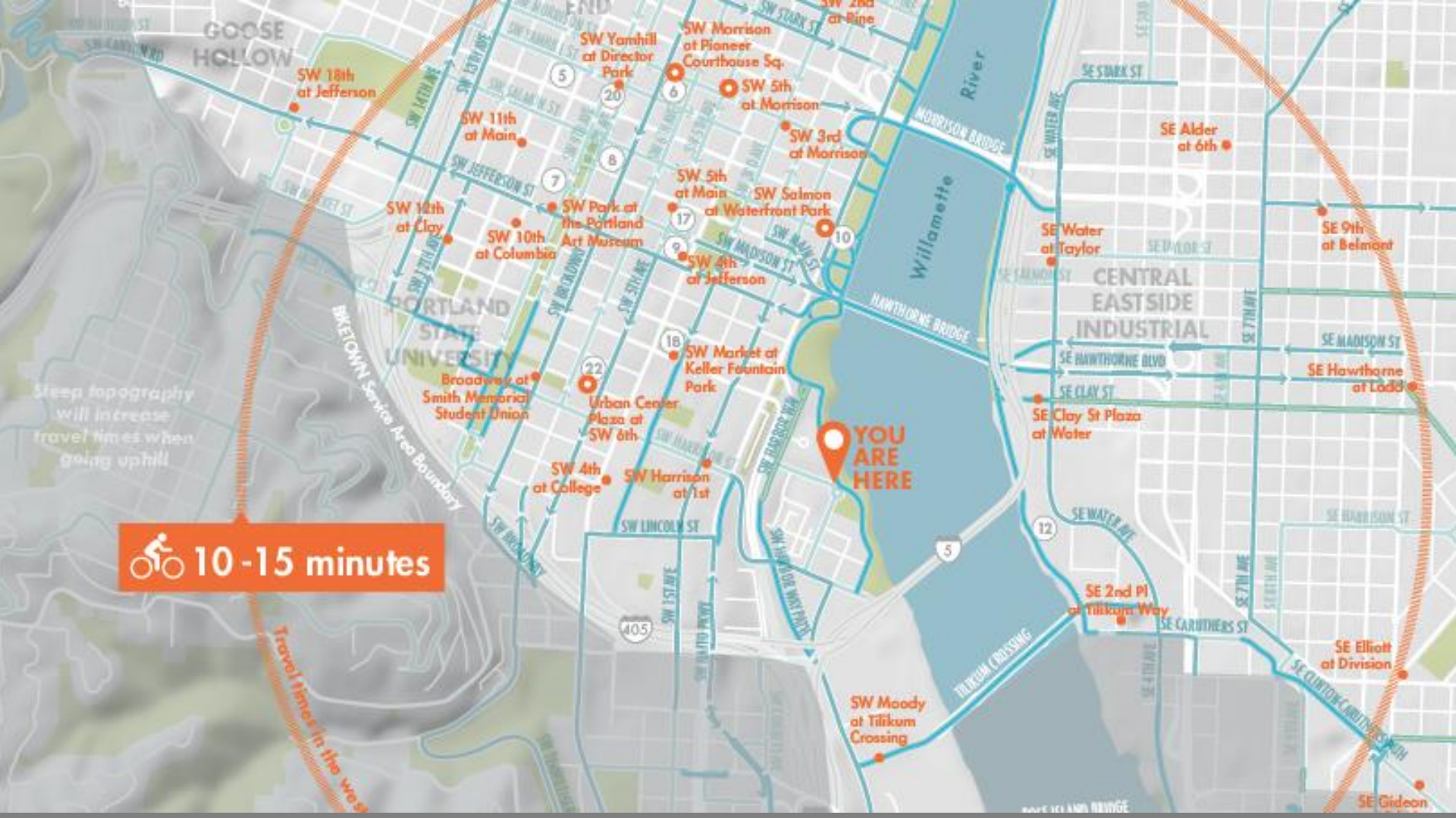


MAKING MAPS

Cartographic Design & Principles| Winter 2018

Cartography

"the art, science, and technology of making maps, together with their study as scientific documents and works of art"

- The International Cartographic Association

"Far from being an antique craft belonging to a bygone era, cartography is the art of geovisualization; a way of sharing spatial knowledge and empowering people through the application of good design, whether the medium is electronic or paper, permanent or perishable, static or dynamic"

- Alexander J Kent, *Bulletin of the Society of Cartographers* (2008)

The Cartographic Process

The Cartographic Process

Planning	Data Analysis	Presentation	Critique / Editing	Production

• Purpose
• Topic
• Format
• Audience
	• Collection
	• Synthesis
	• Analysis
		• Layout
		• Medium
		  • Monitor
		  • Projector
		  • Paper
		• Design
			• Design
			• Content accuracy	

Making maps is hard!

*What is the **PURPOSE** of the map?*

*Who is the **AUDIENCE**?*

What is the best way to REPRESENT the data?

*Is all **NECESSARY** data included?*

*Is all the **UNNECESSARY** data excluded?*

*How will the map be **VIEWED**?*

Map data is also complex!

Is it qualitative or quantitative?

Are there any copyright issues with the data?

Are the symbols appropriate?

Has the data been properly analyzed?

Does the data serve the purpose of the map?

Is the data too generalized or complex?

Then there's the map DESIGN!

So many things to consider….

- Title & subtitle
- Map scale
- Legend
- How many data frames?
- Color
- Balance & layout
- Symbols
- Map Projection
- And so on…

Core Cartographic Principles

For designing maps people want to look at

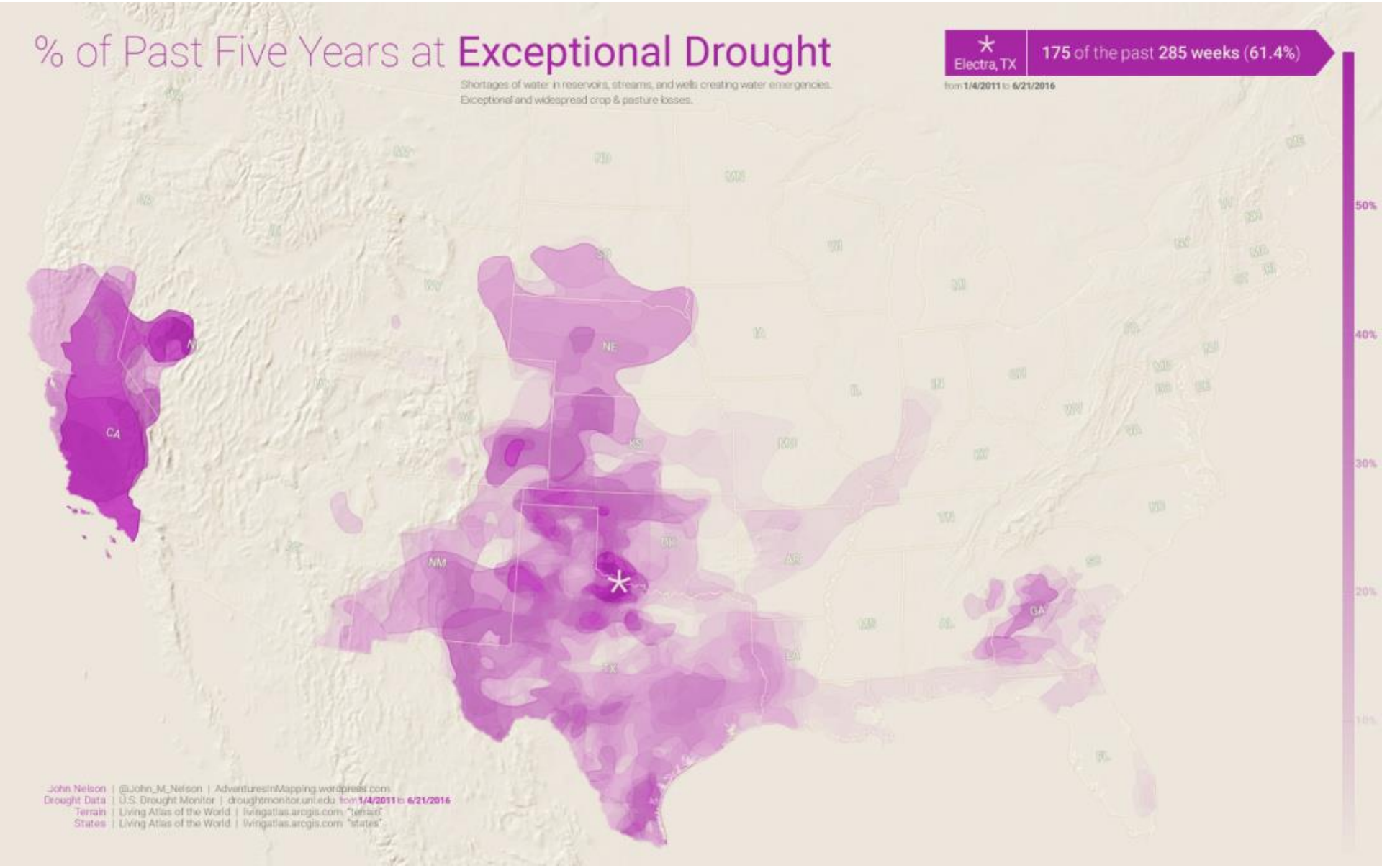
Visual hierarchy

[map design] the presentation of features on a map in a way that implies relative importance, usually achieved with visual contrast (GIS Dictionary)

