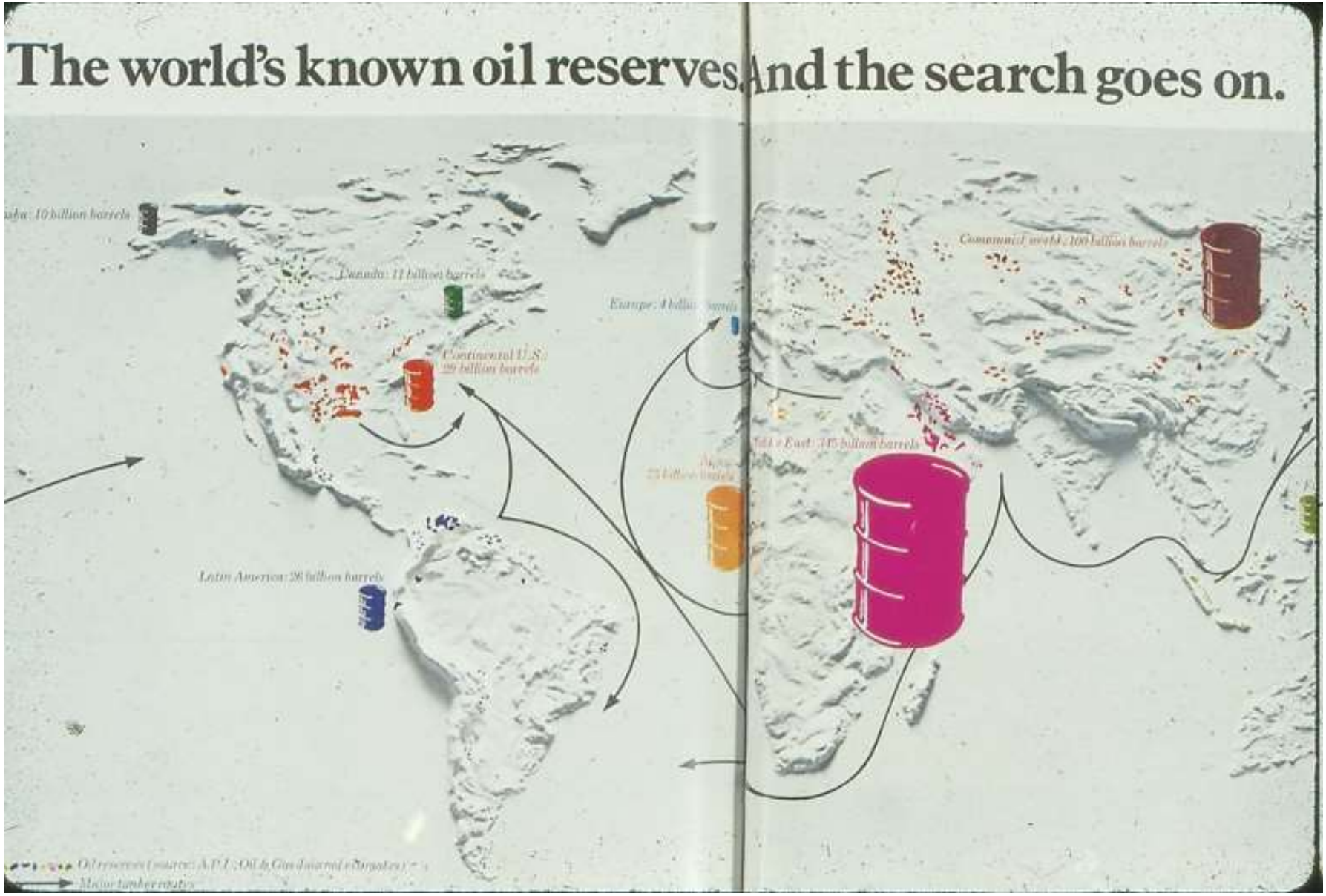


Figure 6.13 A portion of a population map of Ohio (1920) drawn by Guy-Harold Smith. Compare with Fig. 6.8. (Courtesy of the author and *The Geographical Review*, published by the American Geographical Society of New York.)



