Multi-Scale Design: ScaleMaster Decisions and ArcGIS .mxds

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Objective

Create single project (.mxd) to view multi-scale design

From 24K…

And all the scales in between.

To 1M…

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West Branch Potomac (WV) Scale Series
WV: 50K
WV: 100K
WV: 500K
WV: 1M
How Were Scale Ranges Decided?

Development of a data and design-specific ScaleMaster

- ScaleMaster – a tool for multi-scale mapping that assists decisions about map content and symbols
  - Shows the interaction of themes across the full scale range
- Two ScaleMasters were created for TNM project, based on feature density in subbasins
  - Urban
  - Rural

scalemaster.org
Urban Versus Rural ScaleMasters

Both use the same thematic groupings, but vary in when certain features are visible

- Administrative
- Cultural
- Hydrography
- Physical (other than hydrography)
- Transportation

In general, urban cultural and transportation features are removed sooner than in rural subbasins.
Urban Versus Rural at 24K

St Louis

Texas

CEGIS meeting, August 2009
Urban Versus Rural at 100K

St Louis

Texas

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Urban Versus Rural at 500K

St Louis

Texas

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Case Study: Multi-Scale Terrain
Flat Terrain

UT: 24K

50 ft. contour interval
Contour DEM r=3
Hillshade DEM r=3
Flat Terrain

UT: 50K

100 ft. contour interval
Contour DEM r=15
Hillshade DEM r=3
UT: 150K

200 ft. contour interval
Contour DEM r=30
Hillshade DEM r=3

24K Terrain at 150K
Flat Terrain

UT: 275K

200 ft. contour interval
Contour DEM $r=30$
Hillshade DEM $r=15$
Flat Terrain

UT: 700K

Hillshade only
Hilly Terrain

MO: 24K

10 ft. contour interval
Contour DEM $r=3$
Hillshade DEM $r=3$
Hilly Terrain

MO: 50K

20 ft. contour interval
Contour DEM r=15
Hillshade DEM r=3

24K Terrain at 50K
Hilly Terrain

MO: 150K

50 ft. contour interval
Contour DEM r=30
Hillshade DEM r=3
MO: 275K

50 ft. contour interval
Contour DEM r=30
Hillshade DEM r=15
Hilly Terrain

MO: 700K

Hillshade only
Mountainous Terrain

CO: 24K

50 ft. contour interval
Contour DEM r=3
Hillshade DEM r=3
Mountainous Terrain

CO: 50K
100 ft. contour interval
Contour DEM r=15
Hillshade DEM r=3

24K Terrain at 50K
Mountainous Terrain

CO: 150K

200 ft. contour interval
Contour DEM r=30
Hillshade DEM r=3
Mountainous Terrain

CO: 275K

200 ft. contour interval
Contour DEM r=30
Hillshade DEM r=15

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Mountainous Terrain

CO: 450K

400 ft. contour interval
Contour DEM $r=50$
Hillshade DEM $r=15$
Mountainous Terrain

CO: 700K

Hillshade only
Case Study: Multi-Scale Hydrography
Dry Hydrography

TX: 24K

CEGIS meeting, August 2009
Dry Hydrography

TX: 50K

CEGIS meeting, August 2009
Dry Hydrography

TX: 50K

24K High Resolution NHD

Generalized High Resolution NHD
Dry Hydrography

TX: 100K
Dry Hydrography

TX: 215K
Dry Hydrography

TX: 320K
Dry Hydrography

TX: 500K
# Multi-Scale Hydrography Breaks

## Perennial Flowlines

<table>
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<tr>
<th>UDA class breaks</th>
<th>Line weights in points</th>
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</table>

**Notes:**
- **‘difs’ removed at 100K**
- *Color change only*
## Multi-Scale Hydrography Breaks

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<td>2.25</td>
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<td>1.13</td>
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**notes**
x n 0 'difs' removed at 100K
* Color change only

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## Intermittent Flowlines

UDA class breaks Line weights in points

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Humid Hydrography

MO: 24K

CEGIS meeting, August 2009
Humid Hydrography

MO: 50K
Humid Hydrography

MO: 50K

Generalized High Resolution NHD

24K High Resolution NHD
Humid Hydrography

MO: 100K
Humid Hydrography

MO: 215K

CEGIS meeting, August 2009
Humid Hydrography

MO: 320K
Humid Hydrography

MO: 500K
Creating Multi-Scale Maps in ArcGIS
Setting Layer Visibility

Scale Ranges

- Manually set layers to be seen at some scales and not others.
- ArcMap then automatically changes layer visibility with scale.
- This continuity mimics a web mapping service.
## WV Table of Contents Before Scale Ranges

[Image of a table and diagram showing various elements such as 'GNIS', 'WV_structure', 'Emergency Response', 'Populated Place', 'Hospital', 'School', 'Church', 'Locate', 'Summit', 'Highway_Named', 'Highway_Numbered', 'Collector_Named', 'Collector_Numbered', 'Local', '4WD', 'Service', 'Trans_RailRoads', 'Railroad', 'GU_StateOrTerritory_labels', 'State_lineclip_1', 'County_line', 'GU_CountyOrEquivalent_Clip_labels'].

CEGIS meeting, June 2010
... And After
... And After

CEGIS meeting, June 2010
Assembling Scale Ranges

For map elements to display correctly, structure and consistency is key
- Features grouped by theme
- Themes organized by drawing order
  - Some are split for desired order
- Scale ranges are set
- Layers named to include the scale range
  - Easier to find in labeling menus
Issues

Map Rendering

- For a .pdf export near the break between scale ranges, the software will sometimes substitute the larger scale design.
  - More often incorrect in Data View, but also a Layout View problem.
  - Substitutions also occurs when previewing a cache tile.
  - Not a consistent problem in either format.