Washington Elevation

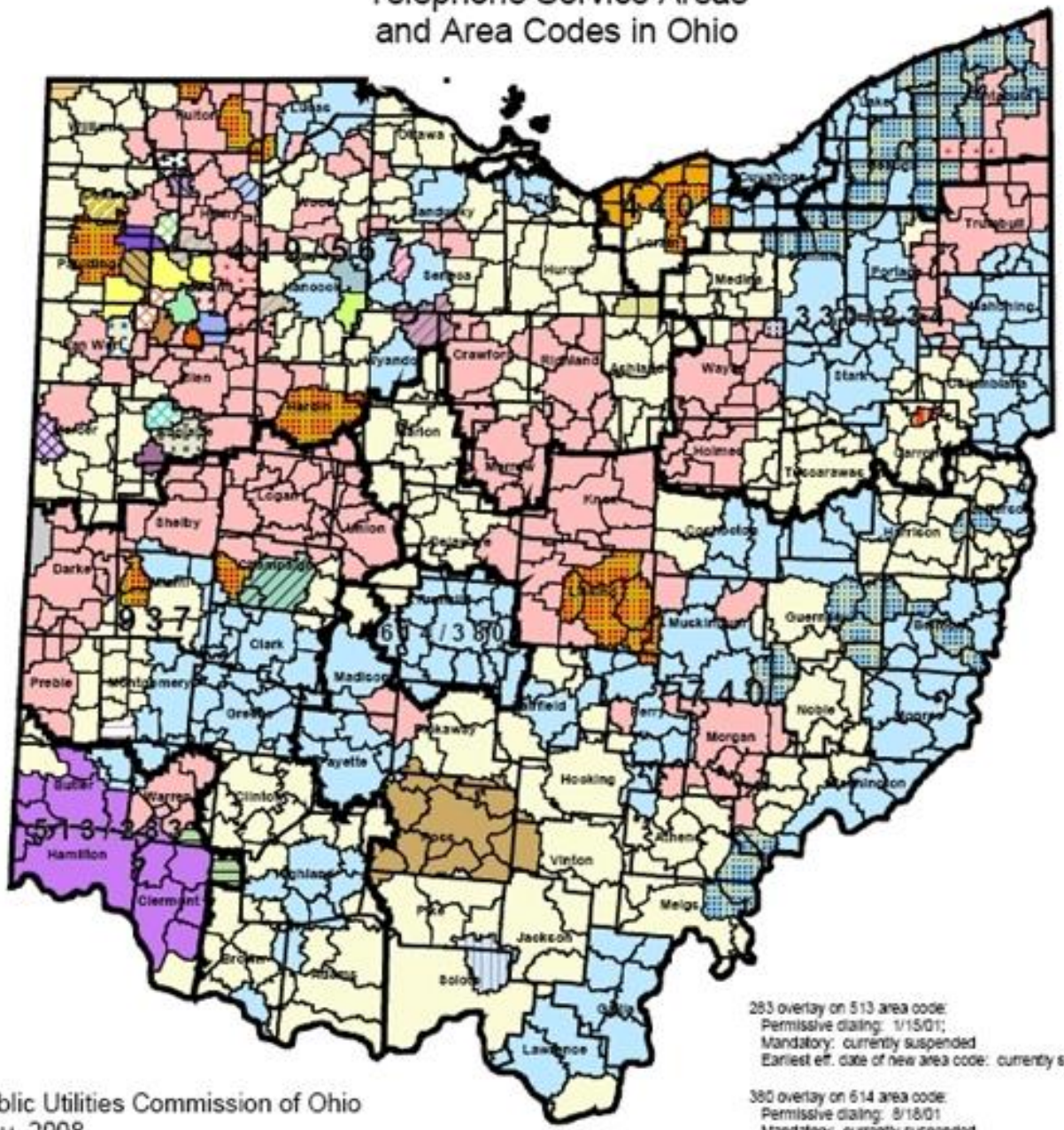
% of Past Five Years at Exceptional Drought

Shortages of water in reservoirs, streams, and wells creating water emergencies.
Exceptional and widespread crop & pasture losses.



John Nelson | @John_M_Nelson | AdventuresInMapping.wordpress.com
Drought Data | U.S. Drought Monitor | droughtmonitor.unl.edu from 1/4/2011 to 6/21/2016
Terrain | Living Atlas of the World | livingatlas.arcgis.com "terrain"
States | Living Atlas of the World | livingatlas.arcgis.com "states"

Telephone Service Areas and Area Codes in Ohio



283 overlay on 513 area code:
Permissive dialing: 1/15/01;
Mandatory: currently suspended
Earliest eff. date of new area code: currently suspe

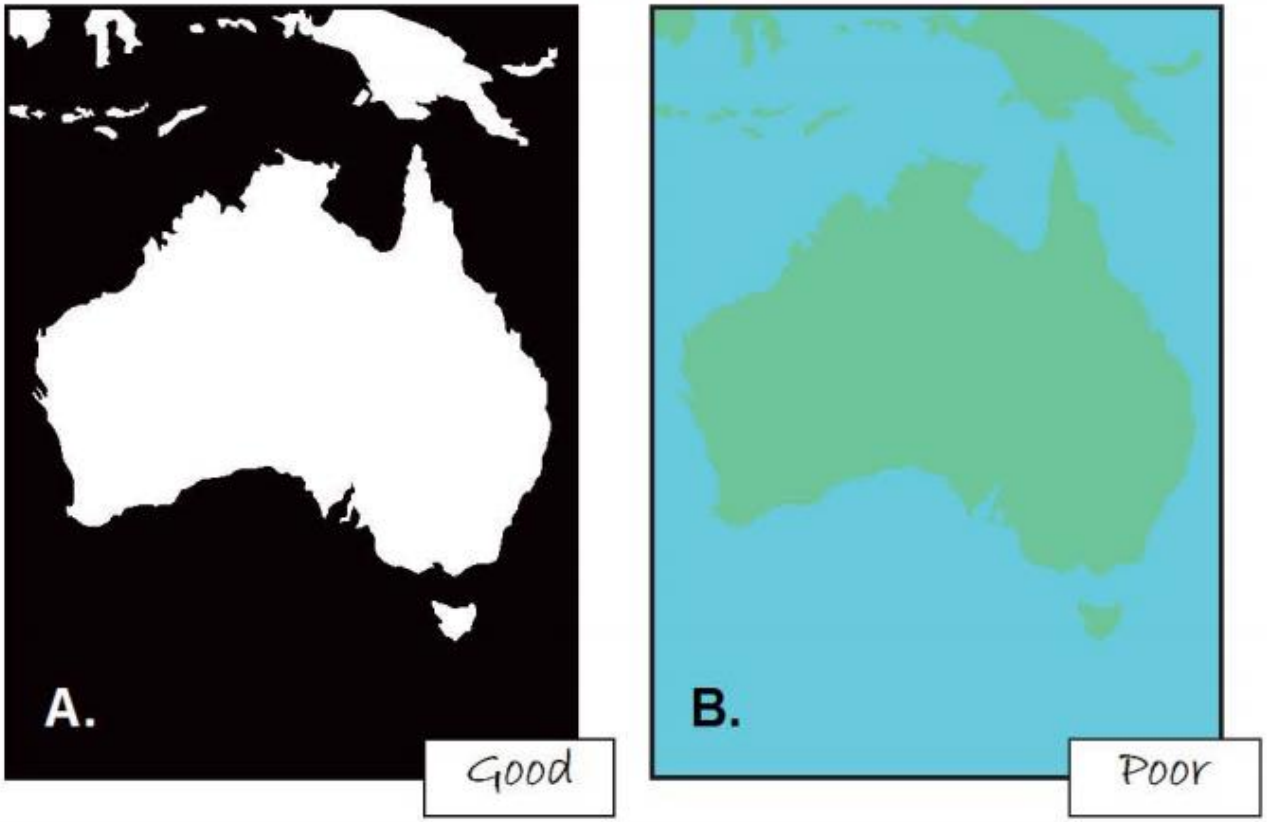
380 overlay on 614 area code:
Permissive dialing: 8/18/01
Mandatory: currently suspended
Earliest eff. date of new area code: currently suspe

Public Utilities Commission of Ohio
May, 2008


13,235-Mile Road Trip to Follow
70°F Normal High Temperature
July 1
August 1
September 1
October 1
November 1
December 1
December 31
January 1
February 1
March 1
April 1
May 1
June 1
Source: NCEI &
Environment Canada
Climate Normals
© Brian Brettschneider, 2015
CANADA
UNITED STATES
MEXICO
Hudson Bay
Pacific Ocean
Gulf of Mexico
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