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

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)

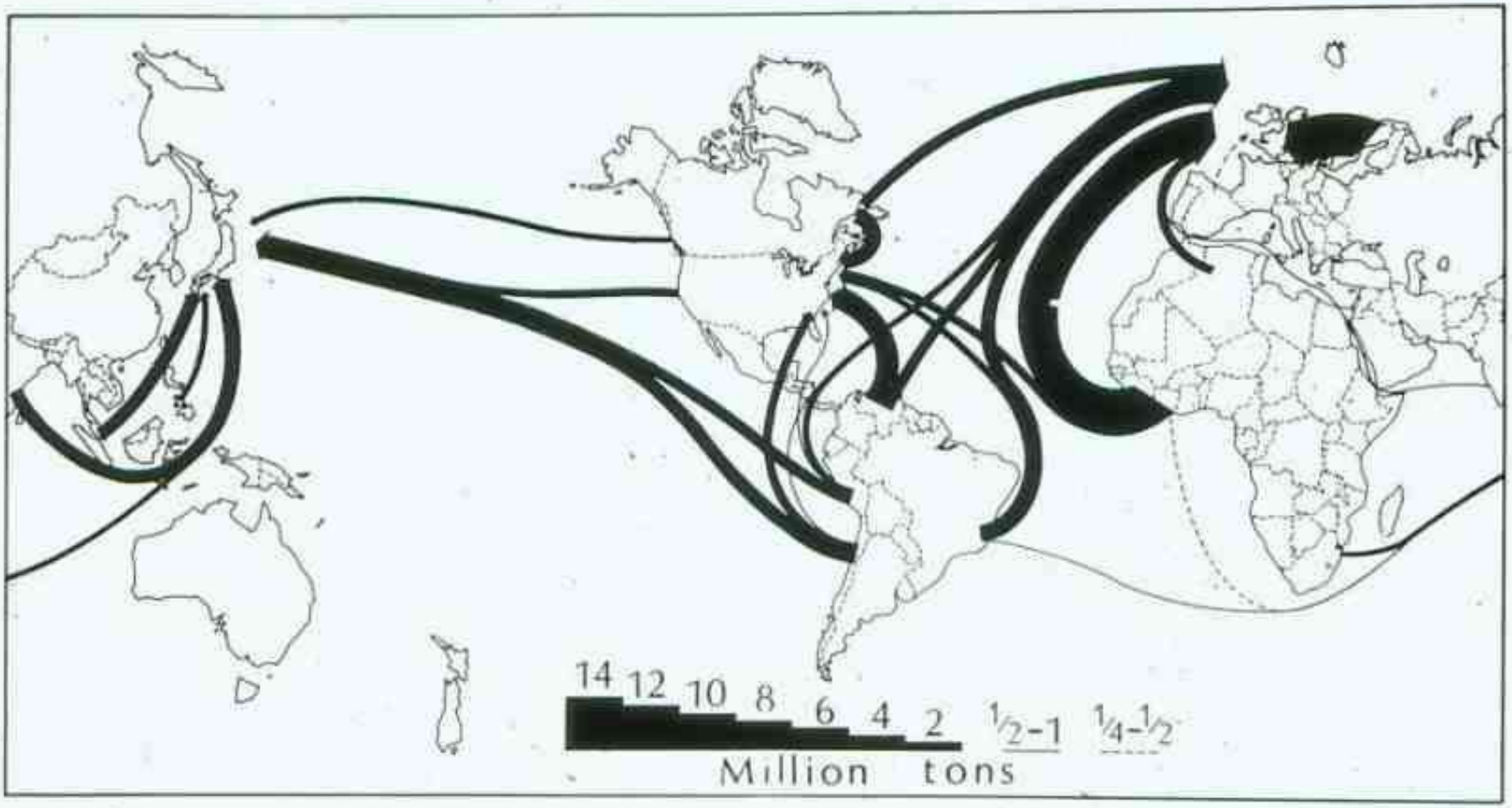
