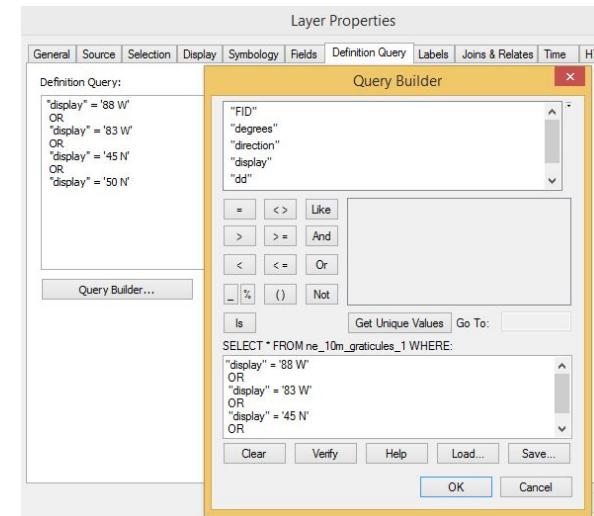

Comparison of the Accuracy of Maps of Lake Superior and the Keewenaw Peninsula

— By Neil Mudjer & Anthony
Akmakjian —

Georeferencing

1. Added the Raster Image into ArcMAP
2. Next we added a graticule layer (a grid of latitude and longitude lines).
3. Next we calculated the degrees of the lines of longitude for the older maps. I.e. East of Ferro Island and noted as 290 W, converted by $360 - 290 = 70 + 18 = 88$ W. Or if the line is labeled as 70 W and it is west of Ferro Island, then $70 + 18 = 88$ W.
4. We chose two points of Longitude and two points of Latitude and added them into the Query Builder for the graticule layer.

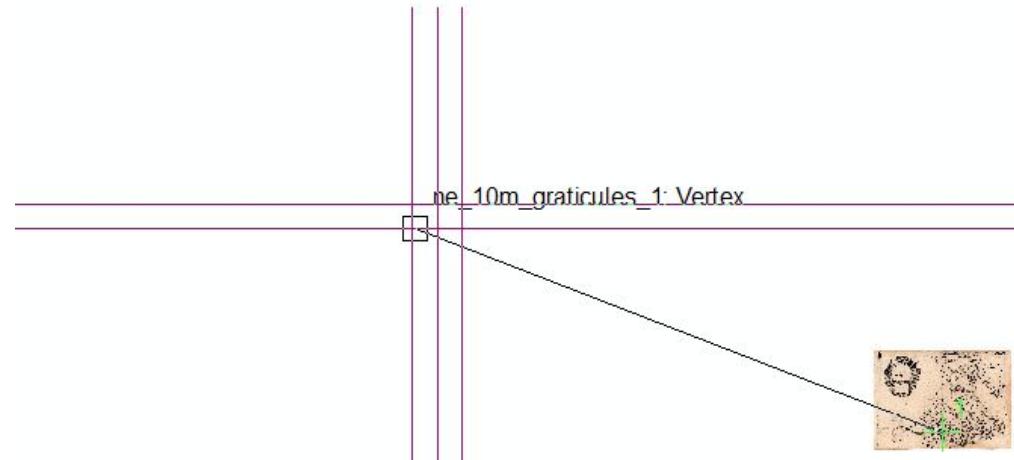


Georeferencing (continued)

5. Then we went to Customize -> Toolbar -> Georeferencing



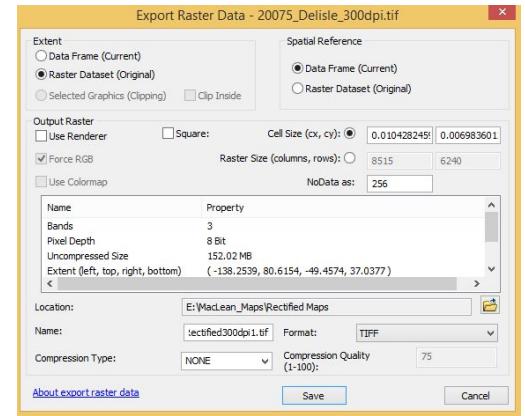
Add a control point on the raster
image and the corresponding
graticule intersection. Repeat
three more times.



