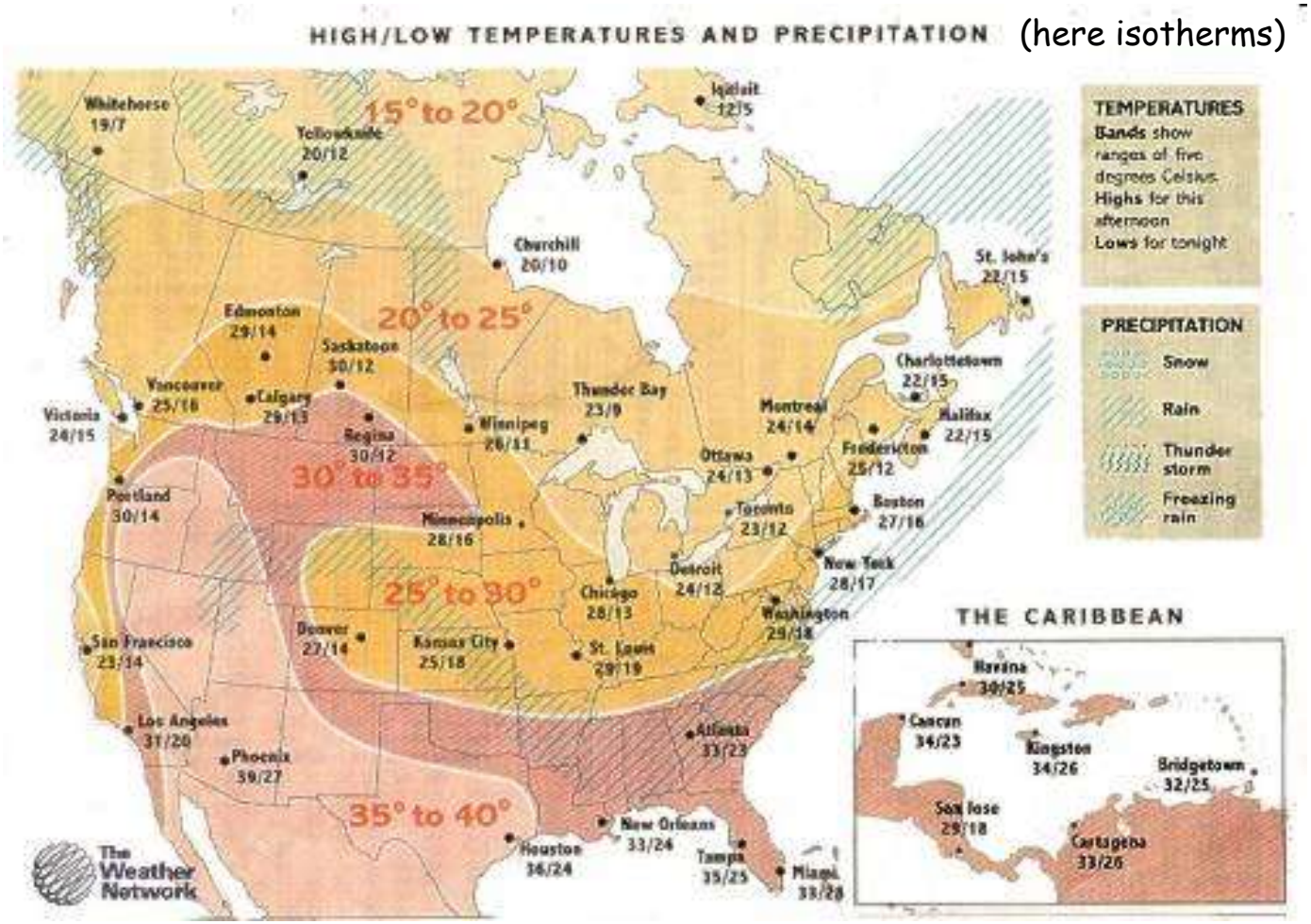
C. Thematic area maps: 1. Isopleths

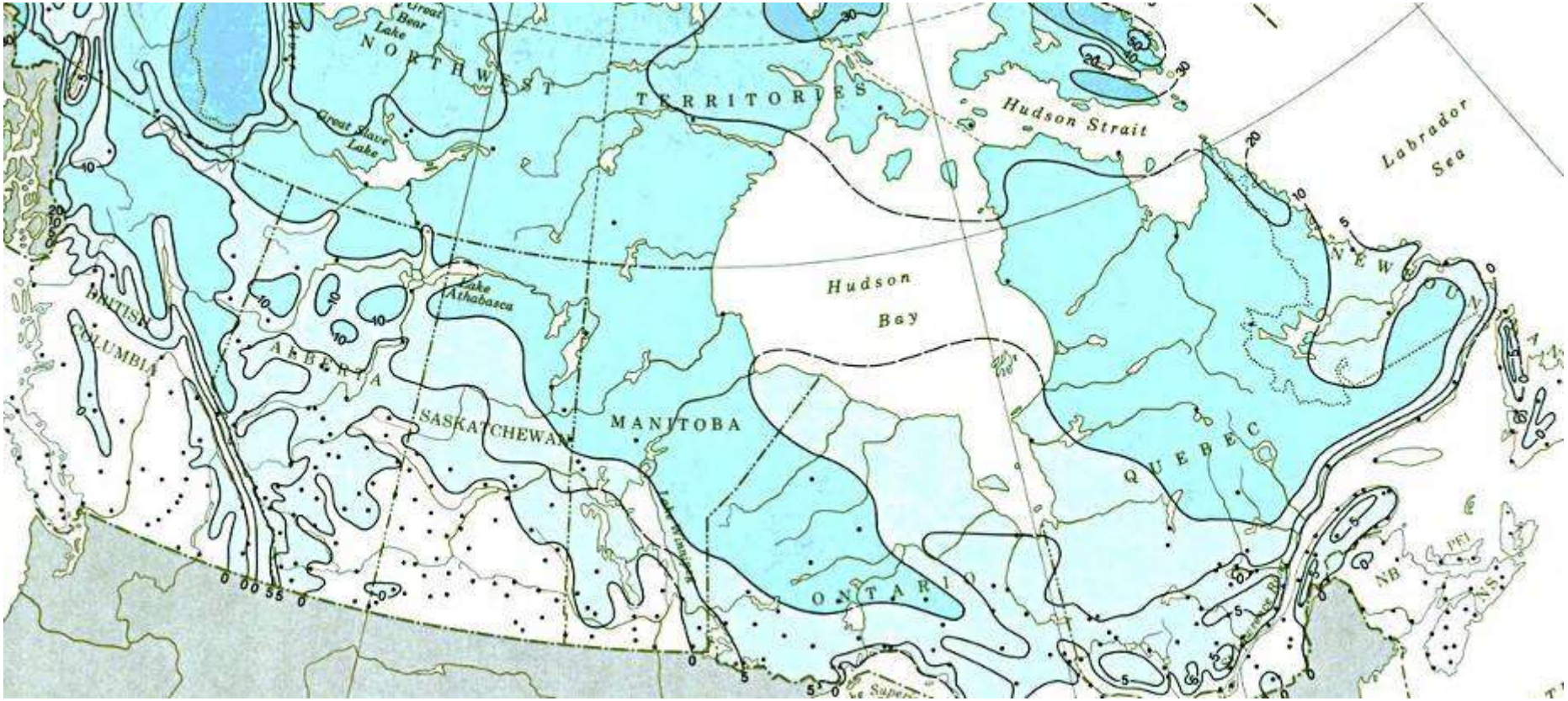


(here isotherms)

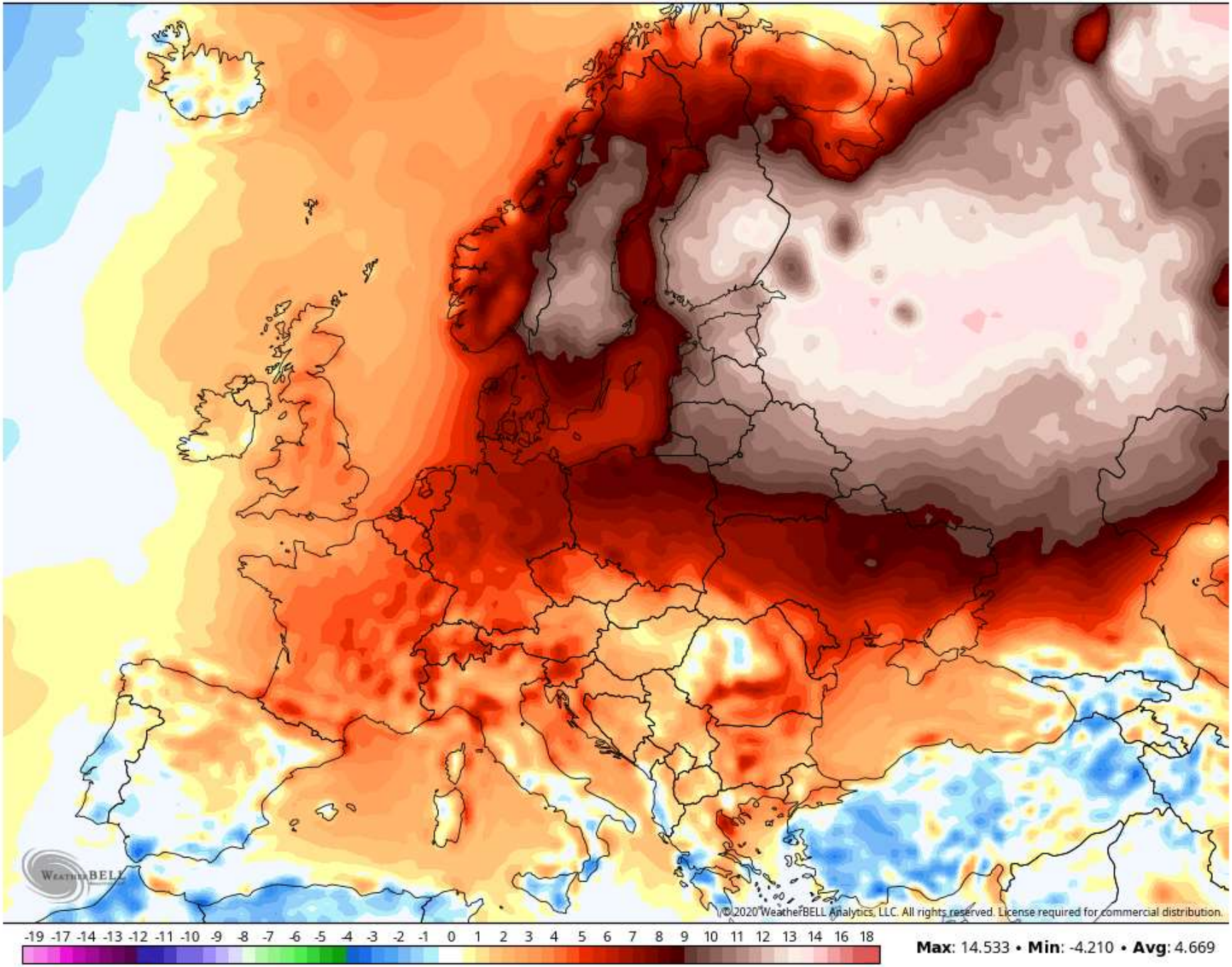
colours selected according to the feature being mapped, e.g. blue & red for temperature, yellow for sunshine. Increased chroma are used for higher values