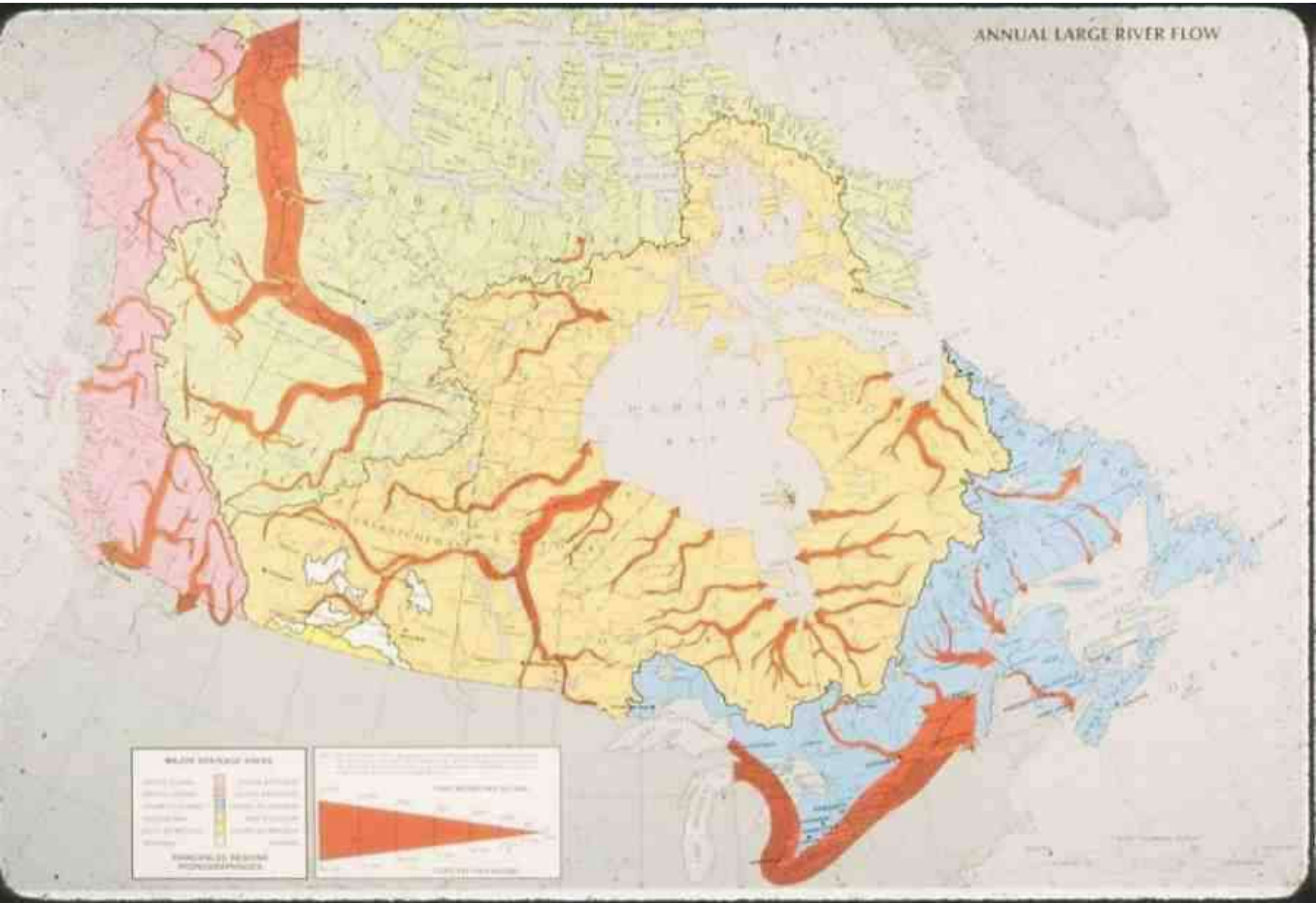
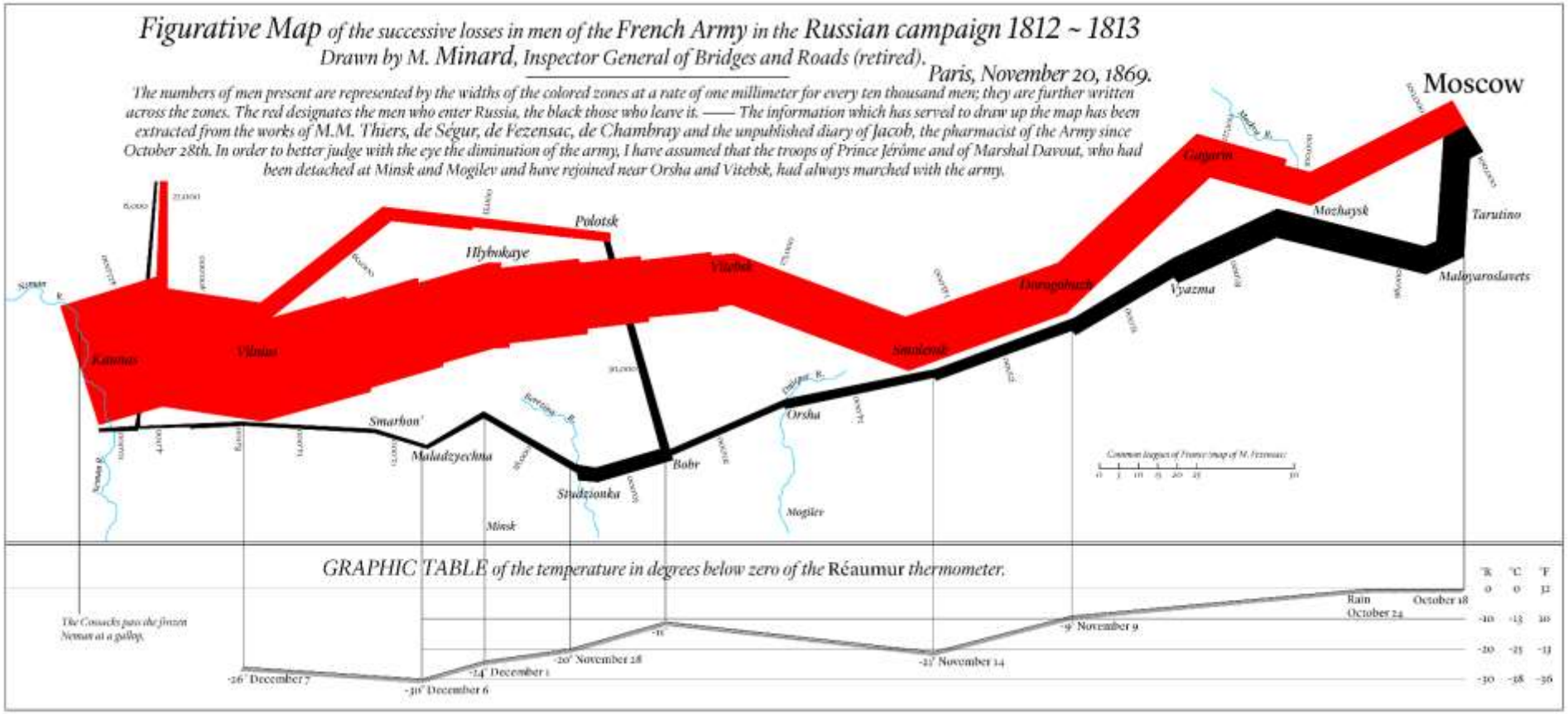


Figure 6.21 A portion of a flow-line map showing the movement of iron ore. Map by G. B. Lewis. (From G. Manners, "Transport Costs, Freight Rates, and the Changing Economic Geography of Iron Ore", *Geography*, 52 (1967), 260-279.)