7. Then we right clicked on the layer and exported the Data. (In 10.3 this was sufficient, for the version used in class you have to define the projection afterwards.)

8. We added a shapefile of the great lakes and compared the locations.

Then changed the coordinate system to one that minimized visual distortion.



Digitizing Lake Superior

We added a polygon layer of the lake onto the following maps: 5 - Franquelin (1684), 13 - Cary (1807) **shown**, and 23 - Province of Ottawa (1947)

We did so by going to the ArcToolbox and Creating a feature class, and naming it Polygon1.

We went to the Editor toolbar dropdown menu, and started editing. We used the freehand tool to trace Lake Superior.

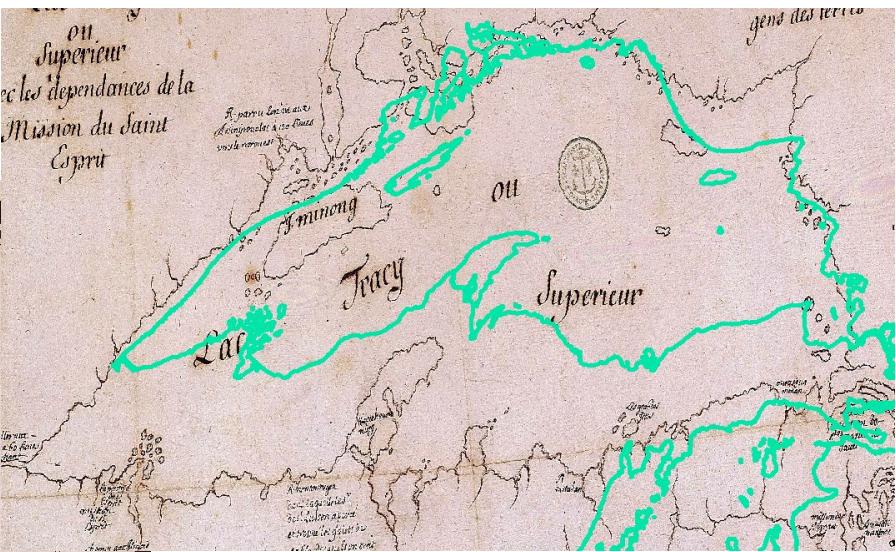
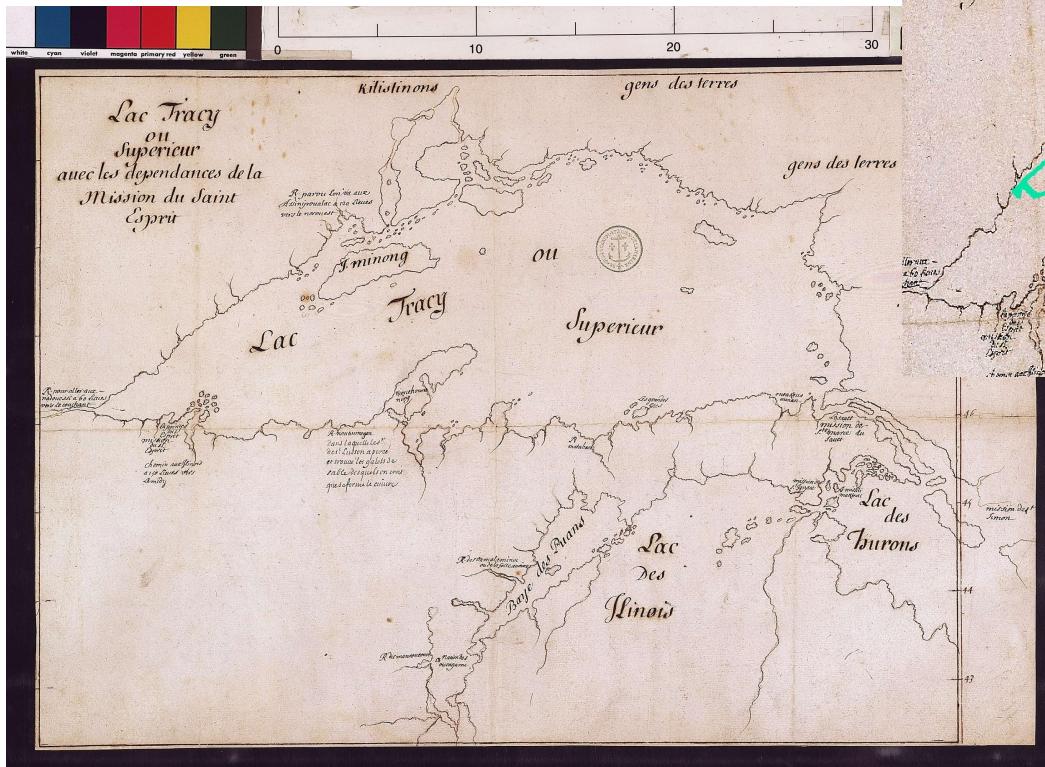