Isopleths

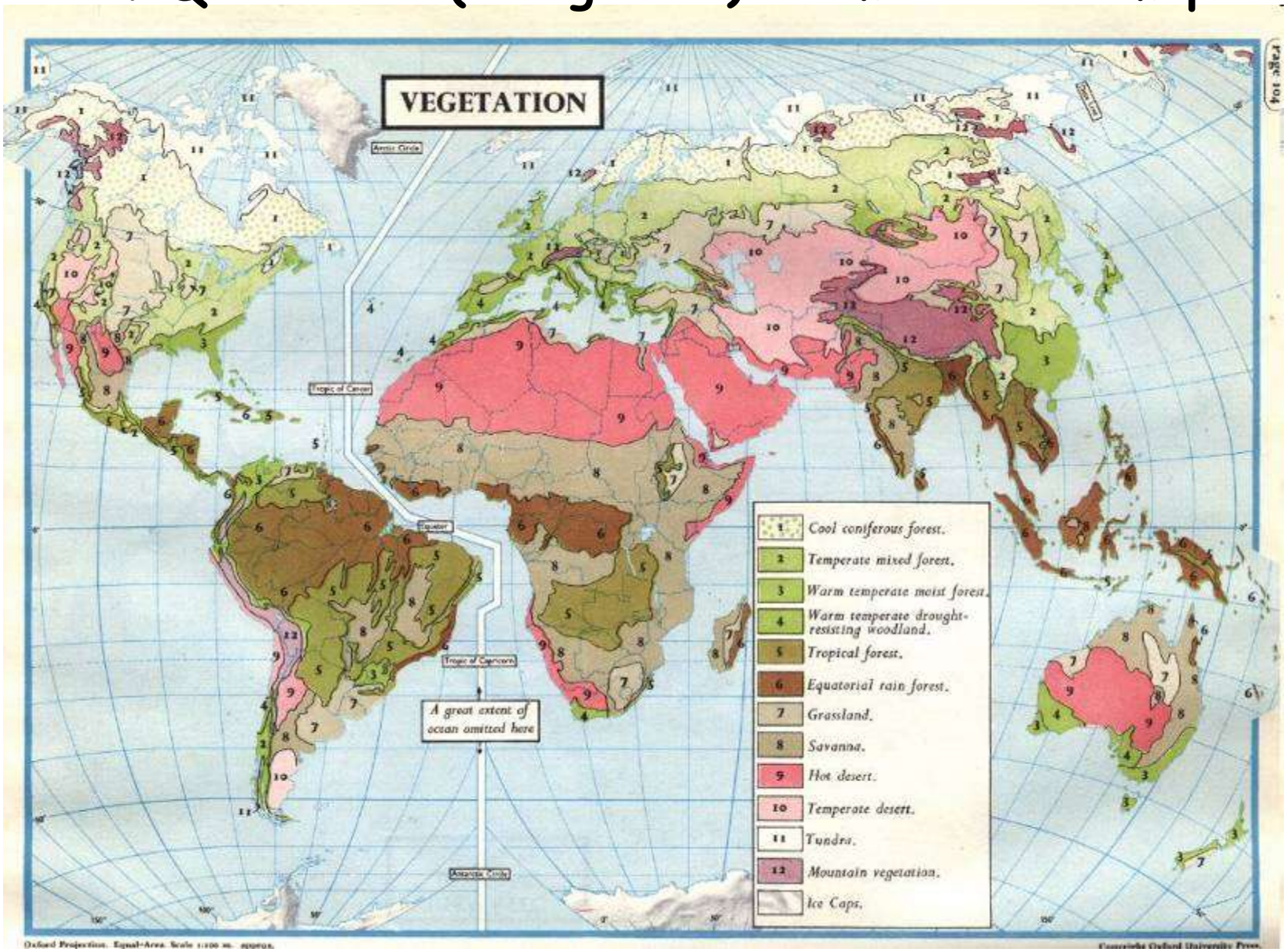
- Data are gathered by points and interpolated to make lines/areas
- This adapts a line technique - with ranges filled with colour tints



Average snow depth, Nov 15 … use of blue to suggest snow!


CDAS 0.5° • Year-to-Date Averaged Temperature Anomaly (°F)
Valid: 06z Mon 3 Feb 2020
WeatherBELL
© 2020 WeatherBELL Analytics, LLC. All rights reserved. License required for commercial distribution.
-19 -17 -14 -13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 16 18
Max: 14.533 • Min: -4.210 • Avg: 4.669

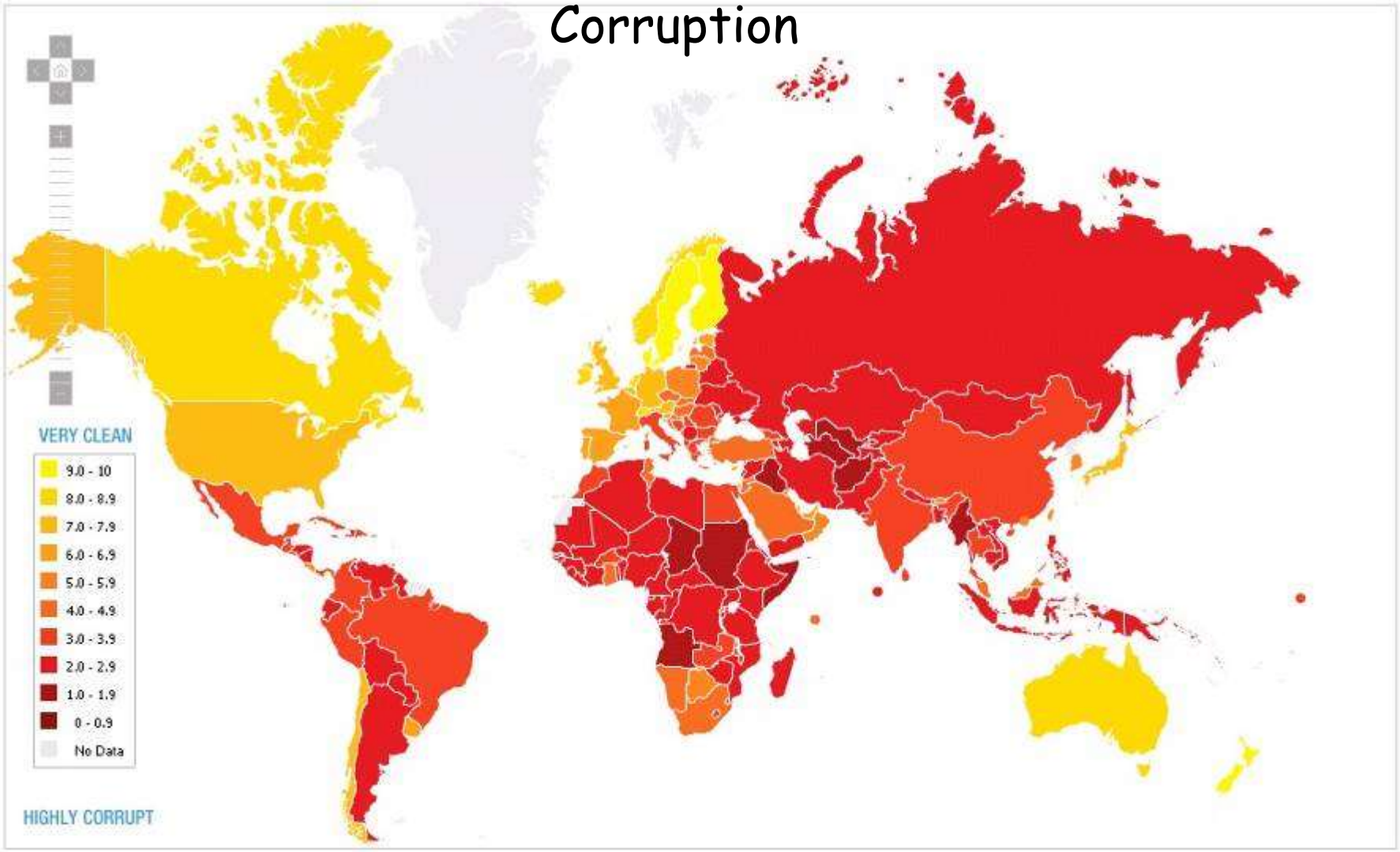
2. Qualitative (categorical) thematic area maps



The boundaries can be subjective and should not be interpreted as 'hard lines'.

