

The Hidden "C" in GIS –

Maps Gone Bad

Rod Bassler, GIS Coordinator North Dakota State Water Commission 2004

Cartography

Maps as a Communication Medium





Maps as a Communication Medium

Bad Maps, Bad Maps, What'cha Gonna Do, What'cha Gonna Do When They Come For You?

"... Internet map servers are taking map design from the hands of cartographers and the result is the worst kinds of carto-crimes, as I call them. Great data, great idea, terrible execution!" – Martin von Wyss



Maps as a Communication Medium

Why do we use Maps? Maps are popular because:

They simplify the complexities of the world They have a strong visual impact They are convenient to use They are considered a credible source of information

Map Elements

Just what are the basic elements of a map?

Purpose **Titles and Subtitles** Legends or Keys **Scales** Text **Balance and Layout Symbols**

Map Elements Titles and Subtitles

- 1) DO NOT INCLUDE THE WORD "MAP" IN THE TITLE!!!
- 2) Keep it simple and about the subject Babier of the subject Burleigh County, North Dakota
- 3) The subtitle should enhance or clarify the title
- 4) The subtitle should be a smaller type size
- 5) Should be prominent but not dominant

Map Elements Map Legend

- 1) DO NOT USE "LEGEND" AS THE TITLE!!!
- 2) Should not contain any elements that are not on the map
- 3) Should be subordinate to the title
- 4) Describes all the symbols on the map; provide good definitions
- 5) Layout should be hierarchically and logically structured

Map Elements Map Legend – An Example

Map Features Major Basins and Sub-Watersheds Water Features + Showing, floading extents circa 2003 HUC12 Sub-Watershed Perennial Stream, Canal, or Ditch Boundary Intermittent Stream Administrative Basin Delineations Dam Calio Coulee Lake, Pond, or Reservoir* Comstock Marsh or Swamp* Additional Map Features Devils Lake Devils Lake Basin, Northeast North Dakota Populated Place or Locale Edmore Coulee City / Urban Area / Corporate Limits Miles Hurricane Lake Scale 1:158.400 One inchi represents two and on e-half miles 🏏 US Highway Mod if ied State Plane Coord inste System, South Zone Mauvais Coulee 🕖 State Highway 🗡 Railroads St. Joe Coulee County Lines Starkweather Coulee PLSS Section Corners Stump Lake 🗥 🖉 PLSS Township Lines

Map Elements

Map Scale – Representative Fraction

- 1) Is the ratio between two points measured on a map and the corresponding distance measured on the ground
- 2) A Representative Fraction is unit-less
- 3) 1:24,000 1:63,360 1:100,000 1:126,720 1:500,000



Map Elements Map Scale – Verbal

- 1) States the scale definition in simple terms
- 2) Ex. One Inch Represents One Mile
- 3) Pay attention to terms such as "Equals", "Represents", and "Approximately"
- 4) 1:63,360 One Inch Represents One Mile
- 5) 1:500,000 One Inch Represents Approximately Eight Miles (actually 7.891414141 miles)

Map Elements Map Scale - Graphic

- Make sure you have the units displayed
 Make sure you have a graphical scale on maps that may be reproduced at different scales
- 3) Use units that are most likely to be used by the reader

Map Elements Map Scale - Graphic

Scale Bar Selector	? 🔀
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0 50 100 200 300 400 Miss	
Alternating Scale Bar 1	
0 50 100 200 300 400	
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Hollow Scale Bar 1	
	Properties
Hollow Scale Bar 2	More Styles
0 50 107 200 307 400 Miss	Save Reset
Double Alternating Scale Bar 1	OK Cancel

Map Elements Map Scale – The Layout



Typography

Type must always be legible and clear; 1) 6 to 8pt type is smallest that should be used 2) Type can have a hierarchical component; bold/dark/larger sizes suggest importance Italicized type can suggest movement 3) **4**) Try to space lettering across the entire feature How about coloring the text the same as the 5) symbol you are labeling





Typography

Type should not fall across a linear symbol, but if necessary the line should be interrupted.



Typography

Lettering generally should be aligned horizontally and not obliquely. If you cannot align it horizontally, curving the lettering is acceptable.







If curved parallels appear on the map, the curvature of the graticule is often strong enough to place the type along the parallel.





Typography

Vertically placed type should be placed so that it can be read

from the left side of the page.







If lettering is on a diagonal, it should be placed so that it will "fall on its feet" if it is swung into the horizontal position.







The point symbol should be seen first and its identification























<u>GIS Lecture 2 - 2nd E.g.</u> Map Design



Outline

- -Vector GIS
- -Graphic Elements
- -Colors
- -Graphical Hierarchy
- -Choropleth Maps
- -Map Layers
- -Scale Thresholds
- -Hyperlinks

Vector GIS

Graphic Features on the World



GIS Map


Vector GIS



Points

Data Attached to Points



Points

Same data displayed as two different points



Queries and Restrictions

 Restricts the features to a specific subset

Query Builder	? 🔀		
Fields: "EVENT_NUMB" "CCR" "NATURE_COD" 'ZONE_NUM" 'ITEM004" 'ITEM003" "ITEM002" ''ITEM001" ''TENSUS_BLO" ''TRACT80" SQL Info SELECT * FROM MID911.Point WHERE:	Unique values: AUT' 'AUTTHE' 'BUR' 'BURBUS' 'BURRES' 'DOA' 'DRUGS' 'GAN' 'GIIN' Complete List		
"NATURE_COD" = 'DRUGS'			
Liear Venty Help Load	L Save Cancel		







Lines



Polygons



Graphic Elements



Jacques Bertin

Visualization Information

"What should be printed to facilitate "communication", that is, to tell others what we know without a loss of information"

-Jacques Bertin, Paris, February 1983

Bertin's Graphic Variables



Point Symbols



Use Solid Point Markers



Use Three to Seven Categories Max.