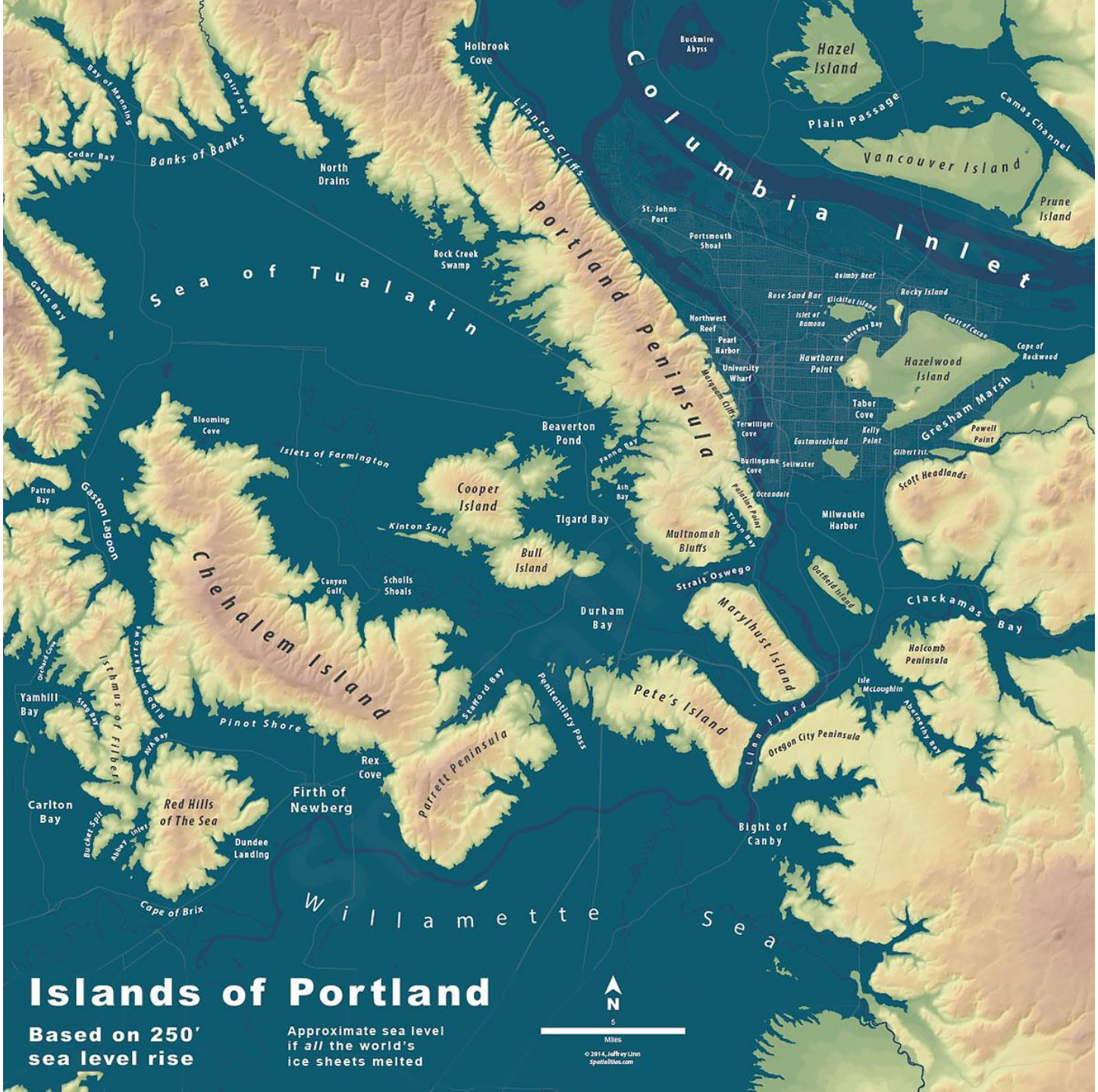
Visual contrast

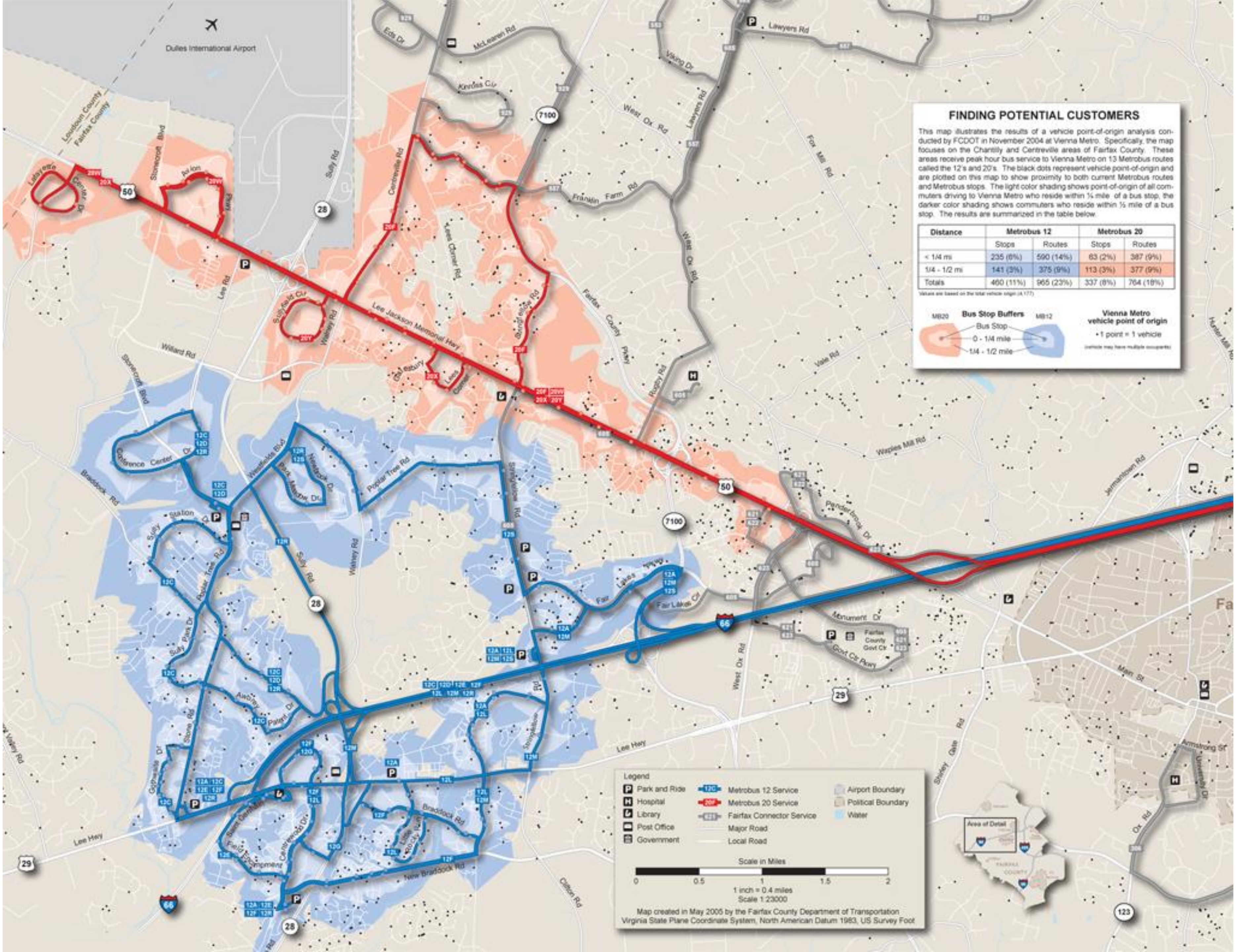
How map features & page elements contrast each other and their background



Visual contrast

If you only use one line weight, one font size, and one font there is no contrast and the map is hard to read


Islands of Portland
Based on 250′ sea level rise
Approximate sea level if all the world's ice sheets melted
N
5
Miles
© 2014, Jaffrey Linn
SpatialBits.com
Columbia Inlet
Sea of Tualatin
Willamette Sea
Portland Peninsula
Chehalem Island
Hazel Island
Vancouver Island
Prune Island
Hazelwood Island
Gresham Marsh
Cooper Island
Bull Island
Pete's Island
Marylhust Island
Multnomah Bluffs
Parrett Peninsula
Red Hills of The Sea
Holbrook Cove
Buckmire Abyss
Plain Passage
Camas Channel
Linnton Cliffs
Banks of Banks
North Drains
Rock Creek Swamp
Bay of Manning
Dairy Bay
Cedar Bay
Gales Bay
Blooming Cove
Islets of Farmington
Patton Bay
Gaston Lagoon
Beaverton Pond
Fanno Bay
Ash Bay
Tigard Bay
Kinton Split
Canyon Gulf
Scholls Shoals
Durham Bay
Strait Oswego
Oatfield Island
Clackamas Bay
Holcomb Peninsula
Isle McLoughlin
Oregon City Peninsula
Abernethy Bay
Lion Fjord
Penitentiary Pass
Stafford Bay
Pinot Shore
Rex Cove
Firth of Newberg
Isthmus of Filbert
Ribbon Ridge
Orchard Cove
Yamhill Bay
Stag Bay
Ash Bay
Carlton Bay
Bucket Spit
Abbey Inlet
Dundee Landing
Cape of Brix
Bight of Canby
St. Johns Port
Portsmouth Shoal
Quimby Reef
Rose Sand Bar
Wicklitat Island
Rocky Island
Islet of Ramona
Roseway Bay
Coast of Cocao
Northwest Reef
Pearl Harbor
University Wharf
Hawthorne Point
Cape of Rockwood
Marquam Cliff
Terwilliger Cove
Tabor Cove
Kelly Point
Powell Point
Eastmoreisland
Gilbert Isl.
Burlingame Cove
Seliwater
Scott Headlands
Oceandale
Tryon Bay
Milwaukie Harbor

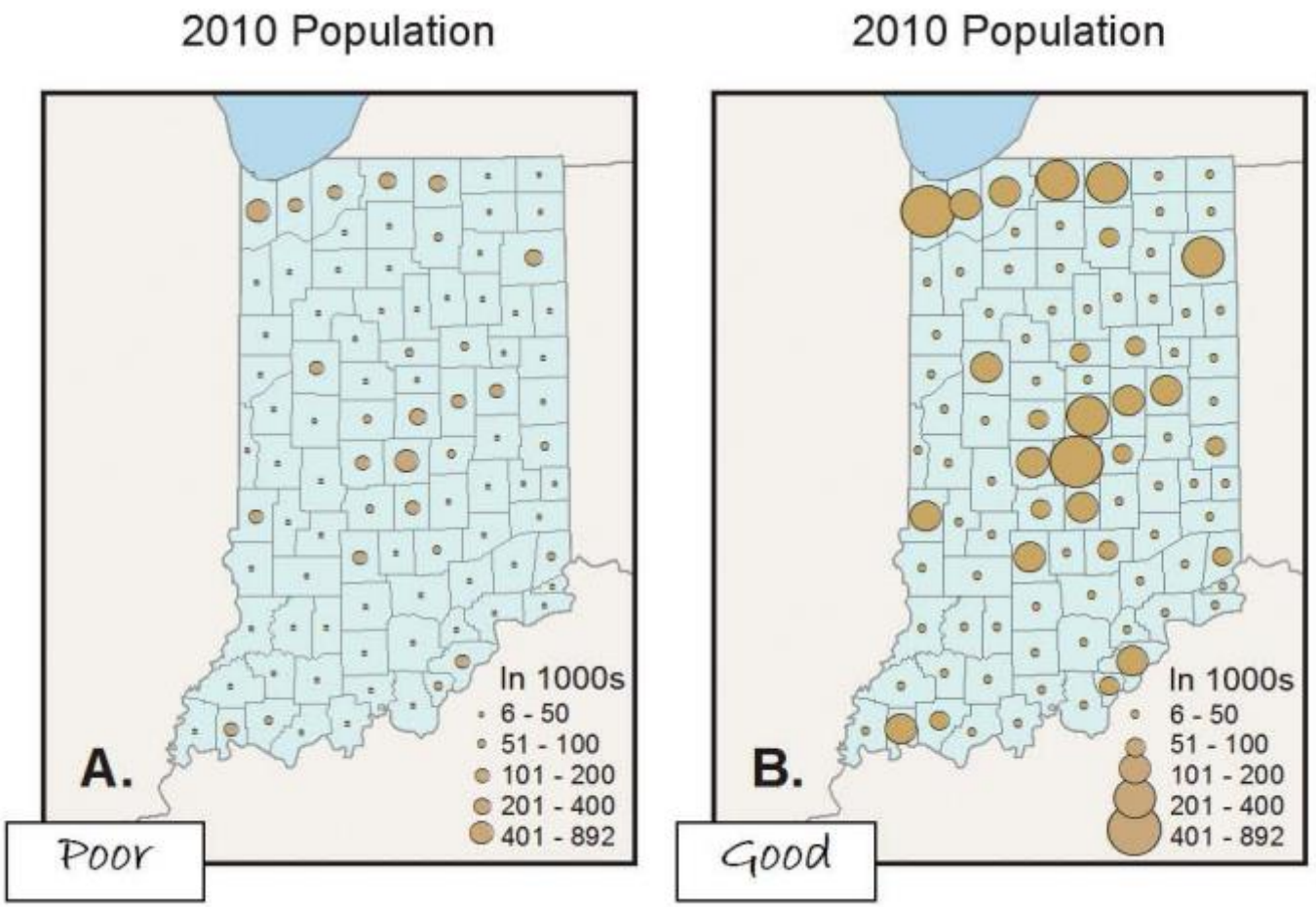


Distance	Metrobus 12		Metrobus 20	
	Stops	Routes	Stops	Routes
< 1/4 mi	235 (6%)	590 (14%)	63 (2%)	387 (9%)
1/4 - 1/2 mi	141 (3%)	375 (9%)	113 (3%)	377 (9%)
Totals	460 (11%)	965 (23%)	337 (8%)	764 (18%)

Values are based on the total vehicle origin (4,177)