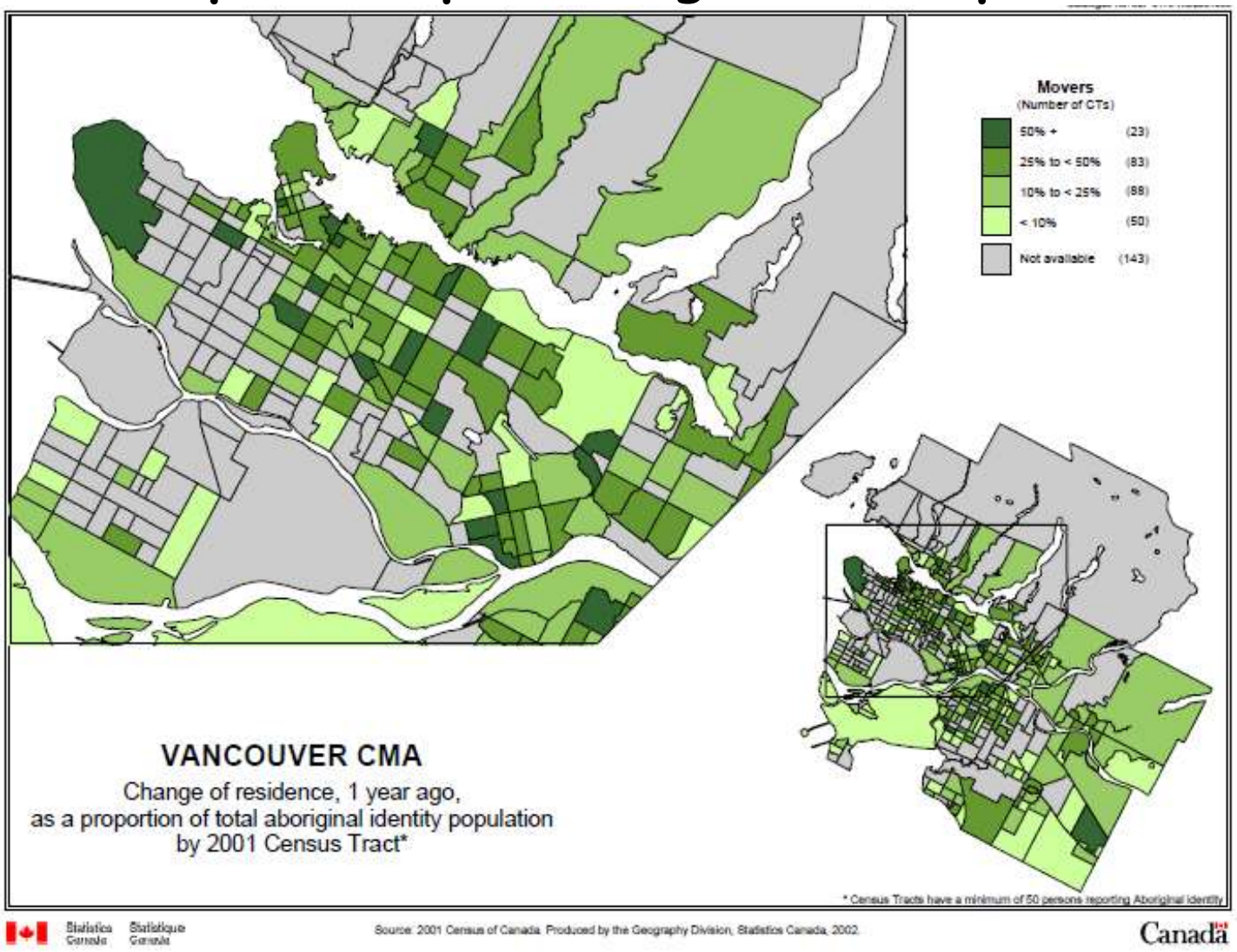
3. Thematic mapping – choropleth = 'magnitude at place'

One value per 'collection unit' (here each country)



http://transparency.org/policy_research/surveys_indices/cpi/2010/results

Choropleth maps = 'magnitude at place'



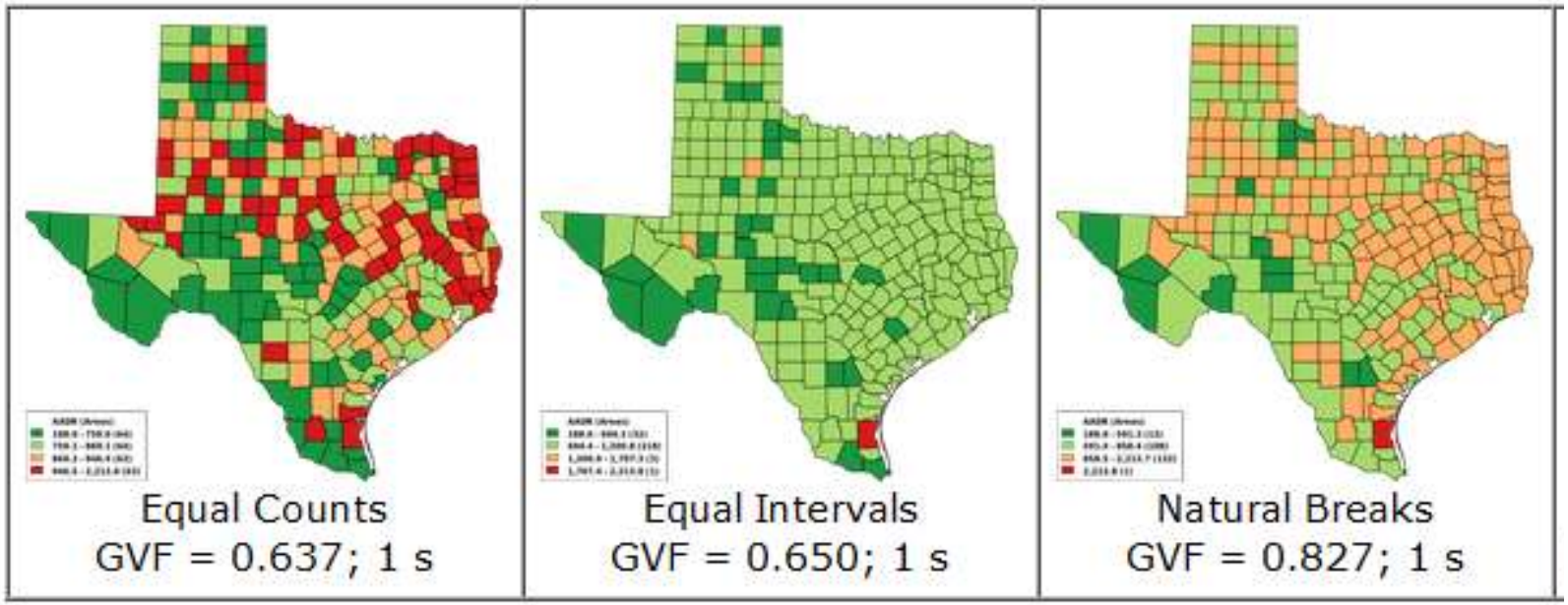
Choropleth maps show data from collection units such as census districts or larger areas. They map intensity, % more than numbers.

Design of Choropleth Classes

On Isarithmic maps, the intervals are even (equal-steps);

But for choropleth maps:
the class ranges may be changed to match the data distribution
Often 'equal steps' give too many values in one class (see below)