Orientation



Polygon Symbols



Texture

•Black and White Prints •Polygons •Large Areas

Texture

- Brings object to the front (figure)
 - long wavelength hues
 - coarse texture



Size – Point Symbols



Size

Graduated Symbols

Show Size or Amount









- Increase/Decrease Contrast
- The greater the difference in value between an object and its background, the greater the contrast.





 By creating a pattern of dark to light values, even when the objects are equal in shape and size, it leads the eye in the

directio

<i>2</i> 1 1	



Color Hues



Color Values



Saturation



Saturation

 You can change the saturation of a hue by adding black (shadow) or white (light). The amount of saturation gives us our shades and tints.





Saturation

• Customize the Properties...of a layer



Color

Color Hues and Values

Each of individual color is a hue

Colors have meaning (i.e. cool colors, warm colors, political meanings)

- -Cool colors calming
- -Warm colors exciting

-Cool colors appear smaller than warm colors and they visually recede on the page so red can visually overpower and stand out over blue even if used in equal amounts.

www.colormatters.com www.colorbrewer.org









- Harmony
 two adjacent hues
- Contrast
 - two hues with
 one hue skipped
 in between



- Harmony
 two adjacent hues
- Contrast
 - two hues with
 one hue skipped
 in between



- Harmony
 two adjacent hues
- Contrast
 - two hues with
 one hue skipped
 in between


Color Wheel

- Harmony
 two adjacent hues
- Contrast
 - two hues with
 one hue skipped
 in between



Non-Contrasting vs. Contrasting





Color Wheel

- Harmony

 two adjacent hues
- Contrast
 - two hues with
 one hue skipped
 in between
 - Clash
 - Opposites



Color Wheel Review

- Harmony

 two adjacent hues
- Contrast
 - two hues with
 one hue skipped
 in between
 - Clash
 - Opposites



Double-Ended Scales

- Extremes Emphasized
 - critical value of zero
 - e.g., regression residuals, time change
 - blue and red contrast
 - white center is ground



Change Map



Double-Ended Scales

- Balance Emphasized
 - 50% is desired
 - yellow contrasts with white paper
 - green and orange contrast



Color Spot

White background allows yellow color spot to be visualized



Color Spot Ramps



Goal

 direct attention toward or away from available Information



- Goal
 - direct attention toward or away from available Information
- Figure-Ground
 - visual separation of a scene into recognizable *figures* and inconspicuous *background (ground)*





- Ground
 - larger of two contrasting areas



- Ground
 - larger of two contrasting areas
 - grays, light browns, heavily saturated hues



• Ground

- larger of two contrasting areas
- grays, light browns, heavily saturated hues









• Figure

- long wavelength hues
- coarse texture





• Ground

- larger of two contrasting areas
- grays, light browns, heavily saturated hues









• Figure

- long wavelength hues
- coarse texture
- strong edge











Choropleth Maps



Choropleth Maps

Map using different colors or patterns to show different values over space



Classifications

• Process of placing data into groups that have a similar characteristic or value

Layer Properties		
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		Standard Deviation
		Show class for values: above custom max Sampling



Natural Breaks

Classes are based on natural groupings inherent in the data

Looks for where there are big jumps in data





Quantiles

Each class contains an equal number of features Good for linearly distributed data





Equal Interval

Divides the range of attribute values into equal-sized Subranges (e.g. 0–100, 101–200, and 201–300)





Standard Deviation

Calculates the mean of the data distribution and then maps one or two standard deviations above or below the mean



Know your data!

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Normalizing Data

Divides one numeric attribute by another in order to minimize differences in values based on the size of areas or number of features in each area

Examples:

- Dividing the 18- to 30-year-old population by the total population yields the percentage of people aged 18–30
- Dividing a value by the area of the feature yields a value per unit area, or density

Map Layers, Scale Thresholds, and Hyperlinks

Map Layers

Organizes your layers Group logically and rename



Scale Thresholds

Minimum Scale Range

 If you zoom out beyond this scale, the layer will not be visible



Scale Thresholds

When you zoom in, the layers are visible



Scale Thresholds

Maximum Scale Range

- If you zoom in beyond this scale, the layer will not be visible
- State Capitals not visible at this scale



Hyperlinks

Links images, documents, WEB pages, etc. via features on a map



Summary

- -Vector GIS
- -Graphic Elements
- -Colors
- -Graphical Hierarchy
- -Choropleth Maps
- -Map Layers
- -Scale Thresholds
- -Hyperlinks