Area of Lake Superior

- Actual Area = 31,700 Sq. Mi. (82,103 Sq. Km)
- Franquelin (1684) - digitized area of 69,487 Sq. Mi. 2.19 times larger
- Cary (1807) - 32,364 Sq. Mi. 1.02 times larger
- Province of Ottawa (1947) - 31,320 Sq. Mi. 0.988 of actual area

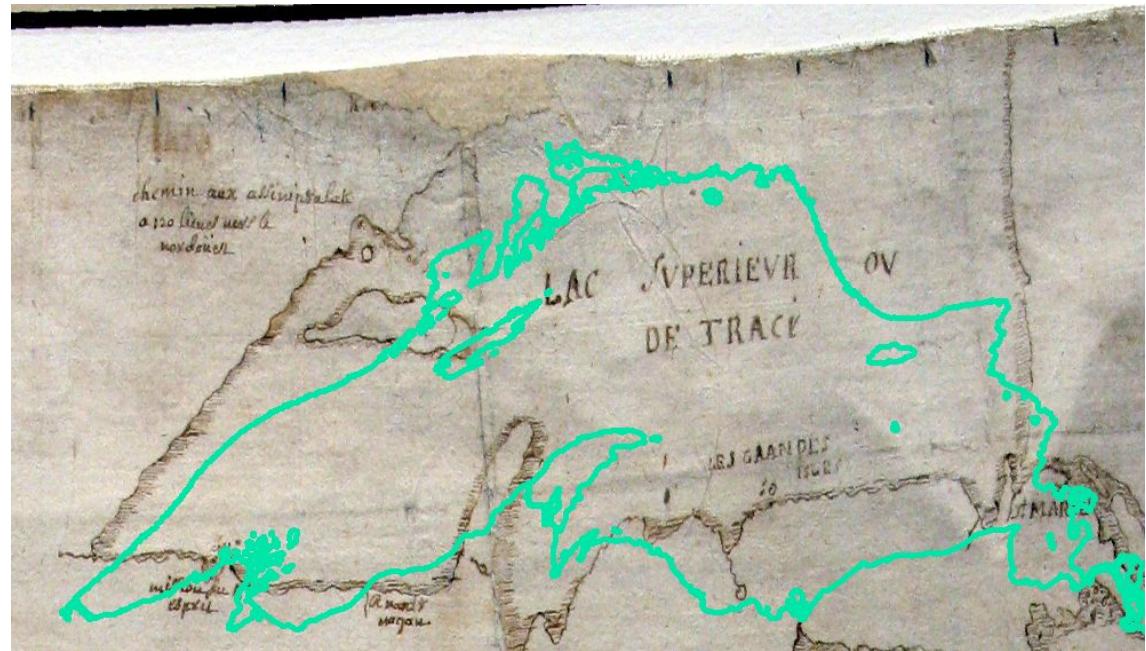
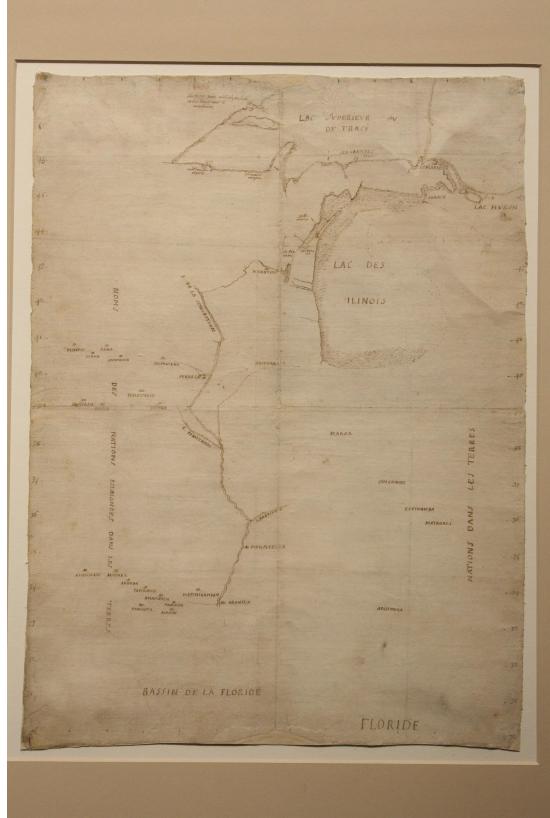
All in all, accuracy seems to have been pretty close to perfected by some of the early 1800s maps, as we shall see.