Legibility

The ability to be see and understand the map

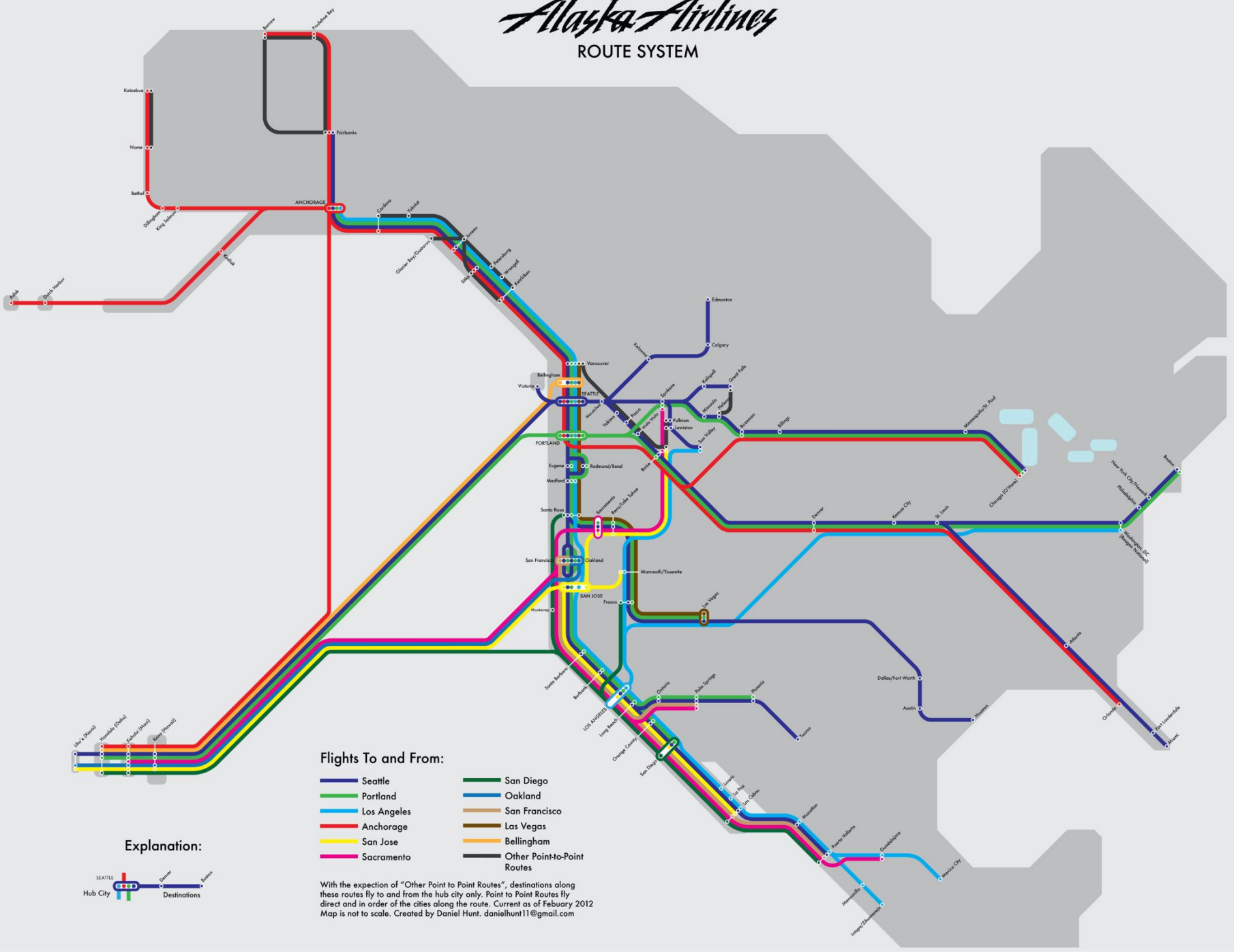


Legibility

1. Emphasize important elements
2. Eliminate anything that does not enhance the message of the map

Alaska Airlines

ROUTE SYSTEM



Flights To and From:

- Seattle
- Portland
- Los Angeles
- Anchorage
- San Jose
- Sacramento
- San Diego
- Oakland
- San Francisco
- Las Vegas
- Bellingham
- Other Point-to-Point Routes

Explanation:

With the expection of "Other Point to Point Routes", destinations along these routes fly to and from the hub city only. Point to Point Routes fly direct and in order of the cities along the route. Current as of Febuary 2012 Map is not to scale. Created by Daniel Hunt. danielhunt11@gmail.com

Portland (Race)

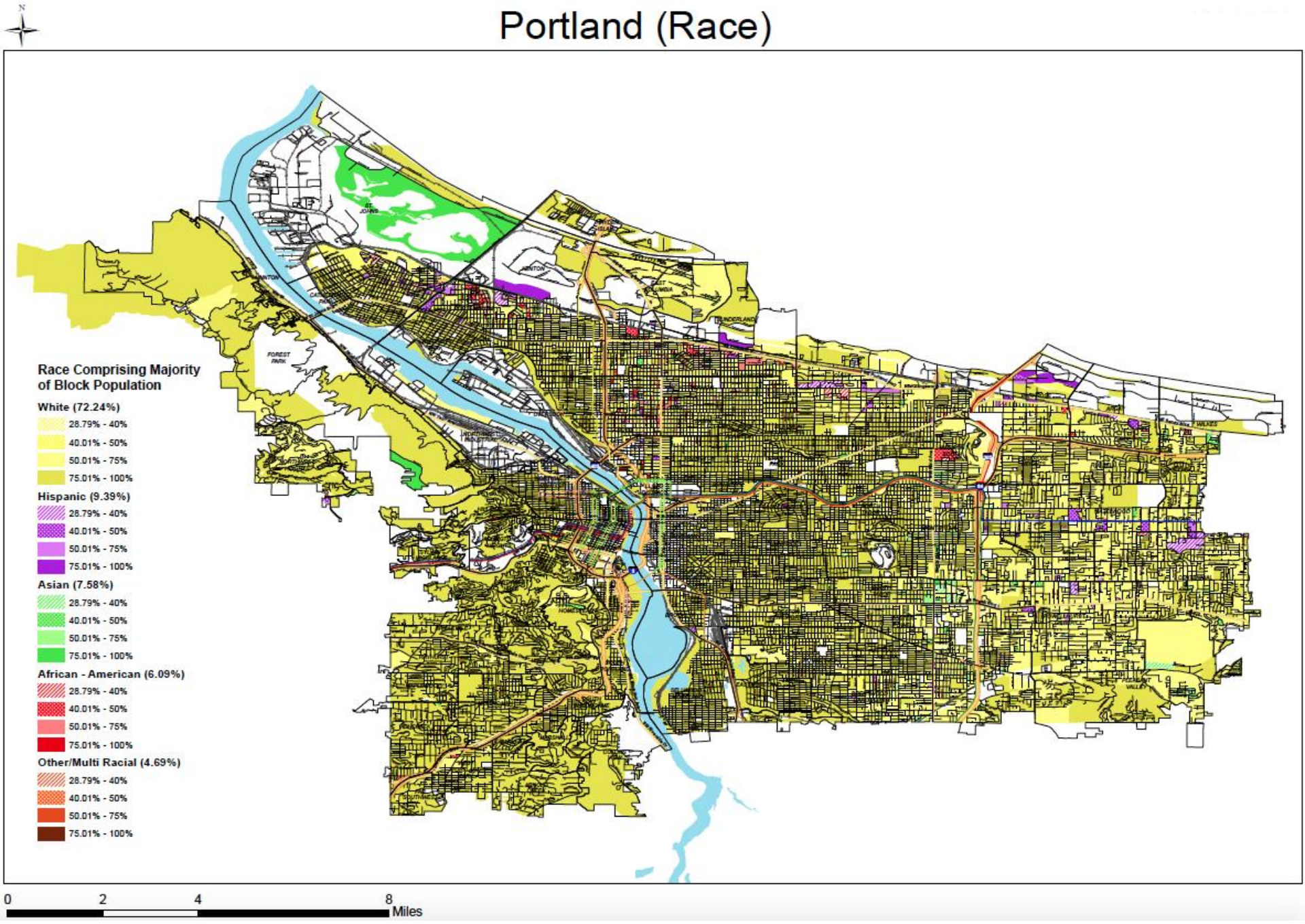
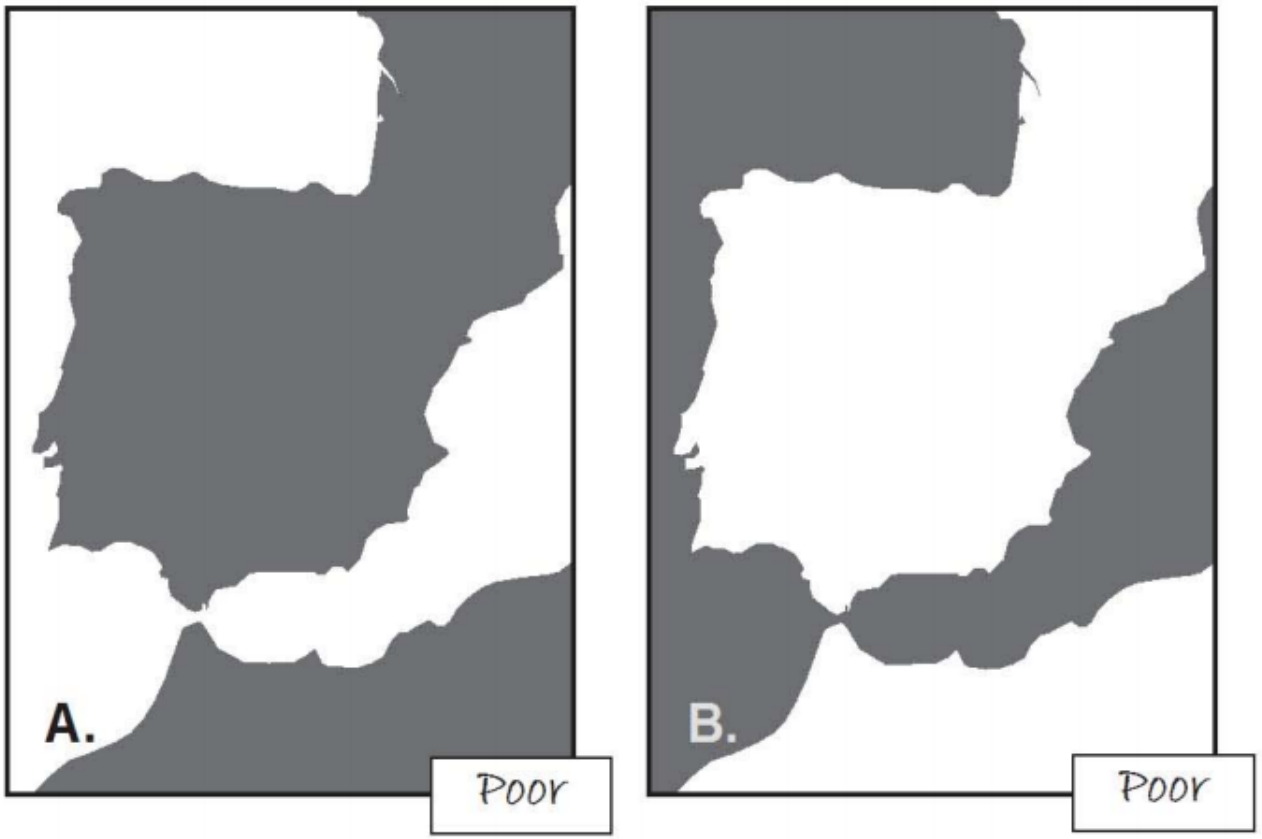
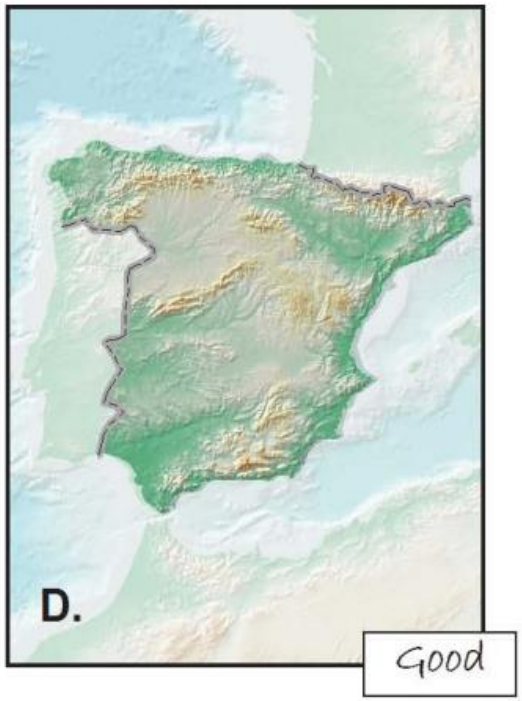