TX 2005 Age Adjusted Death Rate, 4 Ranges



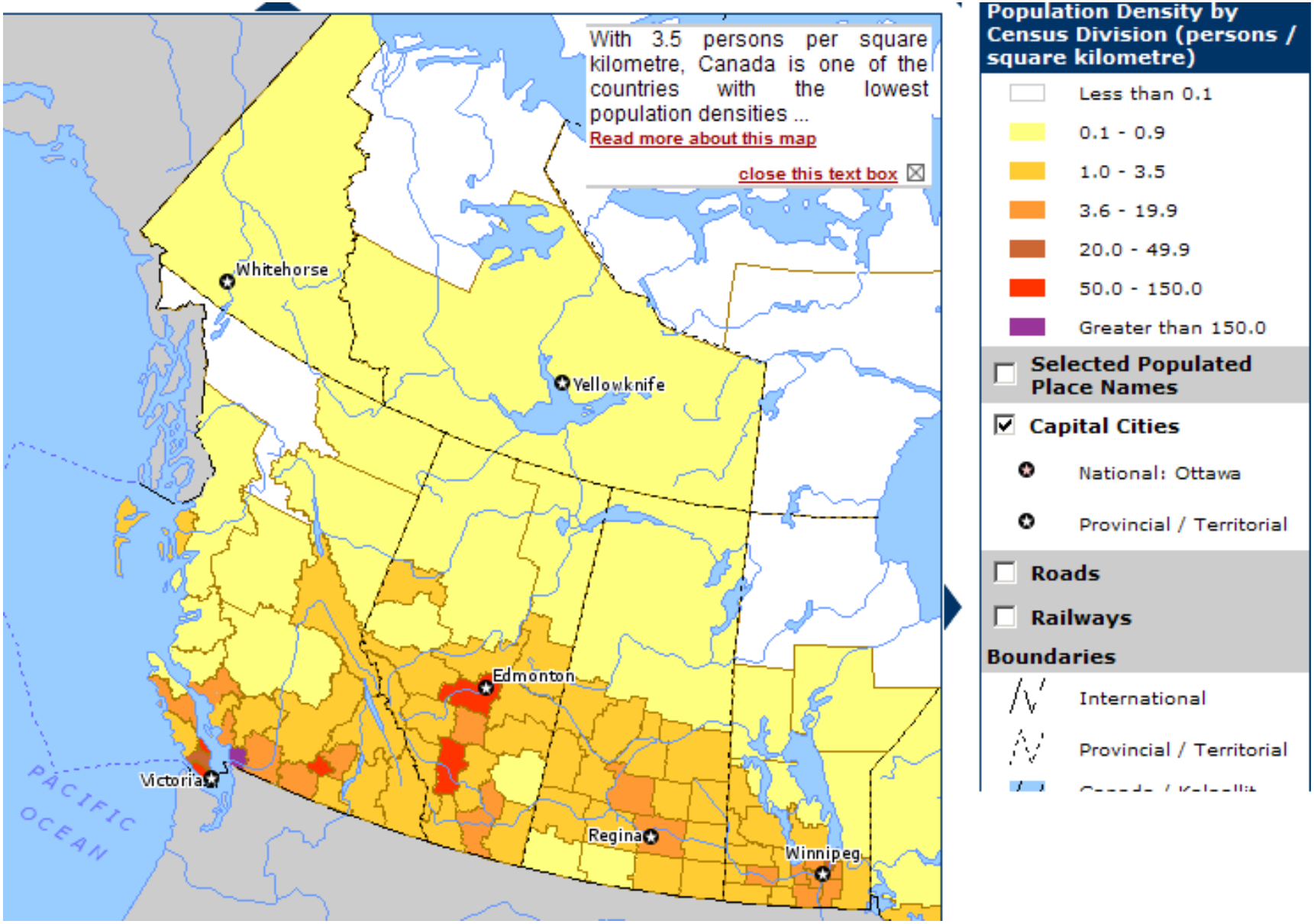
General class design goals:

- maximize difference between classes and minimize contrast within classes
- minimize or eliminate empty classes and avoid too many values in one class

Schemes include these options:
e.g. 4 classes

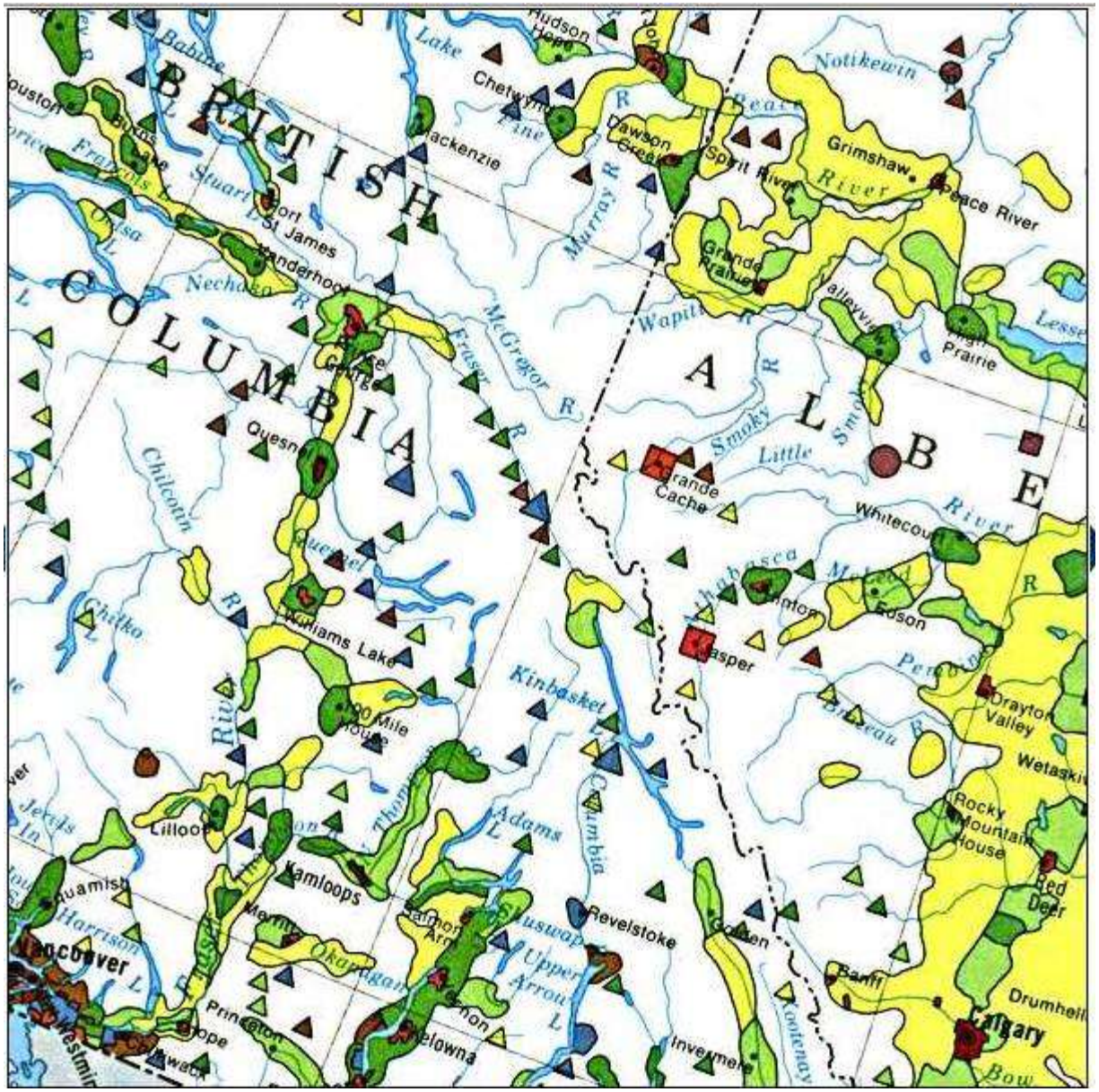
- **Equal steps** 0 –10 –20 –30 -40
- **Geometric** 2- 4 – 8 – 16 – 32
- **Quantiles** (equal counts)
  2 - 4 - 7.5 - 10.4 - 40
- **Natural breaks**
  2 – 4 – 6 – 15 - 40

2.0	4.4	7.6	10.5
2.7	4.8	7.7	14.1
3.3	4.9	7.9	19.1
3.4	5.3	9.0	22.6
3.5	7.2	10.4	39.8



Tones or chroma are used to depict values in classes with logical ranges.

4. Dasymetric = 'measure of density'



Dasymetric maps depict intensities

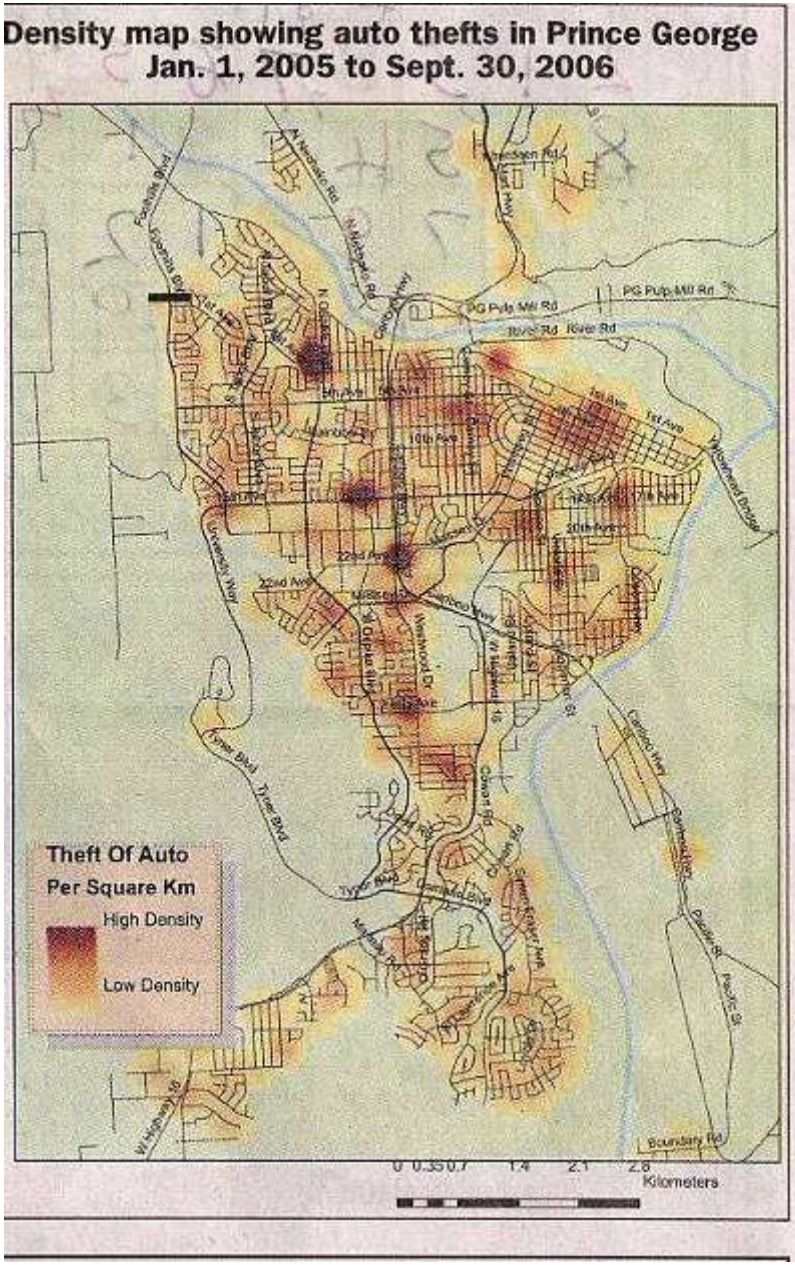
e.g. %, ratios, densities.