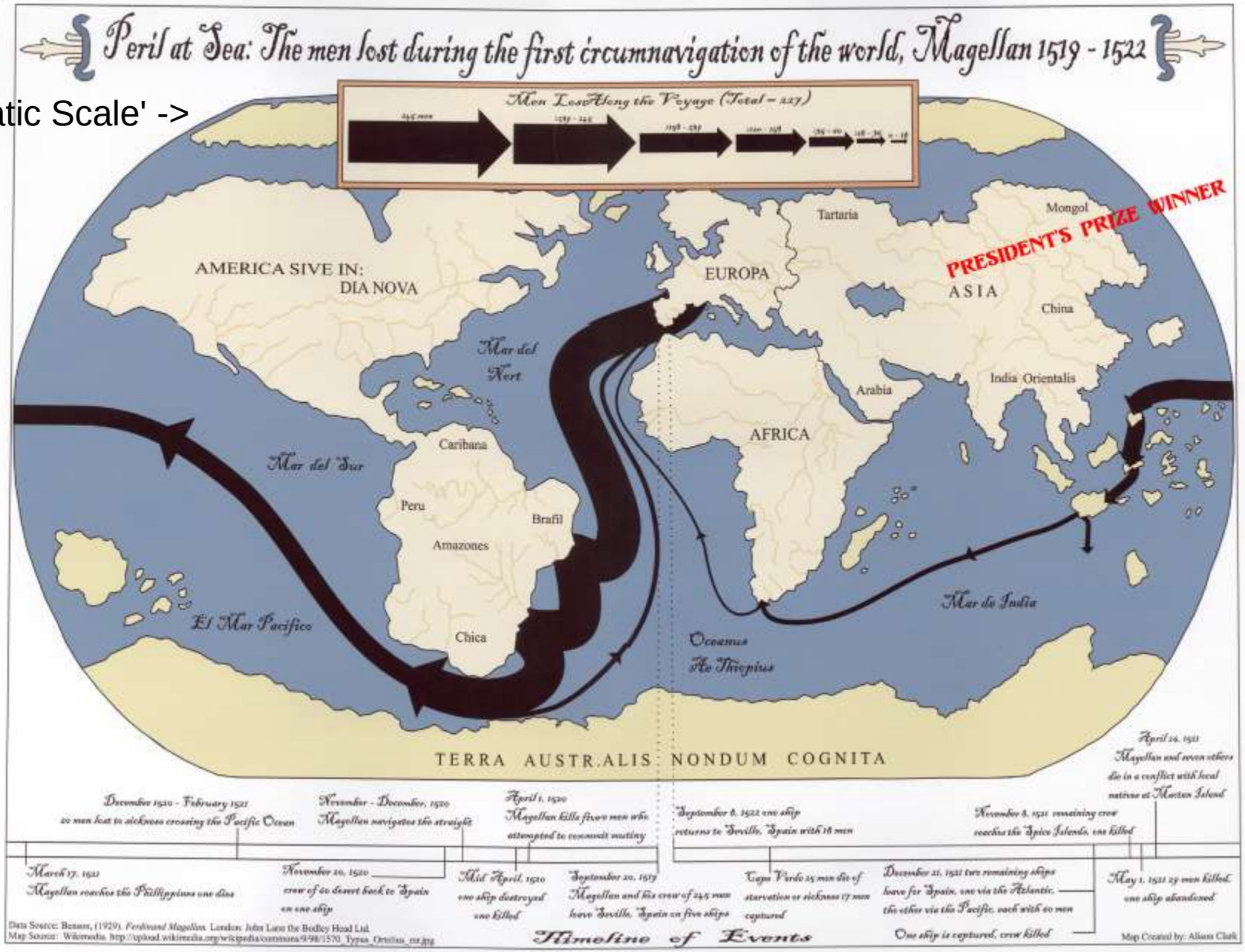
River volume – Canada ‘flow’



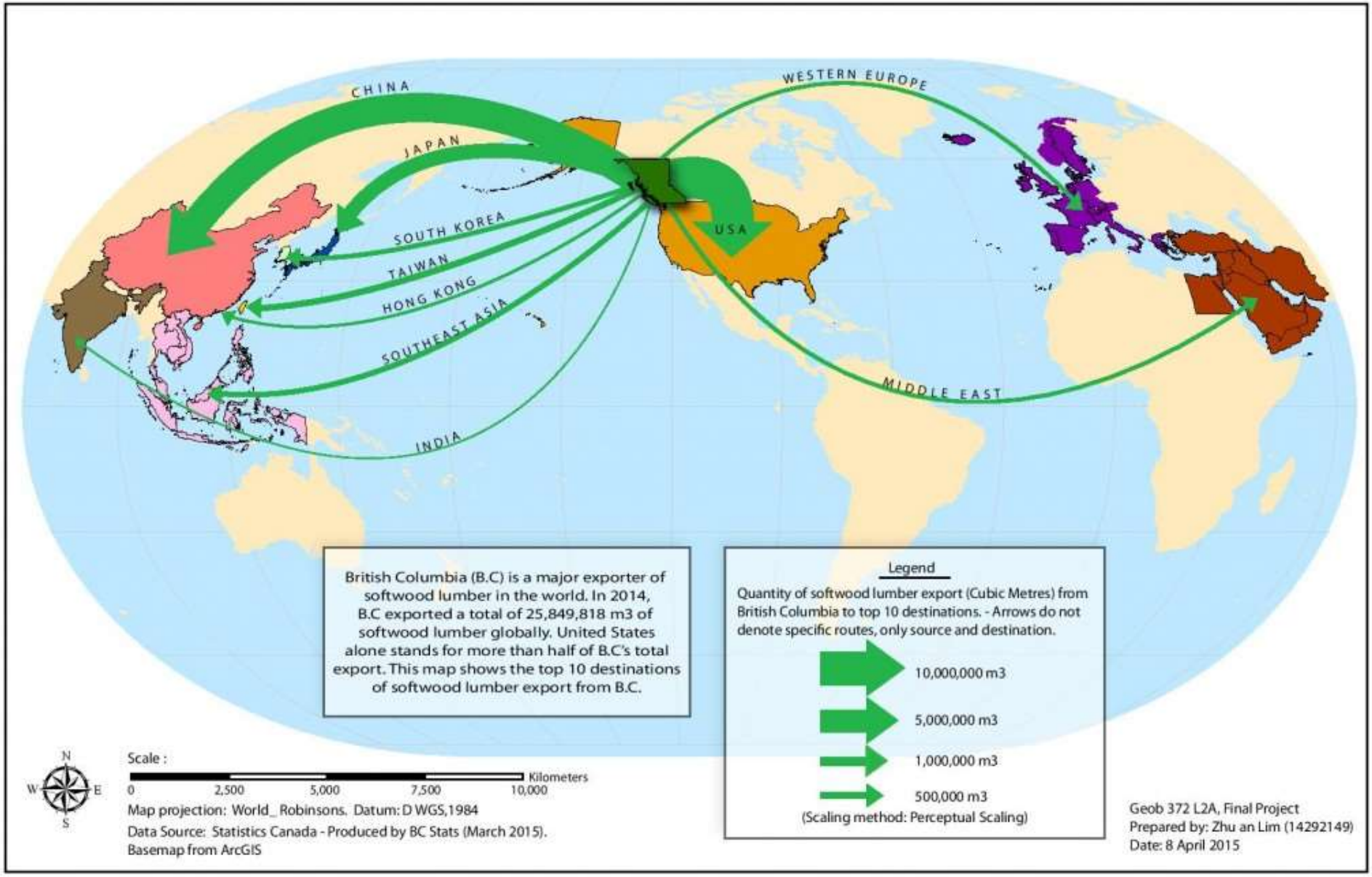
Napoleon's retreat from Moscow



'Thematic Scale' ->



Softwood Lumber Exports from British Columbia in 2014



https://blogs.ubc.ca/zhuanlim/2015/12/03/proportional-symbol-flow-map