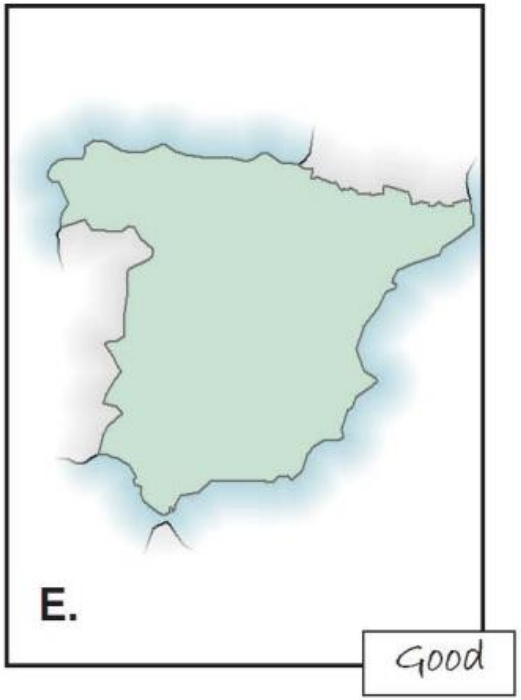
Figure-ground

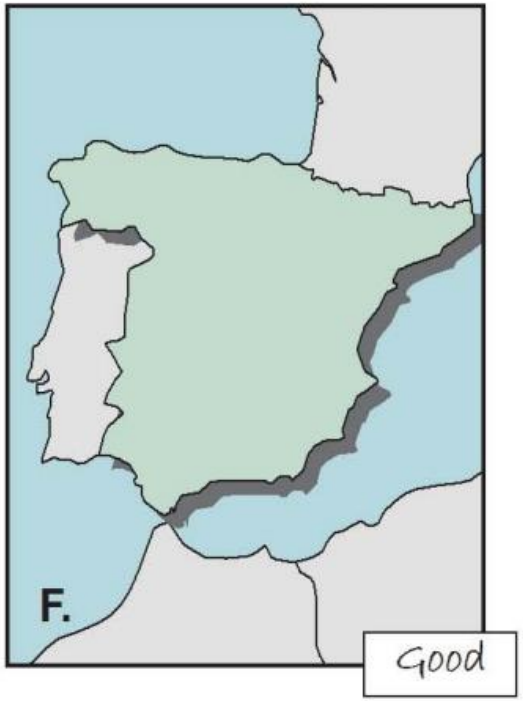
Easily distinguish between the main figure on the map and the background