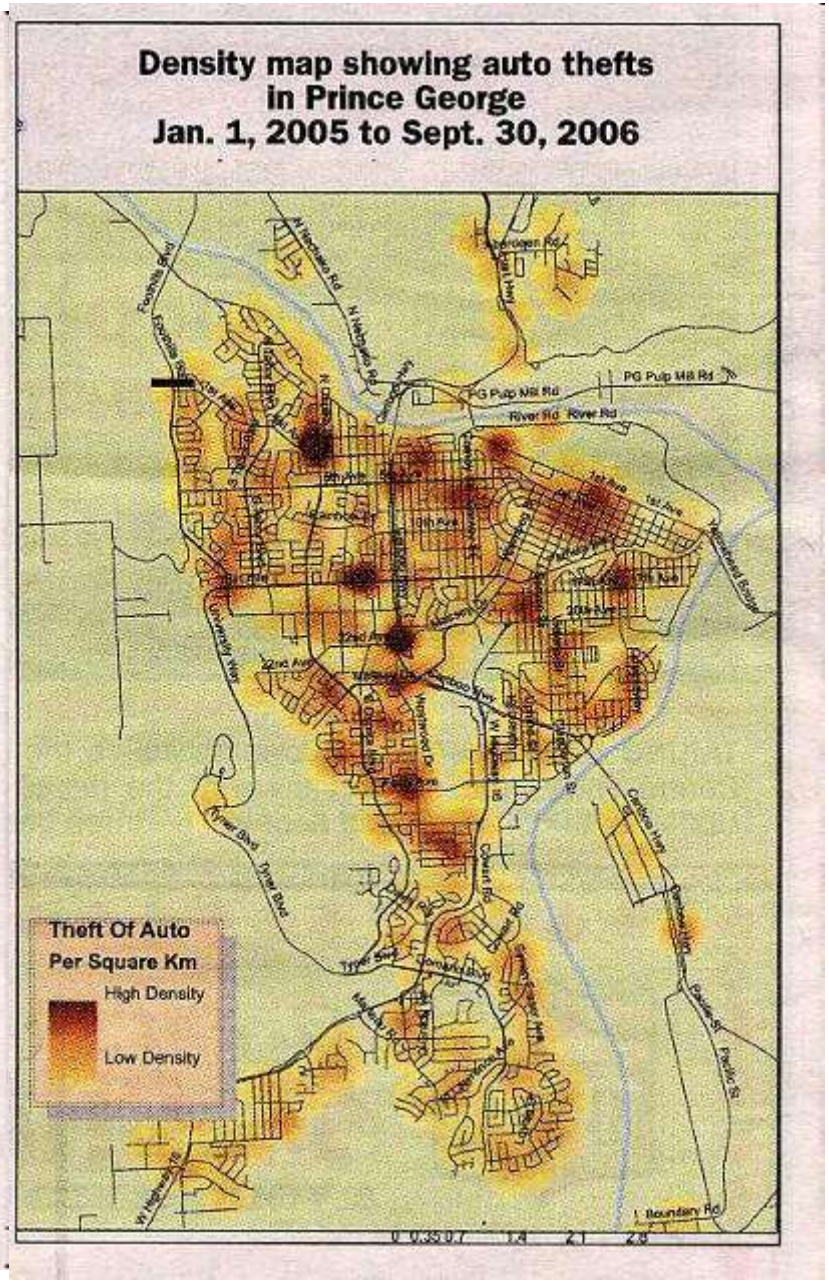
They involve analysis beyond admin. districts;

i.e. they do not assume homogeneity within districts.

Most commonly applied to population density maps

Prince George Citizen 'Heat map' PG week review





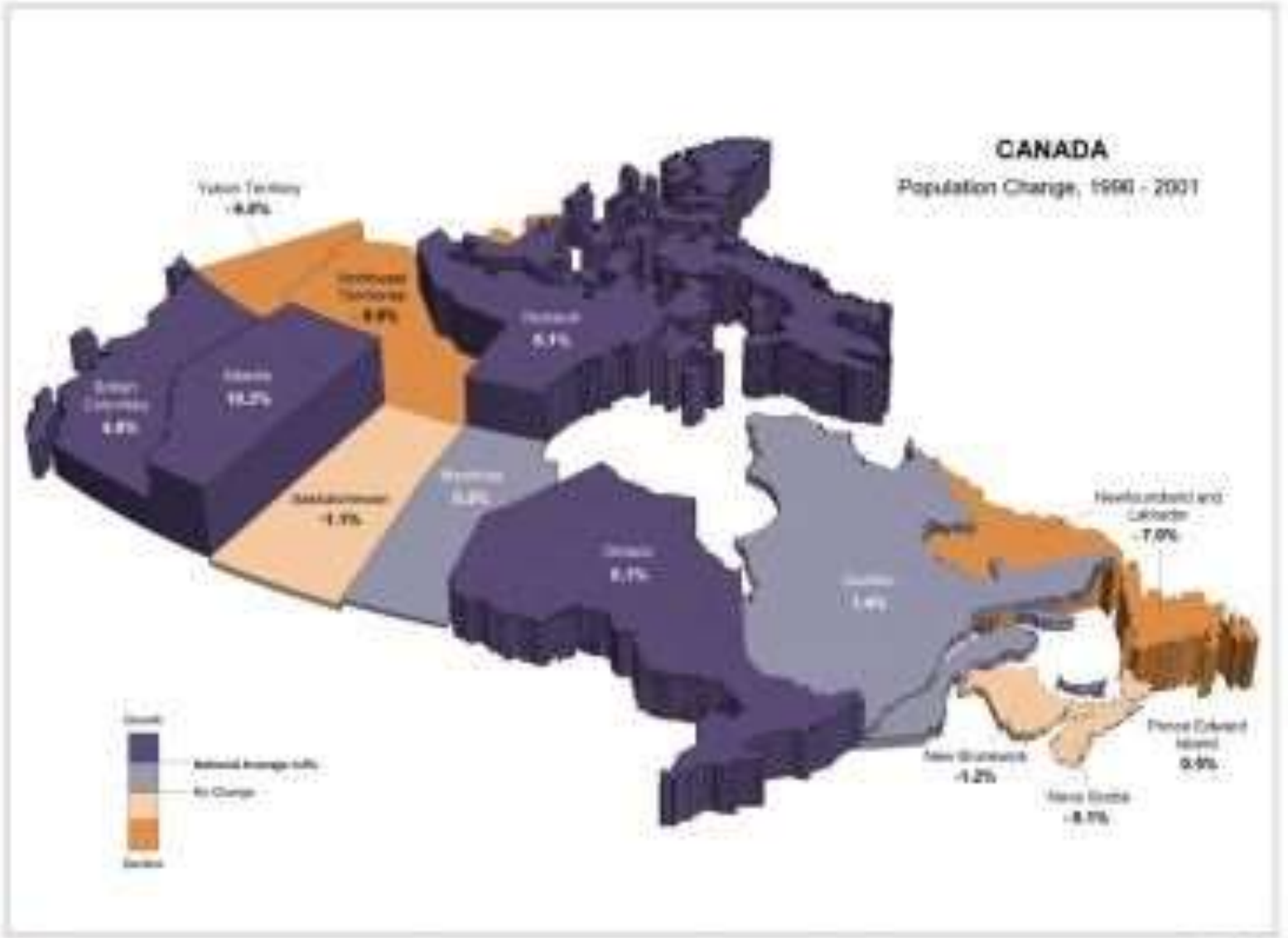
Ordinal data

isopycnic (density)