Dablon - 1672



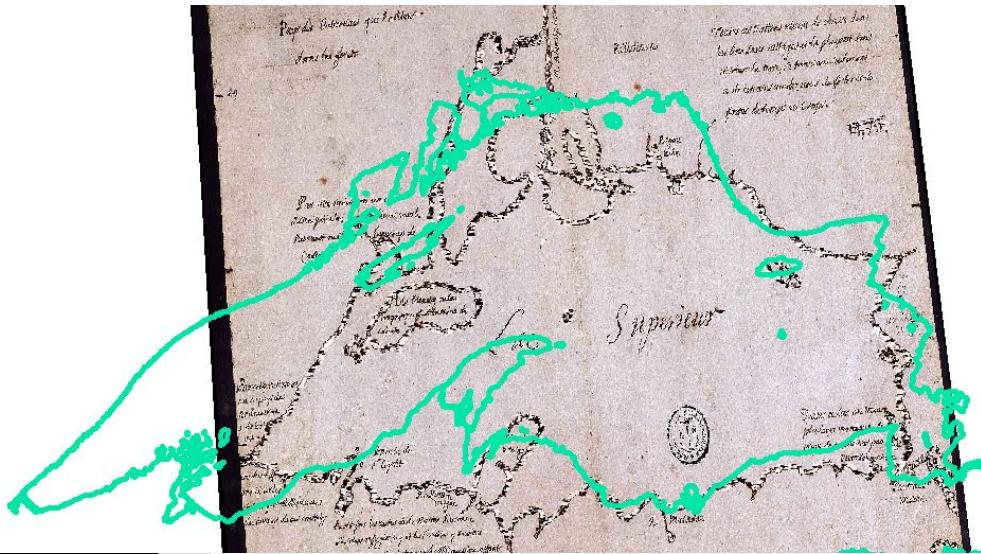
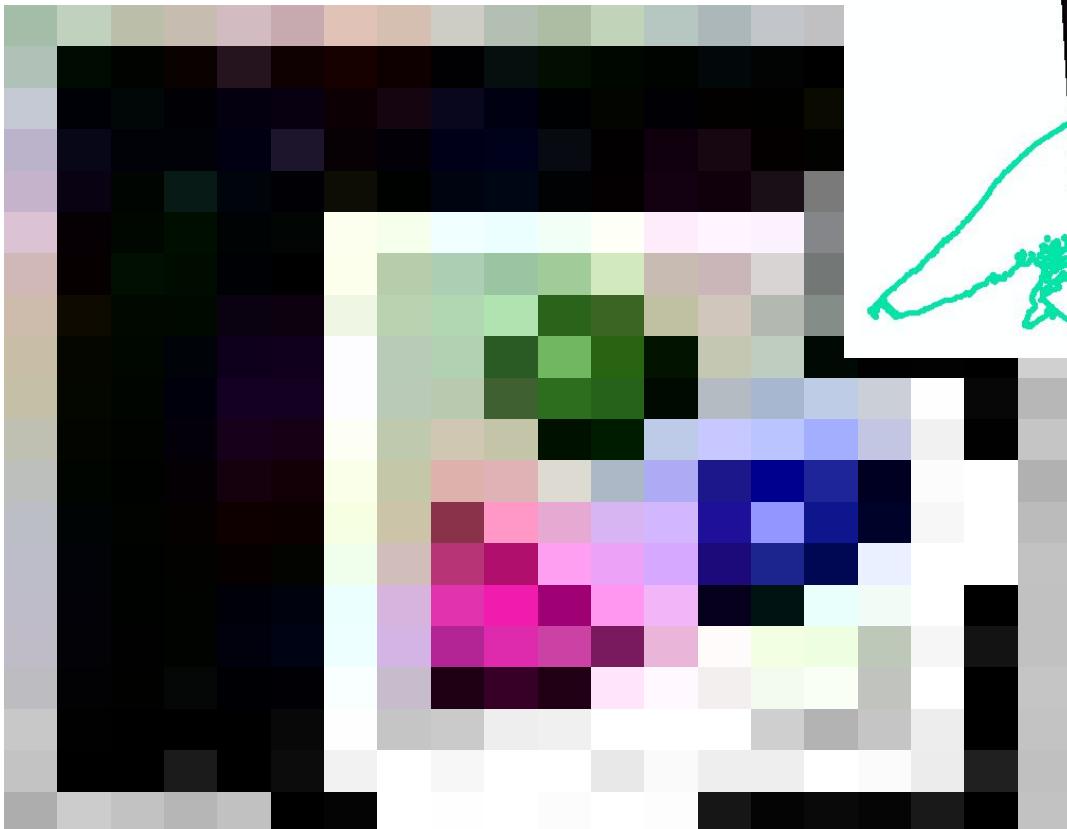
- No longitude
- Scale by inference
- Parallels of latitude