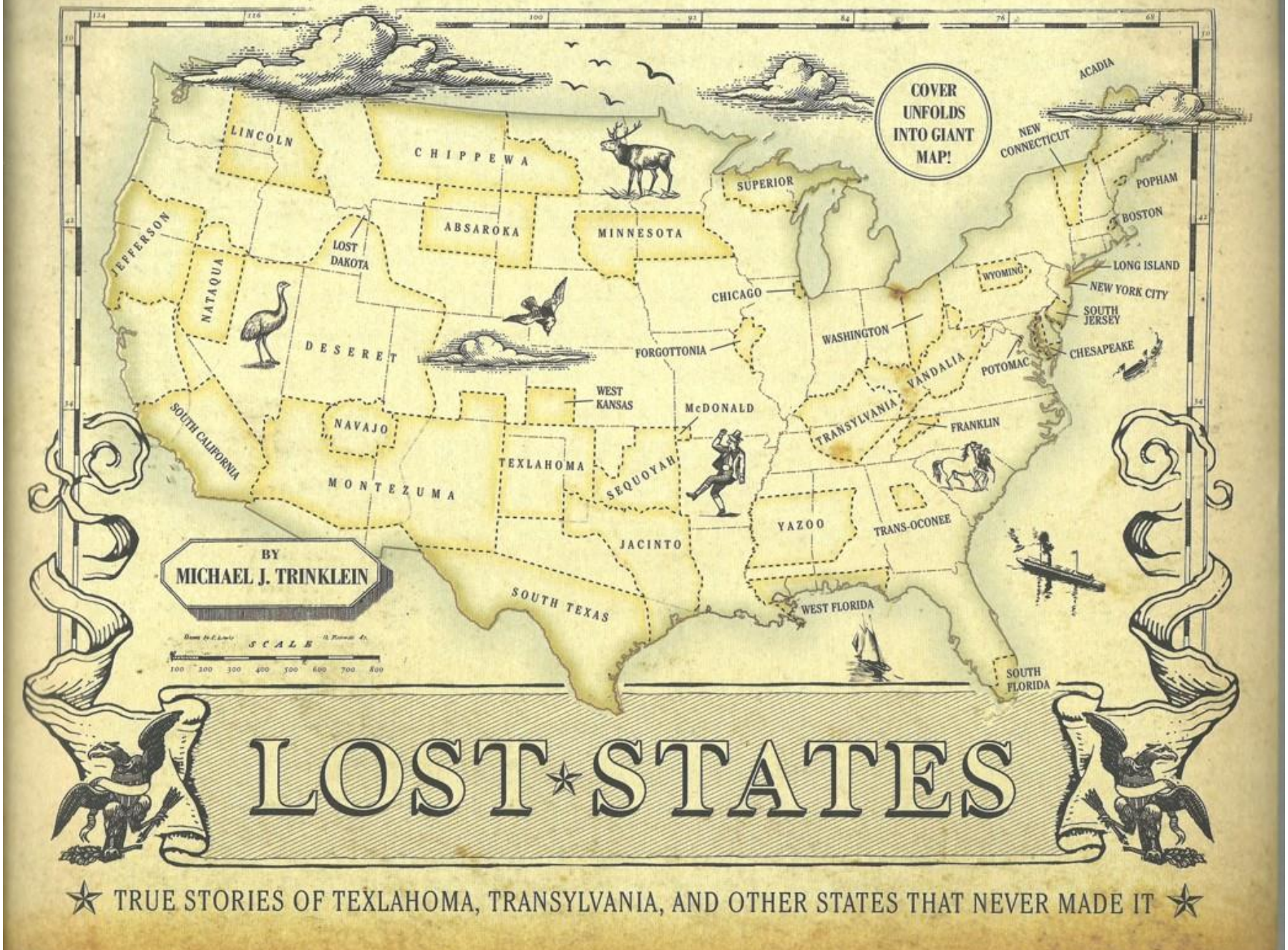



France
Spain
Portugal
Algeria
Morocco
C.
Good


D.
Good


E.
Good


F.
Good



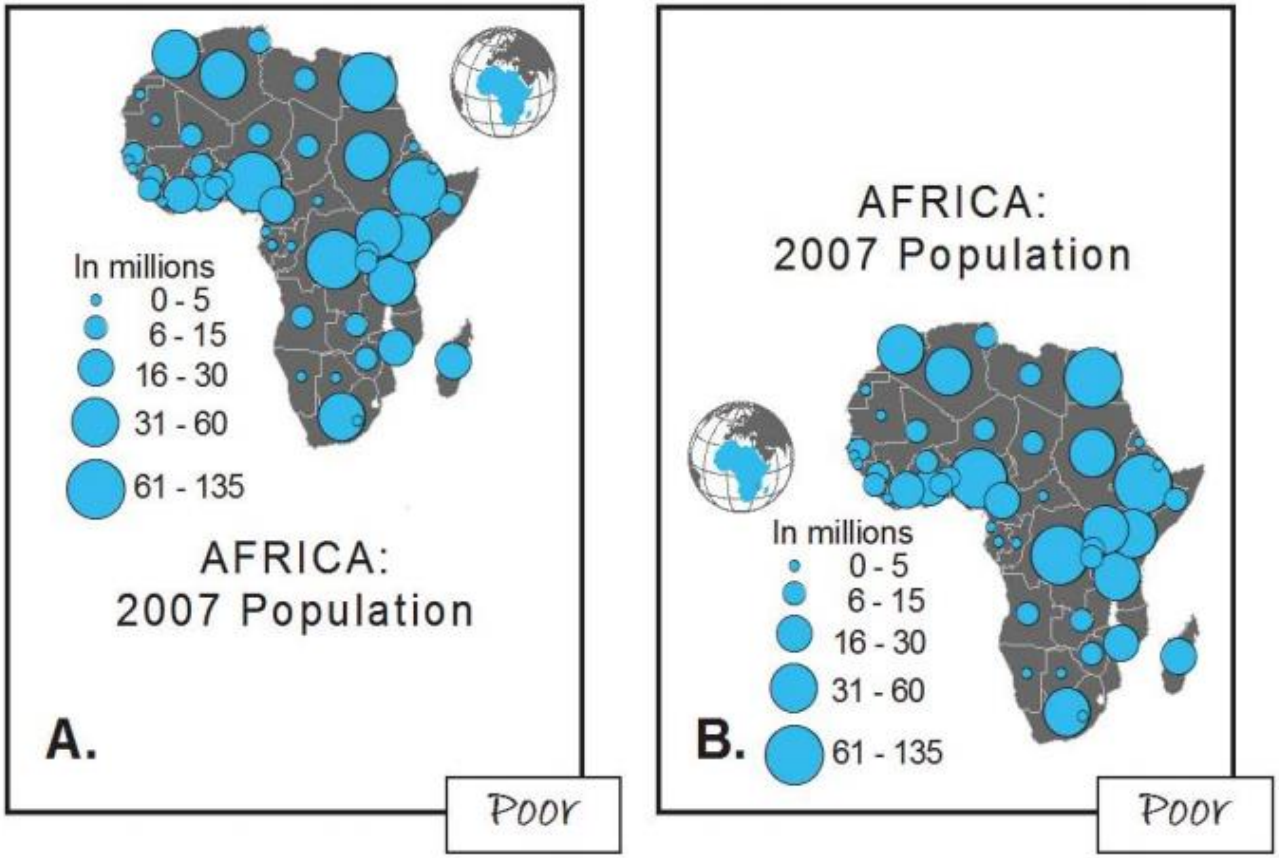
LOST★STATES

★ TRUE STORIES OF TEXLAHOMA, TRANSYLVANIA, AND OTHER STATES THAT NEVER MADE IT ★


Turkey
Bulgaria
Georgia
Armenia
Iran
Iraq
Syria
Greece
Cyprus
Black Sea
Mediterranean Sea
Aegean Sea
Marmara
Istanbul
Ankara
Izmir
Bursa
Konya
Adana
Gaziantep
Kayseri
Sivas
Erzurum
Erzincan
Trabzon
Samsun
Diyarbakir
Mersin
Antalya
Eskisehir
Kinkkale
Cankiri
Corum
Amasya
Tokat
Ordu
Giresun
Rize
Artvin
Kars
Agri
Van
Mus
Bitlis
Tatvan
Batman
Siirt
Hakkari
Sirnak
Mardin
Sanliurfa
Elazig
Malatya
Tunceli
Bingol
Yozgat
Kirsehir
Nevsehir
Aksaray
Nigde
Karaman
Kahramanmaras
Adiyaman
Hatay
Kilis
Iskenderun
Tarsus
Eregli
Afyon
Usak
Denizli
Isparta
Burdur
Aydin
Mugla
Manisa
Balikesir
Canakkale
Edirne
Kirklareli
Luleburgaz
Tekirdag
Kocaeli
Sakarya
Bilecik
Bolu
Zonguldak
Karabuk
Kastamonu
Cape Ince
Sinop
Bafra
Gumushane
Bayburt
Batumi
Poti
Tbilisi
Vanadzor
Yerevan
Kars
Aleppo
Al Qamishli
Mosul
Irbil
Kirkuk
Al Hasakah
Ar Raqqah
Dayr az Azwr
Al Ladhiqiyah
Hamah
Hims
Tartus
Nicosia
Lemosos
Kárpathos
Creta
Rodos
Kos
Mitilini
Lesvos
Hios
Soke
Antalya Bay
Iskenderun Bay
Buhayrat al Asad
Dardanele
Zakho
Dijlah
E80
E90
E89
E88
E87
D-010
D-785
D-100
D-200
D-260
D-715
D-650
D-330
D-525
D-400
D-850
D-080
D-965
D-975
Scale 1:6.500.000
0 50 100 150 200 250 km
N
28°
32°
36°
40°
44°
42°
40°
36°

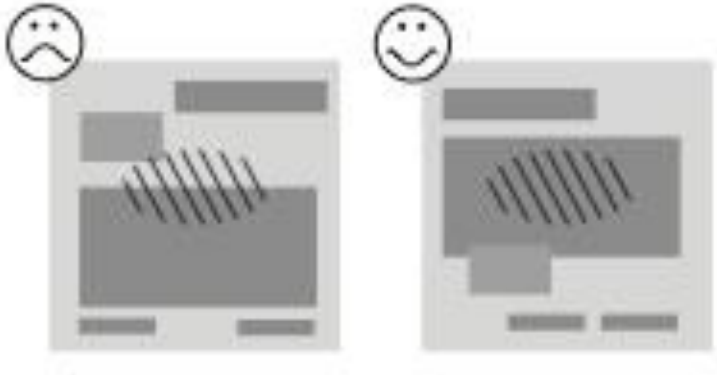
Balance

Organization of the map and other elements on the page layout

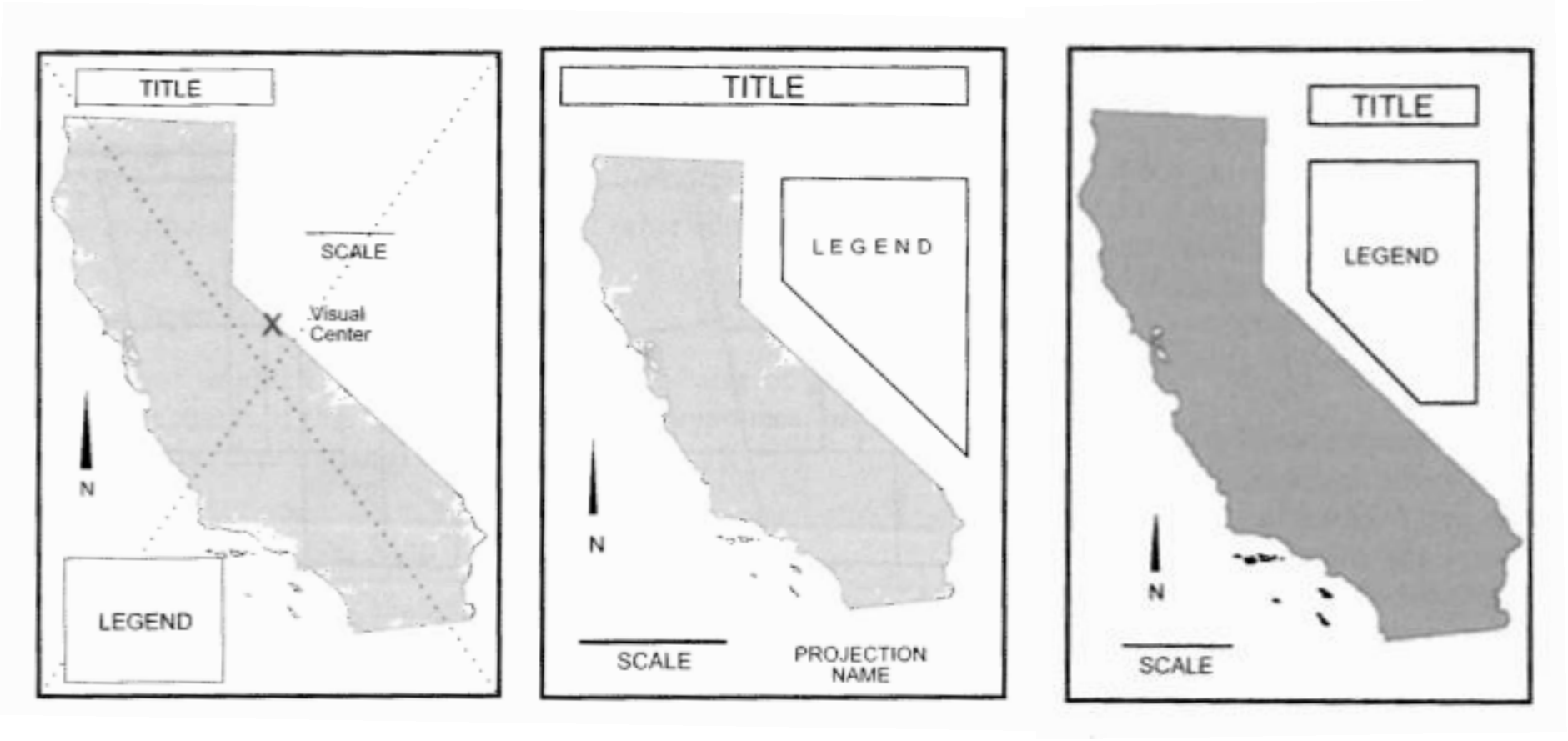


Balance

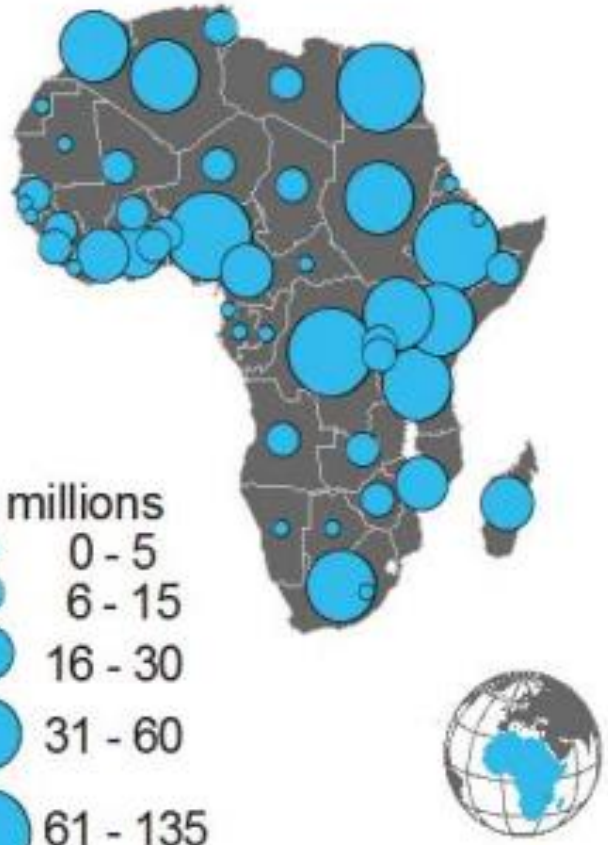
*Every element of a map has **visual weight**, which should be evenly distributed around the **visual center** of the page*



Balance


TITLE
SCALE
Visual Center
N
LEGEND
TITLE
LEGEND
N
SCALE
PROJECTION NAME
TITLE
LEGEND
N
SCALE

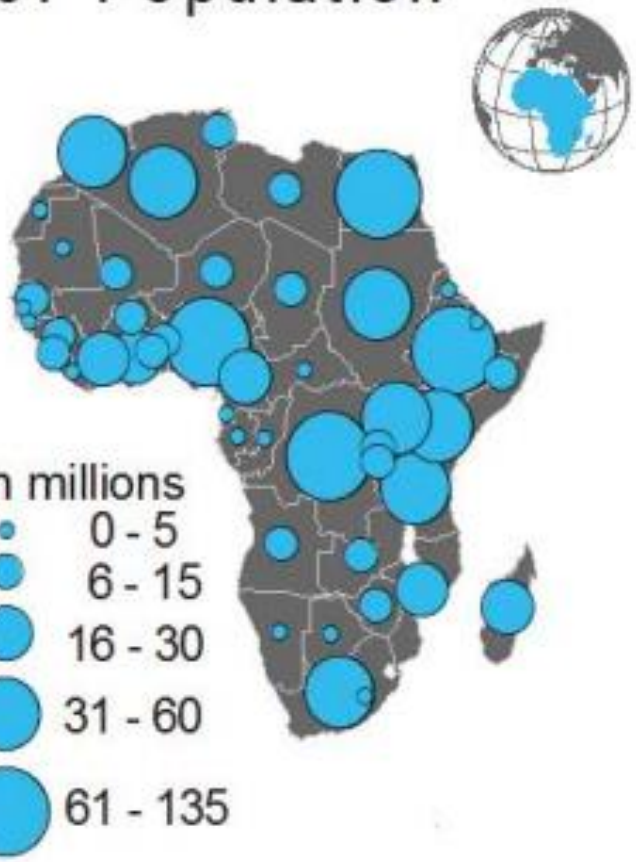
AFRICA:
2007 Population



C.