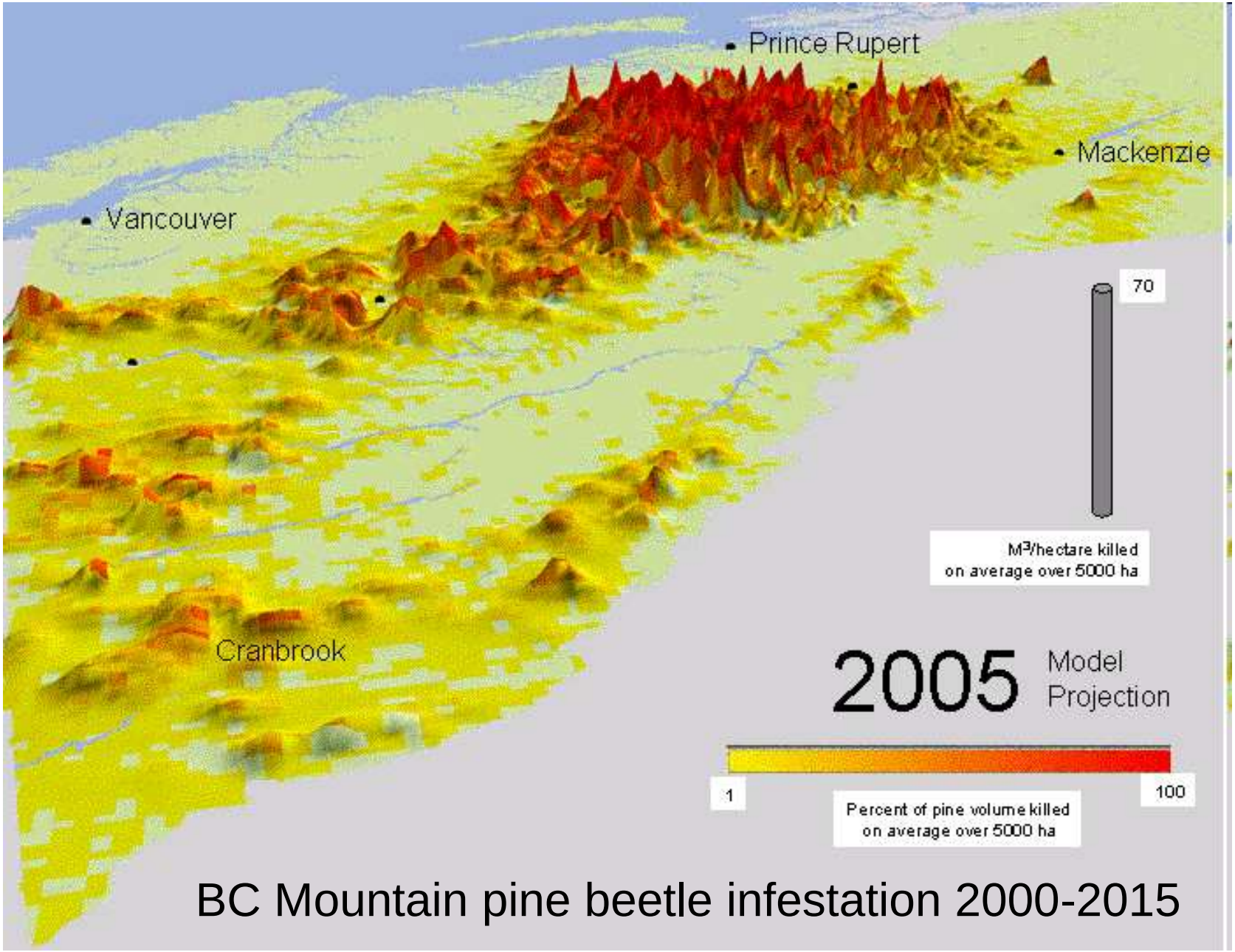
World's greatest map ?

5. Topograms (in this case a modified choropleth)

- Avoids the need to create classes, using (continuous) height



Topogram technique applied to isarithmic data (bivariate – 2 variables)



BC Mountain pine beetle infestation 2000-2015

7. Value-by-area cartograms

a cartogram has no 'cartesian' scale, …….but area is based on **another geographic variable**

More examples: http://www.worldmapper.org/

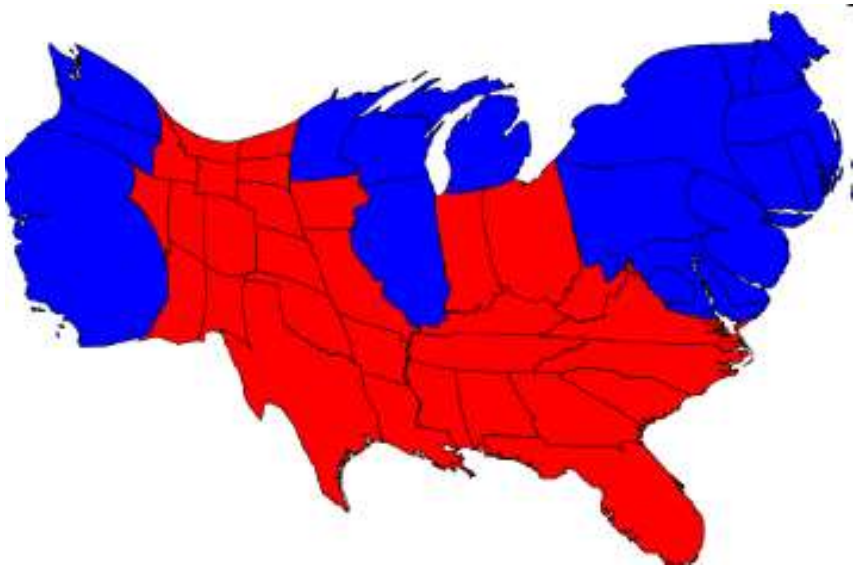
World population map

Design principles:

- Area scale accurately represents a selected variable
- Contiguity is maintained
- Shapes should remain recognisable (if possible)

USA examples

US election results: 2012 **2008**



US population cartograms and animation
http://www.ravi.io/us-population-trends-cartogram

Cartogram software: Scape Toad

US Presidential Election 2020

Results mapped at county level showing the candidate with the largest vote share in each area

Preliminary results*

Biden
78,780,121 votes (50.9%)
306 electoral votes

Trump
73,163,140 votes (47.3%)
232 electoral votes

Vote share
of candidate with most votes

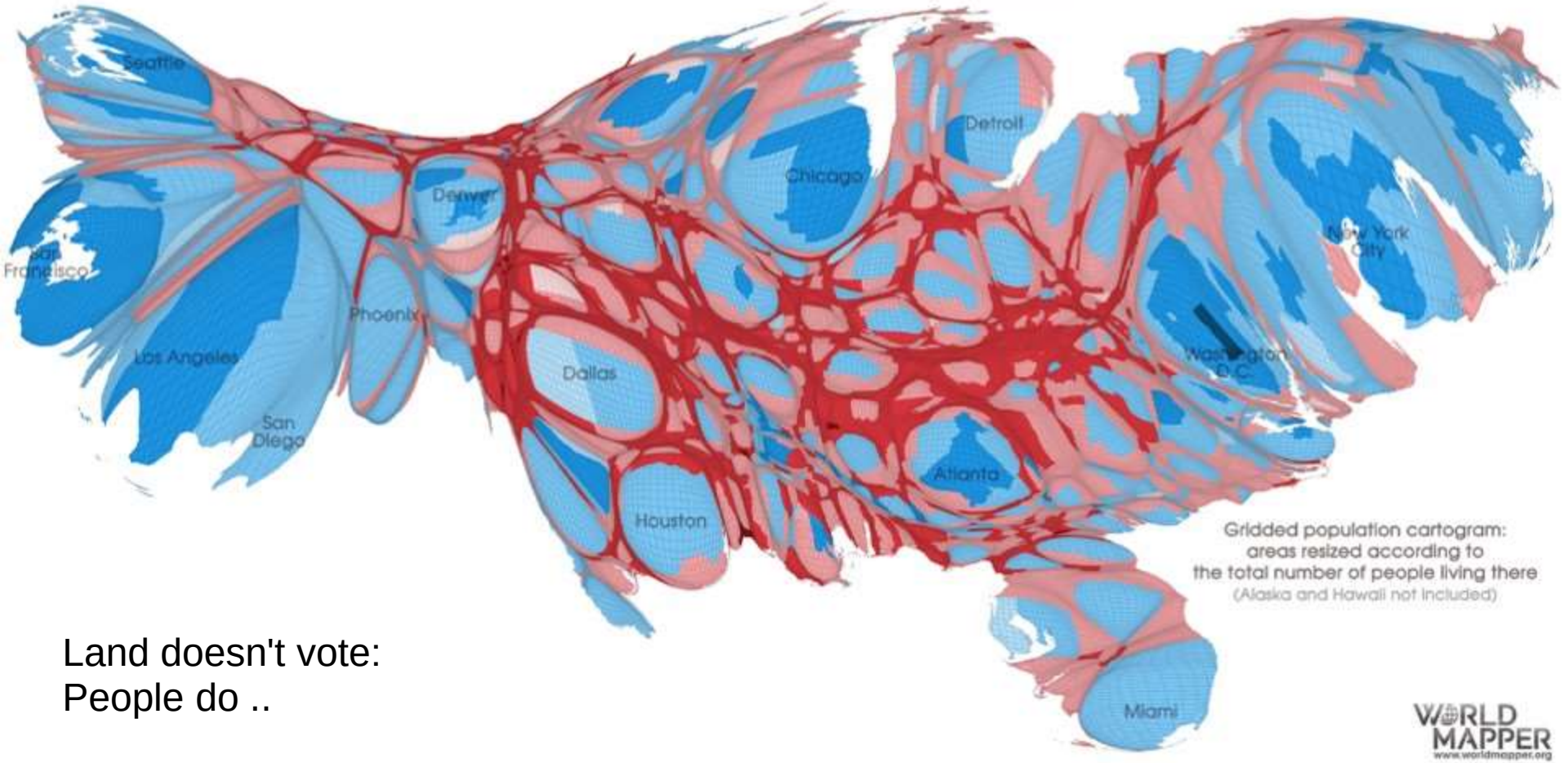
Biden

0 50 70 90%

Trump

* not confirmed final result, last updated 16. Nov 2020
Source: https://github.com/tonmcg/US_County_Level_Election_Results_08-20