Marquette - 1672



Again, no longitude. Referenced to fixed point.

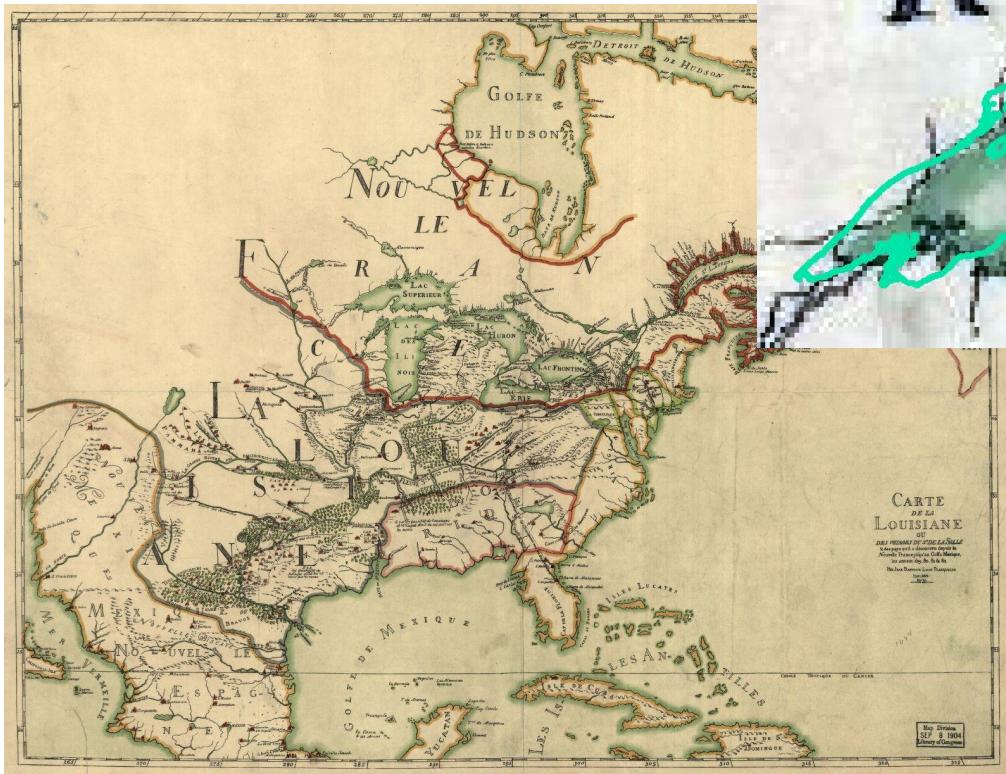
Bernou - 1681



No longitude.

Size vastly underestimated.