Good

AFRICA:
2007 Population



D.

Good

Balance - visual weights

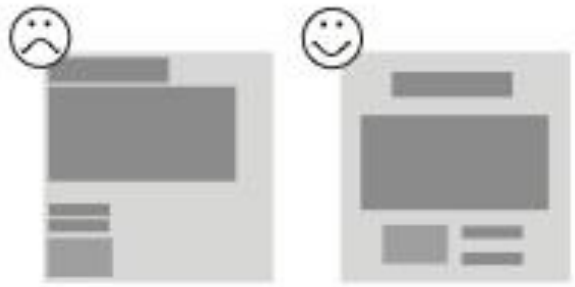
- Centrally located elements have less weight than those to one side
- Objects in the upper half appear heavier than those in the lower half
- Objects on the right side appear heavier than those on the left side
- Weight appears to increase with increasing distance from the center
- Isolated elements have more weight than grouped elements
- Larger elements have greater visual weight
- Red is heavier than blue
- Bright colors are heavier than dark
- Regular shapes seem heavier than irregular shapes
- Compact shapes have more visual weight than unordered, diffuse shapes
- Forms with a vertical orientation seem heavier than oblique forms

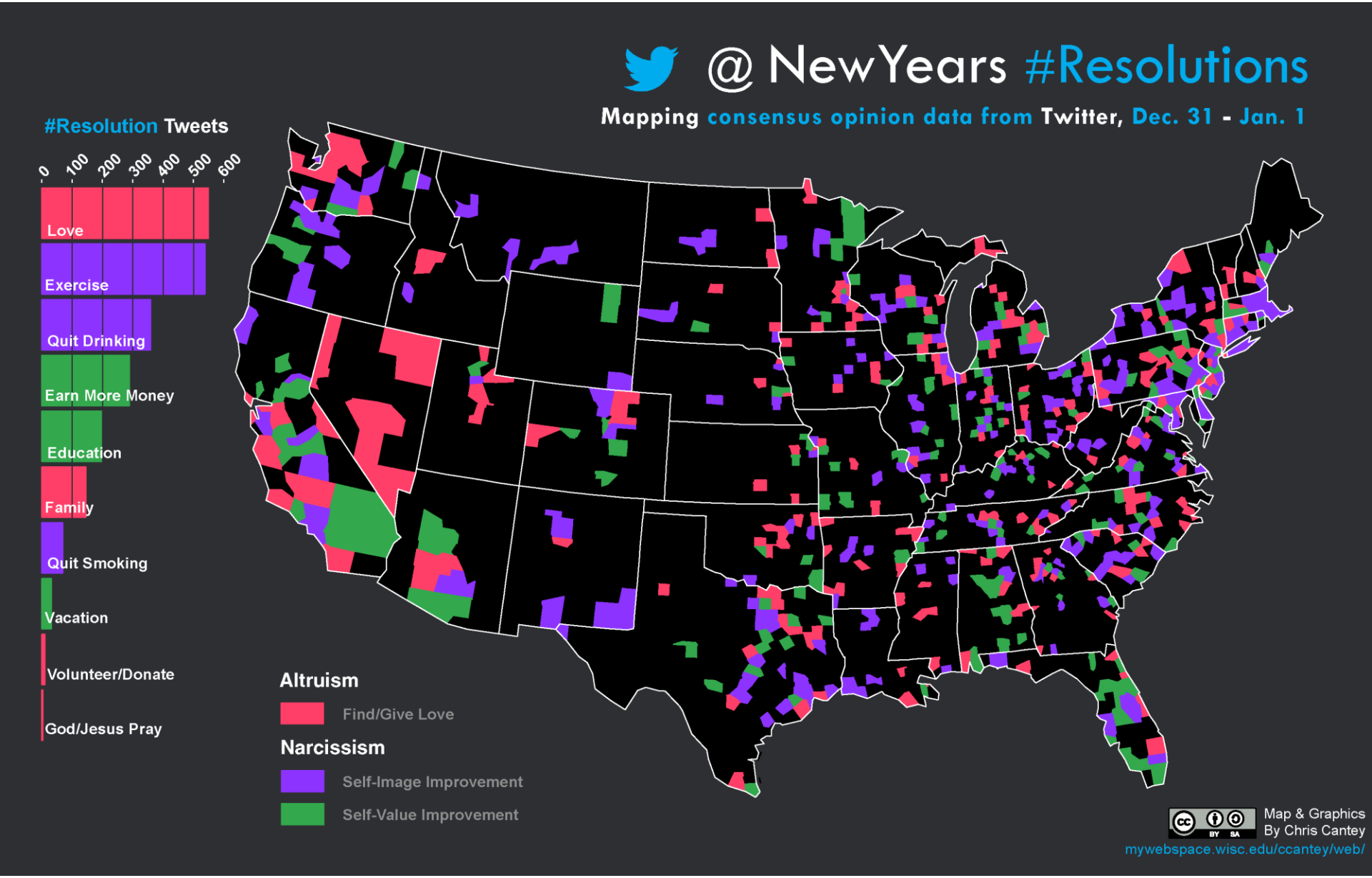
- Arnheim, 1969

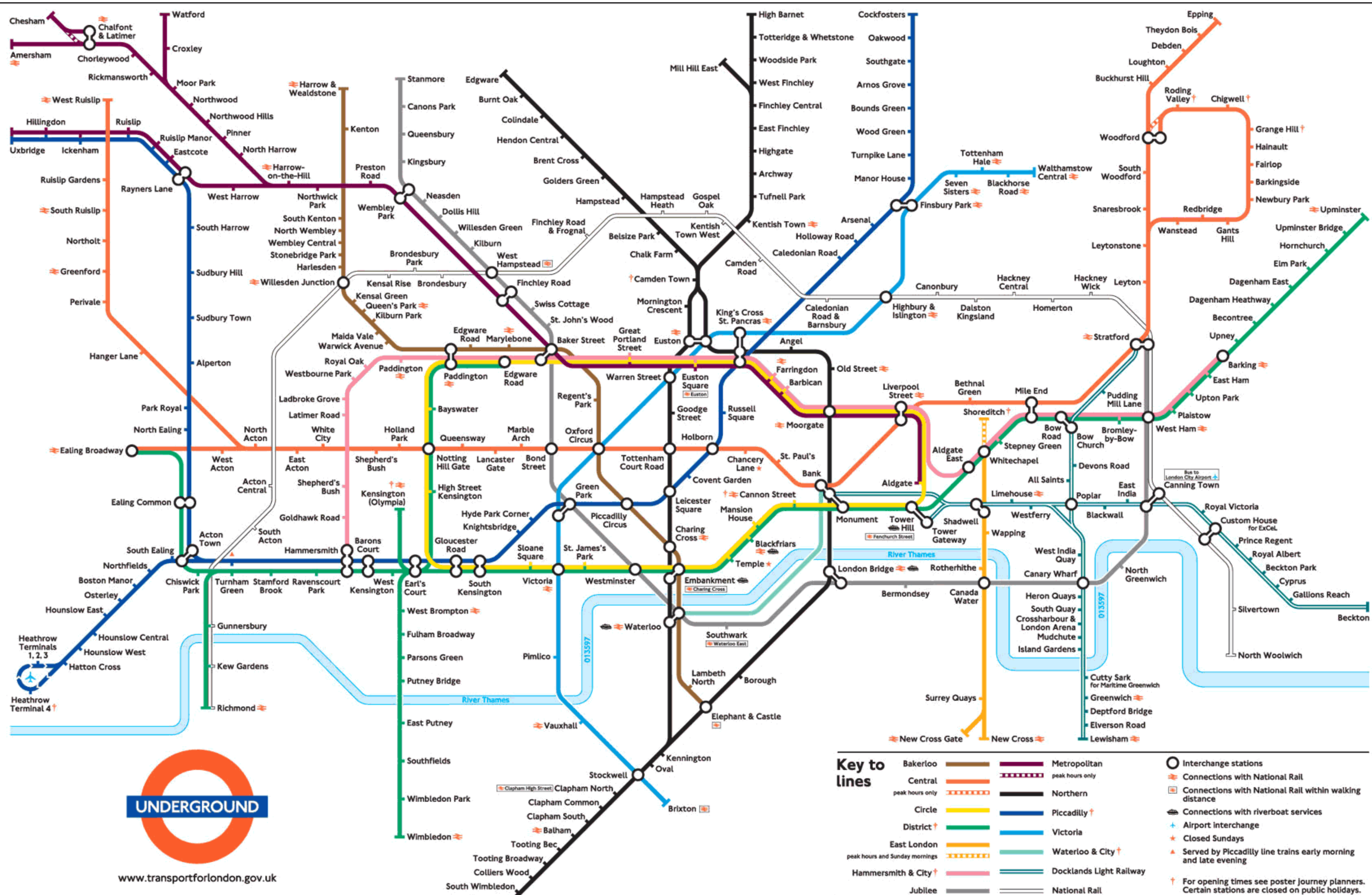
Balance

White space *is any area within the map frame not taken by the map*

1. Certain amount of white space is required
2. Put the largest map possible on the page while still leaving room for other elements



