Multiscale Map Design

Design Highlights

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Systematic color categories for symbols

Human themes:
- points: emergency hospitals, schools
- transportation: built-up areas
- boundaries

Natural themes:
- admin reserves
- hillshade
- wooded areas
- forest reserves
- parks
- hydrography

C. Brewer, NationalMapping.us
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- wooded areas, forest reserves, parks
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**Colors:**
- Br (Brown)
- Yl (Yellow)
- YG (Yellow Green)
- Gn (Green)
- Bu (Blue)
- Cy (Cyan)
- Pu (Purple)
- Or (Orange)
- Rd (Red)
Color contrasts

- Red roads vs brown contours hard to distinguish – use gray contours
- All colors lighter than black labels – few halos
- This is not a road map – do not use whole contrast range on road categories
- Leave contrast available for update and overlay of operational information – magenta could be used for additions if no magenta symbols
- **Contrasting outlines** on point symbols separate from each other and background
Multiscale durability: good point overlaps
Halos and casings

- Dull greenish brown halo on contour labels
- Slightly blue halo on hydro labels
- Slightly beige casing on local roads
- Slightly gray fill in road shields
- Slightly gray drop shadow on populated place names

Other labels dark enough to read over content
Geoprocessing for map design

- **Contour cracking** for faster drawing
- **Polygon-to-line** for dashed lines
- **Dissolve** on attribute to join small segments (e.g., roads)
- **Pair layers** with version not symbolized for labels with different classes (e.g., flowlines, admin areas, populated places)
- Flowline upstream drainage area (UDA) calculated for **stream tapering**
- **Smooth DEM** first to create generalized contours and hillshade for terrain
Tapered by symbolizing upstream drainage area
(stream order or length not useful)
Intermittent and perennial symbolized
# Stream tapering

<table>
<thead>
<tr>
<th>Width (pts)</th>
<th>RGB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.38</td>
<td>lighter</td>
</tr>
<tr>
<td>0.75</td>
<td>100,180,200</td>
</tr>
<tr>
<td>1.13</td>
<td>med blue</td>
</tr>
<tr>
<td>1.50</td>
<td>50,165,200</td>
</tr>
<tr>
<td>1.88</td>
<td>darker</td>
</tr>
<tr>
<td>2.25</td>
<td>0,150,200</td>
</tr>
</tbody>
</table>
Examples of international topo maps using stream tapering
Hydro generalization

- Hydro generalization work continues, by babs Buttenfield, Chris Anderson Tarver (CU Boulder) and Larry Stanislawski (CEGIS)
- Creating Level of Detail (LoD) databases that include pruning, simplification, collapse, aggregation, smoothing, etc. to suit a set range of scales (~50-200K, ~200-800K)
- Not focus of this talk
Missouri series with data from The National Map – 24K map
Missouri 50K map with 24K hydro
Missouri 50K map with 50K LoD hydro

Visual evaluation of hydro in map context
Terrain
Multicolor hillshade with transparency
Contours and hillshade through scale

CO: 24K

50 ft. contour interval
DEM smoothed at r=3
Contours and hillshade through scale

CO: 50K

100 ft. contour interval
DEM smoothed at r=3

24K Terrain at 50K
Contours and hillshade through scale

CO: 150K

200 ft. contour interval
DEM smoothed at r=15

hillshade
DEM smoothed at r=3