Franquelin - 1684



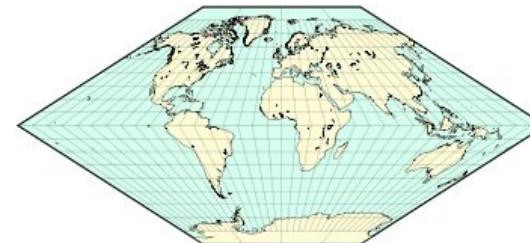
Trapezoidal Projection
Latitudes equally spaced

Coronelli - 1688

Coronelli, Partie occidentale du Canada ou de la Nouvelle France, 1688.

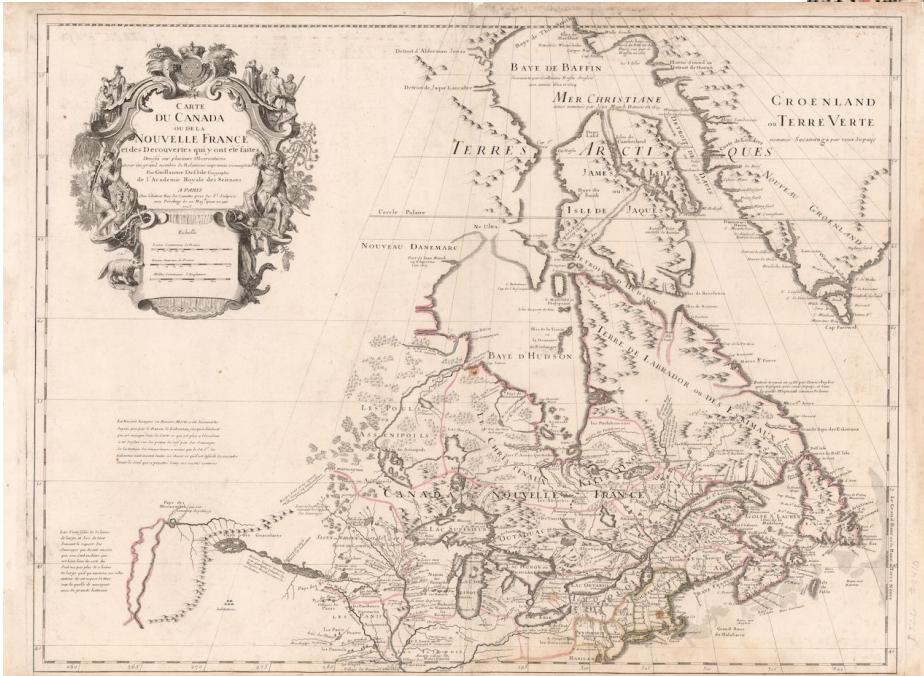


- Equally-spaced lines of latitude
- Trapezoidal Projection of Great Lakes

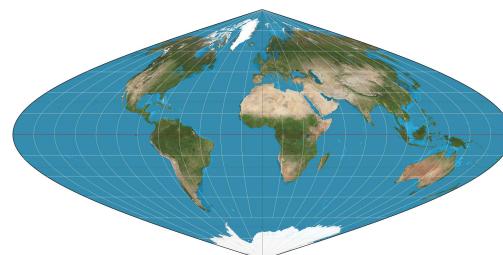


Delisle - 1703

Delisle, Carte du Canada, 1703



- Equally spaced lines of latitude
- Sinusoidal Projection
- Size marks an improvement over Coronelli map, but longitude is still a problem.