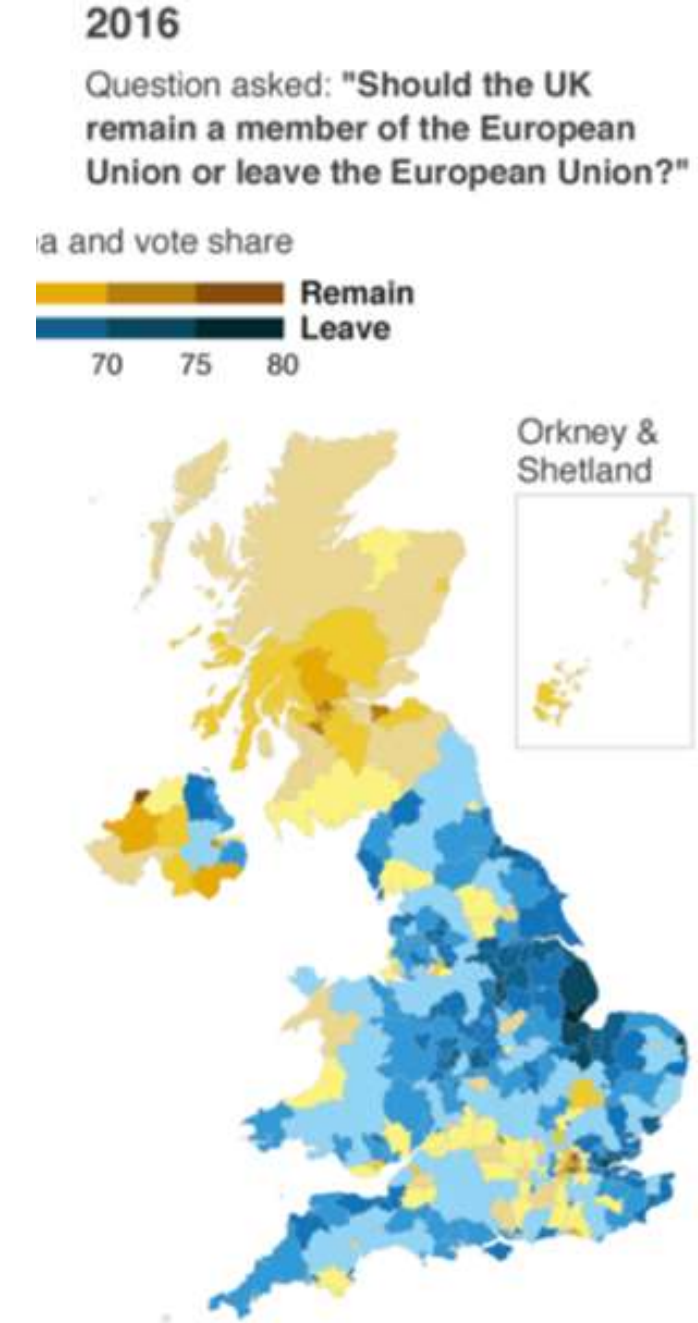
Alaska and Hawaii showing state-level outcomes

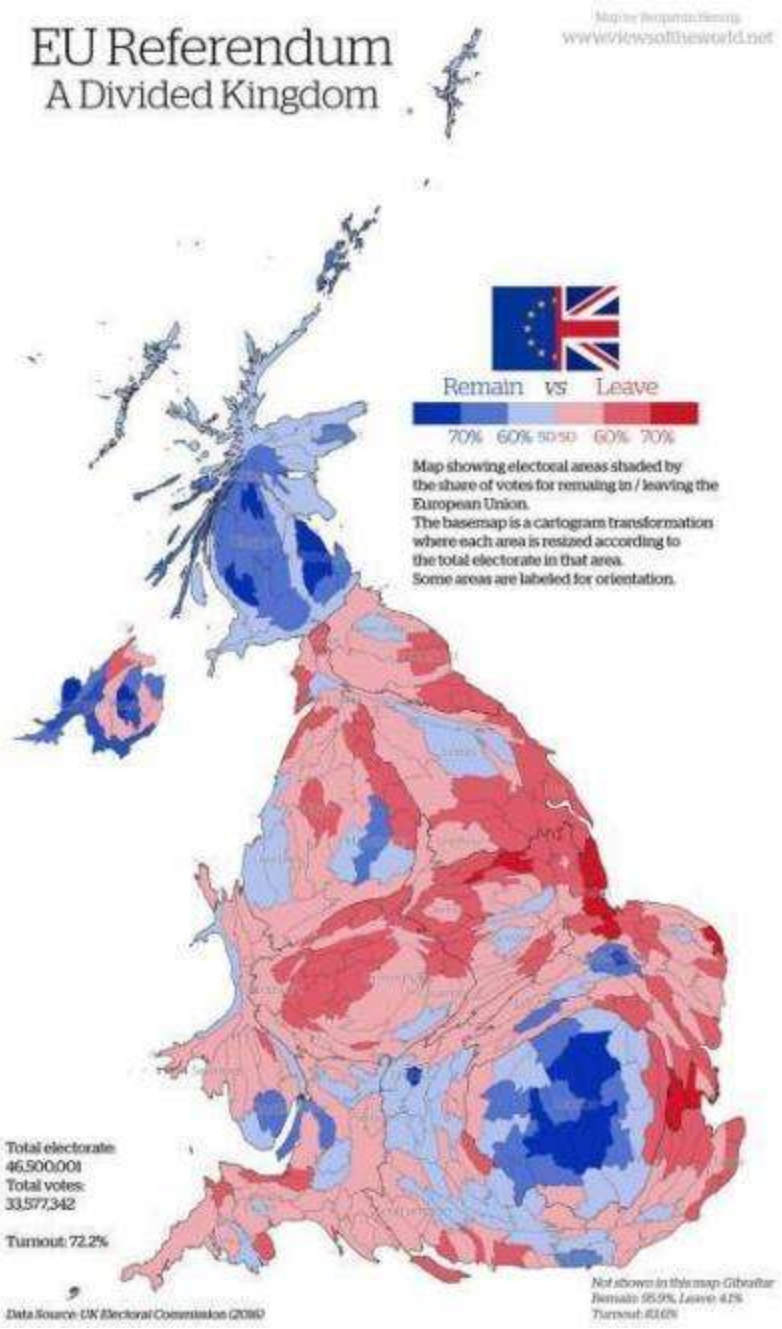


Gridded population cartogram:
areas resized according to
the total number of people living there
(Alaska and Hawaii not included)

Land doesn't vote:
People do ..

WORLD MAPPER
www.worldmapper.org





How to create cartograms in ArcMap ….

Thematic techniques and data types

Raw values / totals

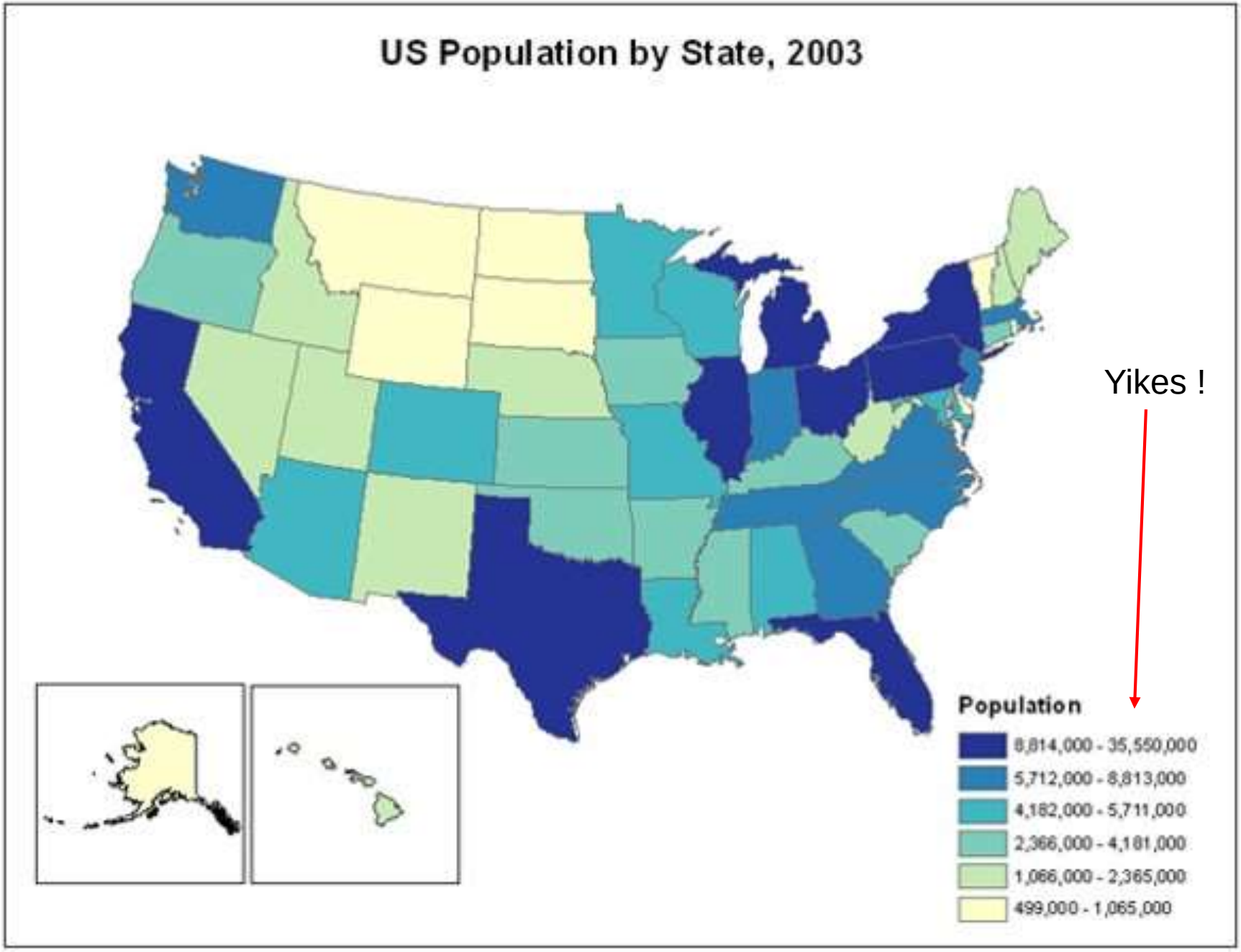
- Dot maps
- Graduated symbols
- Graduated lines
- Cartograms (value by area)