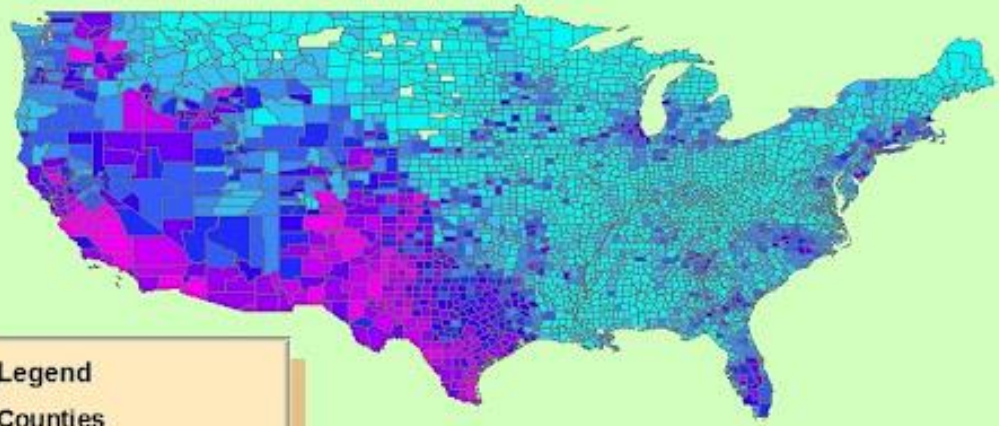

@ NewYears #Resolutions
Mapping consensus opinion data from Twitter, Dec. 31 - Jan. 1
#Resolution Tweets
0
100
200
300
400
500
600
Love
Exercise
Quit Drinking
Earn More Money
Education
Family
Quit Smoking
Vacation
Volunteer/Donate
God/Jesus Pray
Altruism
Find/Give Love
Narcissism
Self-Image Improvement
Self-Value Improvement
Map & Graphics
By Chris Cantey
mywebspace.wisc.edu/ccantey/web/



LTM I FA(a) 10.00

Reg. user No. 01/3597

Percent of Some Other Race Alone across the continental US



Legend

Counties

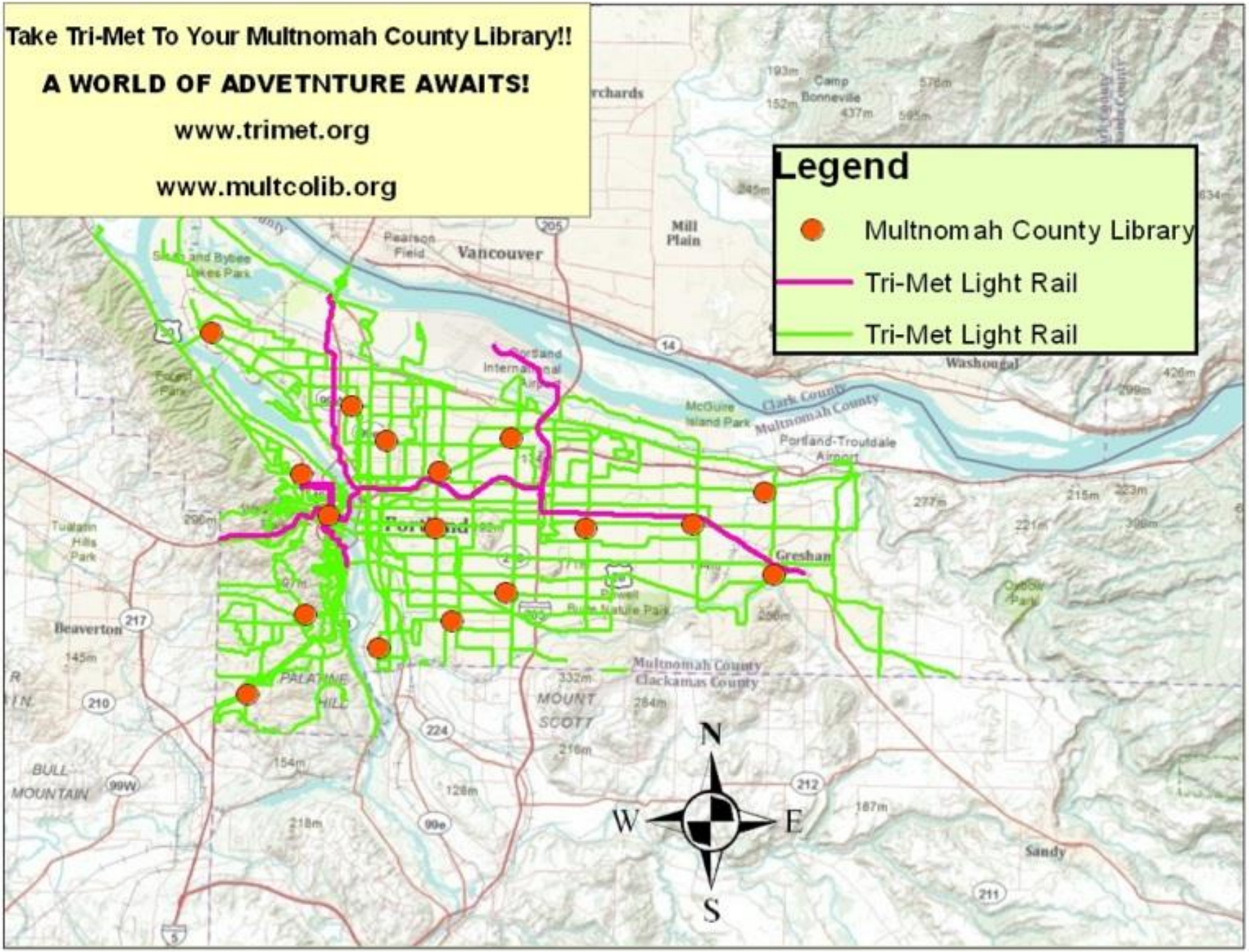
Percent

- 0.007950 - 0.569358
- 0.569359 - 1.287289
- 1.287290 - 2.312043
- 2.312044 - 3.707276
- 3.707277 - 5.474745
- 5.474746 - 7.899605
- 7.899606 - 11.320953
- 11.320954 - 15.830335
- 15.830336 - 22.271278
- 22.271279 - 39.079523

0 355 710 1,420 Miles

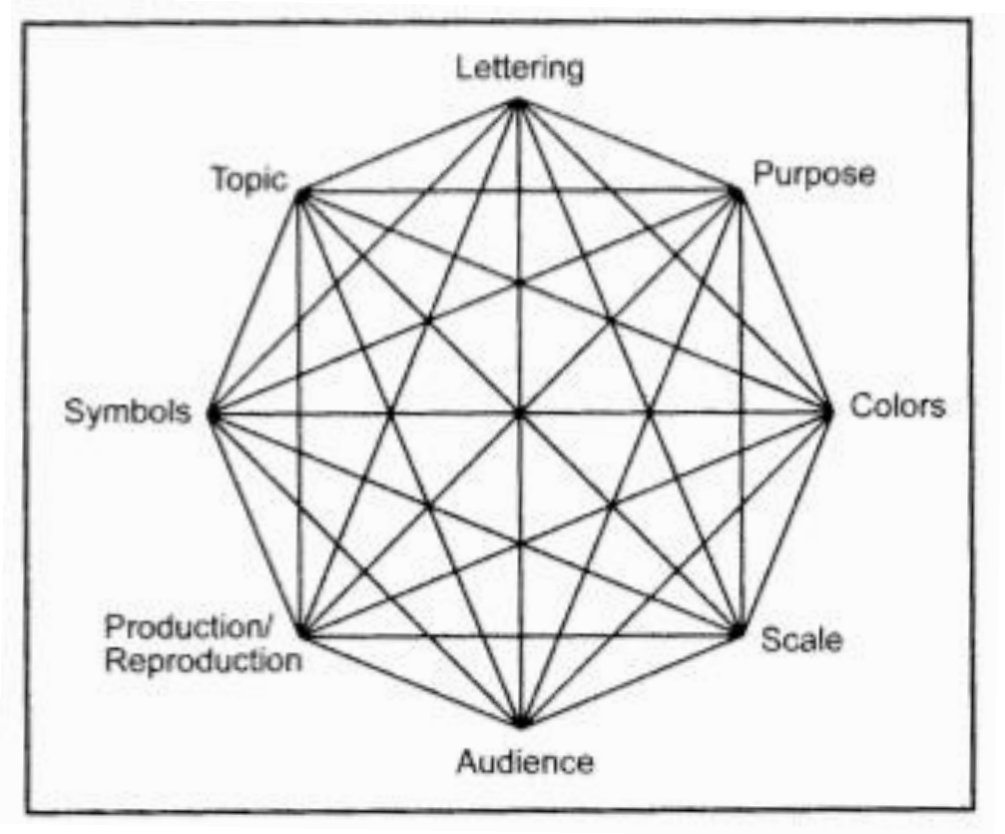
N

S


Take Tri-Met To Your Multnomah County Library!!
A WORLD OF ADVETNTURE AWAITS!
www.trimet.org
www.multcolib.org
Legend
Multnomah County Library
Tri-Met Light Rail
Tri-Met Light Rail
Vancouver
Portland
Gresham
Beaverton
Washougal
Sandy
Mill Plain
Pearson Field
Portland International Airport
Portland-Troutdale Airport
McGuire Island Park
Clark County
Multnomah County
Tualatin Hills Park
PALATINE HILL
MOUNT SCOTT
BULL MOUNTAIN
Multnomah County
Clackamas County
N
S
E
W

Unity & Harmony

The map appears to be a single unit, with an overall pleasing appearance – it's a map that people want to look at



Finding creative inspiration

You can be creative

"Every great advance in science has issued from a new audacity of the imagination" – John Dewey, philosopher

Make lots of maps

- Explore new tools & try new techniques
- Do other creative things
  - Take an art class
  - Carry a sketch book to record what you see
  - Draw a cartoon for a child

Look at lots of maps

- Actively & deliberately observe and absorb the imaginative creations of others
  - Look at maps or an atlas
  - View all types of art, regularly
  - Museums, gardens, architecture, design magazines/books

Inspiration

Flowing Data, http://flowingdata.com/

Axis Maps, http://www.axismaps.com/blog/

Making Maps: DIY Cartography, http://makingmaps.net/

FOSS4G Map Gallery
http://2015.foss4g.org/programme/map-gallery/

Inspiration

A Cartographer's Toolkit,
http://www.gretchenpeterson.com/blog/

Visual.ly – Geography Infographics,
http://visual.ly/geography-infographics

Cartotalk, http://cartotalk.com/

ESRI Mapping Blog,
http://blogs.esri.com/esri/arcgis/category/mapping/

Inspiration

Edward Tufte – data visualization

http://www.edwardtufte.com/tufte/

Map as Art (Katharine Harmon)

http://www.dwell.com/books/article/map-art