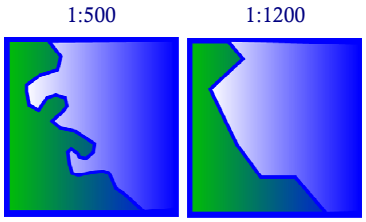
GEOSPATIAL INNOVATION FACILITY
Cutting-Edge Mapping Technology at UC Berkeley

Scale in GIS:
What You Need To Know for GIS

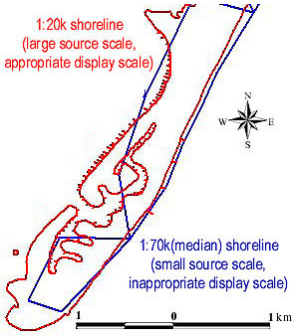
WHAT IS SCALE?

Scale is the scale represents the relationship of the distance on the map/data to the actual distance on the ground.

- Map detail is determined by the source scale of the data: the finer the scale, the more detail.
- Source scale is the scale of the data source (i.e. aerial photo or satellite image) from which data is digitized (into boundaries, roads, landcover, etc. in a GIS).
- In a GIS, zooming in on a small scale map does *not* increase its level of accuracy or detail.
- **Rule of thumb**: Match the appropriate scale to the level of detail required in the project.

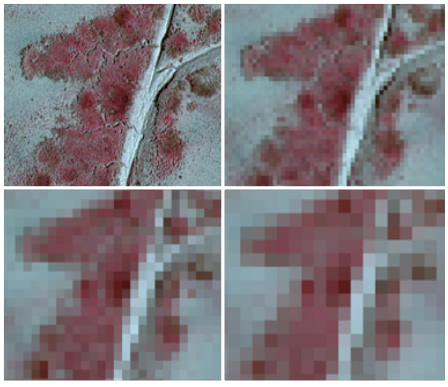


Above, right. Comparing fine and coarse source scales shows how the level of detail in the data is determined by the spatial scale of the source data.



SPATIAL SCALE

Spatial scale involves *grain* & *extent:*
Grain: the size of your pixel & the smallest resolvable unit.
Extent: the size of your study area & the largest resolvable unit.



Left. This series of pictures shows a section of wetland at progressively bigger grain sizes.

The more detail the better; however, more detail requires more computer power.

You can also make grain size larger, but you can never make it smaller.

Common grain sizes:

- 30m – Landsat satellite imagery
- 30m, 10m – USGS quad digital elevation models (DEMs)
- 4m, 1m – IKONOS satellite imagery
- 1m – 2005 National Agricultural Imagery Program (NAIP) photos
- 8ft, 2ft – Quickbird satellite imagery
- 1ft – USGS 2004 color aerial photography

CARTOGRAPHIC SCALE

Scale in a cartographic sense (1 inch = 1 mile) is a remnant of vector cartography, but still has importance for us in a digital world.

Common cartographic scales:

- Topographic Maps
  - 1:24,000 7.5" quads
  - 1:63,360 15" quads
  - 1:100,000 quads
  - 1:250,000 quads
- World Maps
  - 1:2,000,000 – DCW
- Shoreline
  - 1:20,000
  - 1:70,000
- Aerial Photography
  - 1:40,000 NHAP/NAPP
  - 1:12,000 – 4,000 custom aerial photography

GUIDELINES

1. Pay attention to source scale of your spatial data.
2. Don't necessarily compare analysis from maps of different scales.
3. Pay attention to your grain size. Ask yourself:
   - Can you resolve what you want to see?
   - Don't necessarily compare results from datasets with different grain sizes or source scales.
4. Other important *scales*:
   - Temporal scale – how often is the data collected?
   - Ecological scale – does the source scale and grain size of your data match the scale of the ecological phenomena of interest?