Derived densities / % values

- Choropleth
- Isometric (topograms)
- Isarithms (mostly)

Figure: Alberto Cairo, Knightcenter ->

https://geographyfieldwork.com/DataPresentationMappingTechniques.htm


US Population by State, 2003
Yikes !
Population
8,814,000 - 35,550,000
5,712,000 - 8,813,000
4,182,000 - 5,711,000
2,366,000 - 4,181,000
1,066,000 - 2,365,000
499,000 - 1,065,000

8. Cartograms – Mental maps

(based on perceived space)

A tool of psychological research:

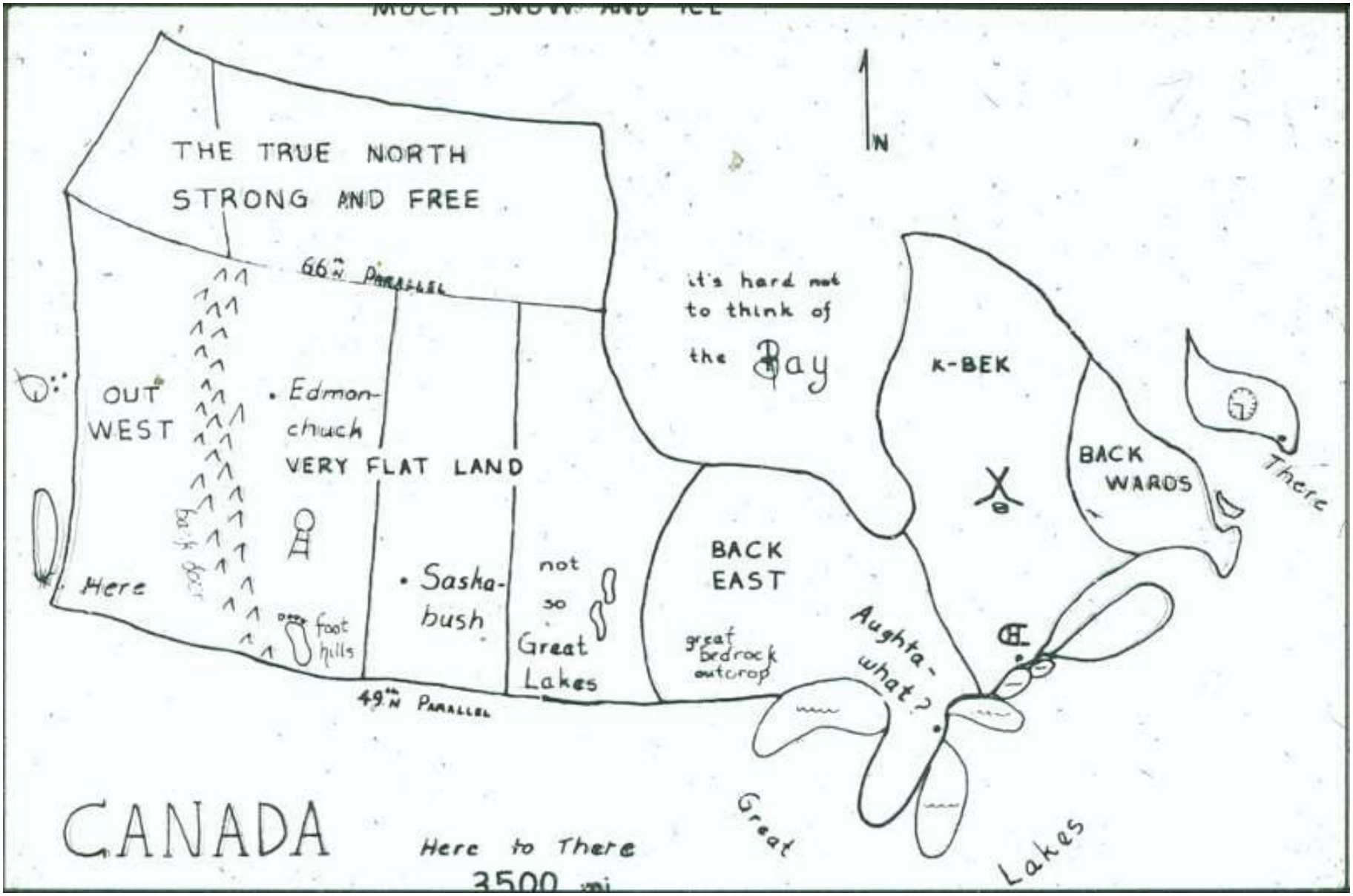
People behave according to how they see their 'map'

People tend to:

exaggerate the size and importance of their home area

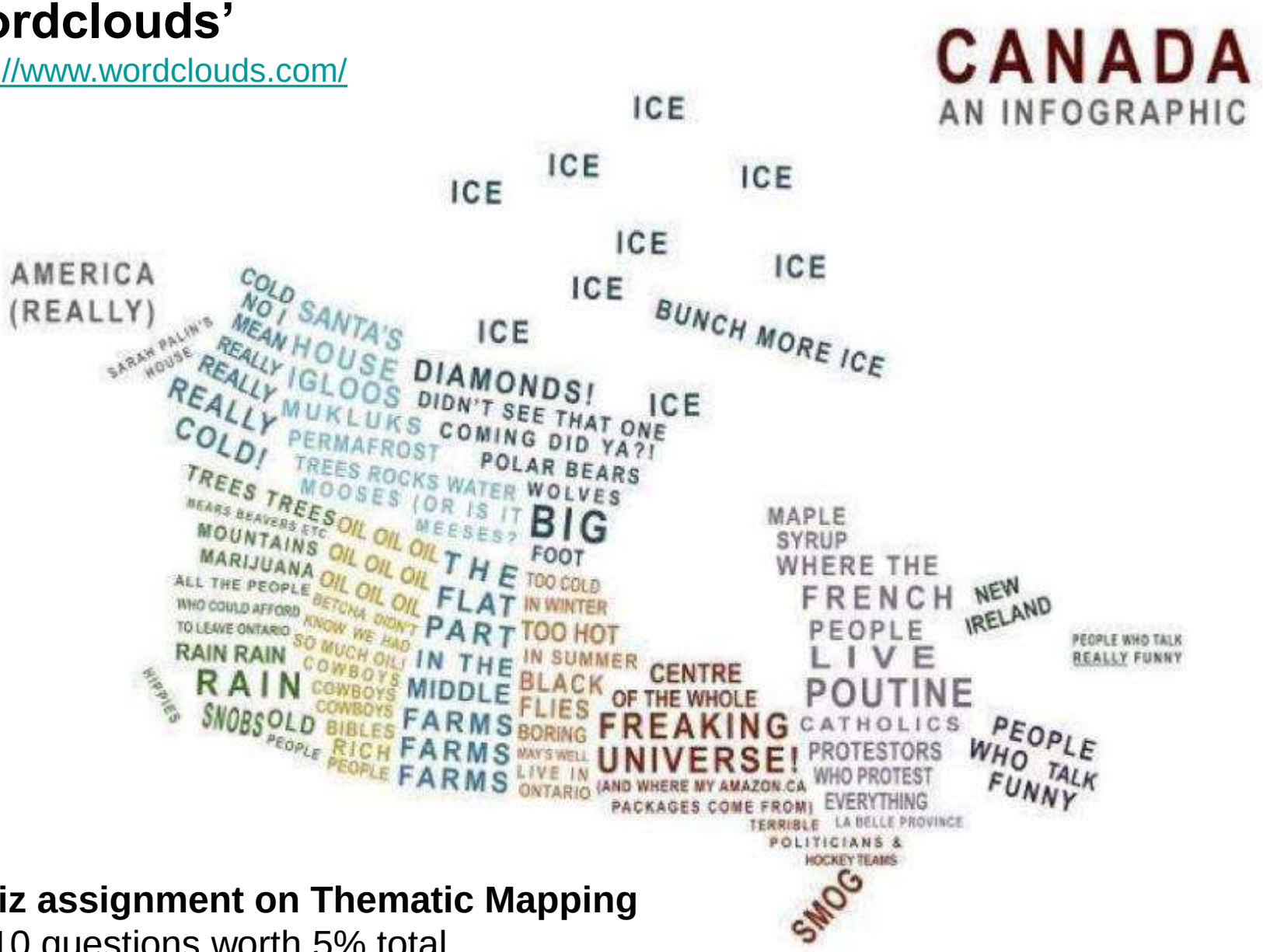
recall unusual features, - e.g. the Florida peninsula, 'boot' of Italy, shape of Hudson Bay, etc..

Mental map of Canada



‘Wordclouds’

https://www.wordclouds.com/



Quiz assignment on Thematic Mapping

5 -10 questions worth 5% total

- will be posted later today / Saturday

Return by 10am, Fri. 11 February