https://en.wikipedia.org/wiki/Sinusoidal_projection

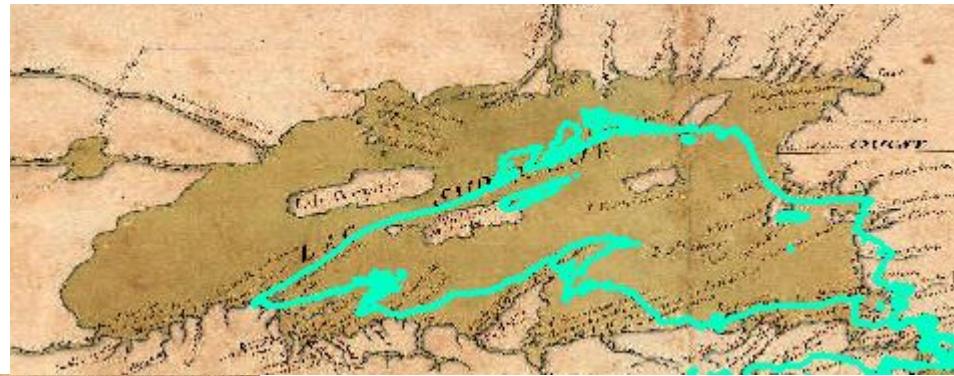
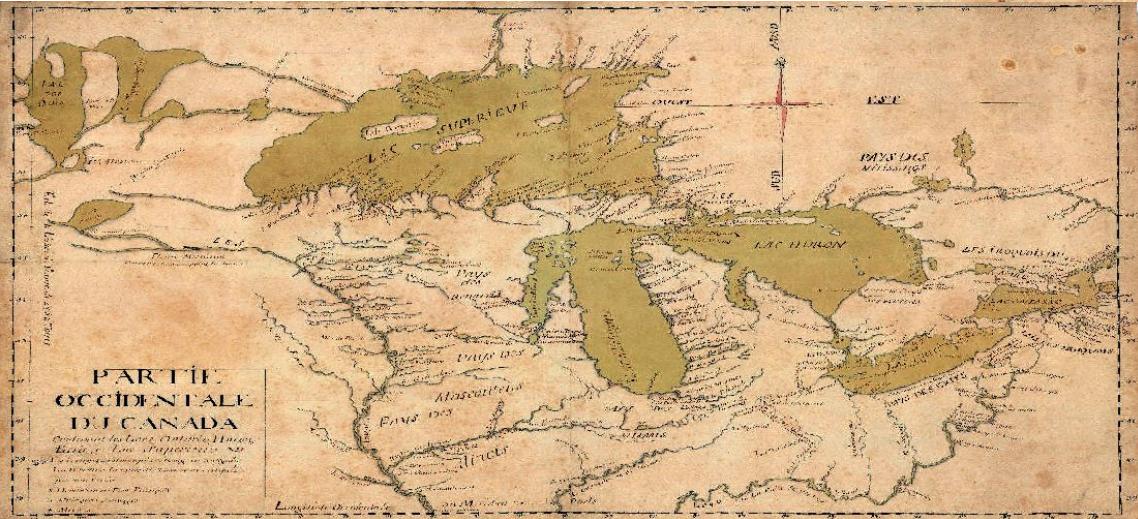
d'Anville - 1746

d'Anville, Amerique Septentrionale, 1746.



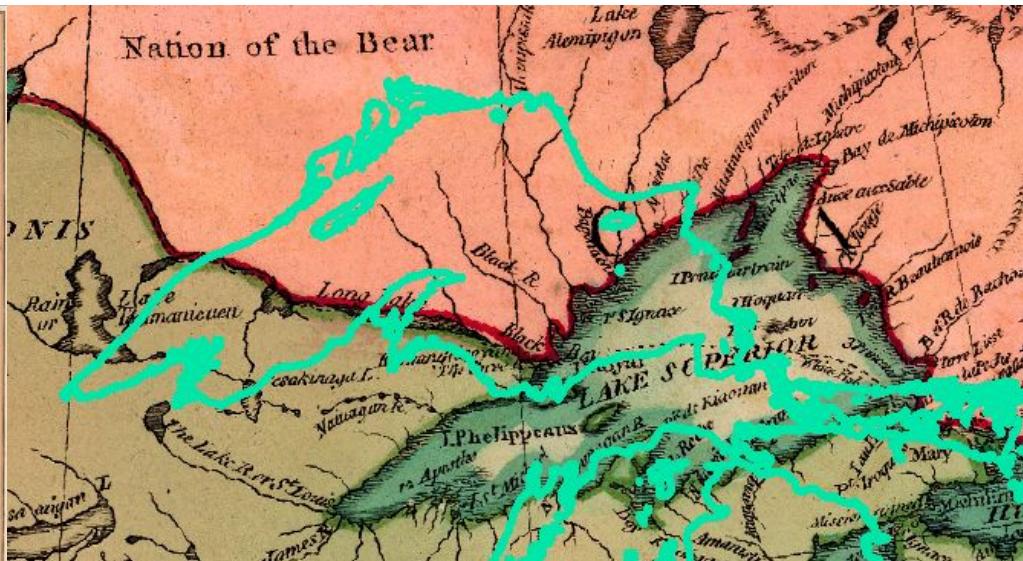
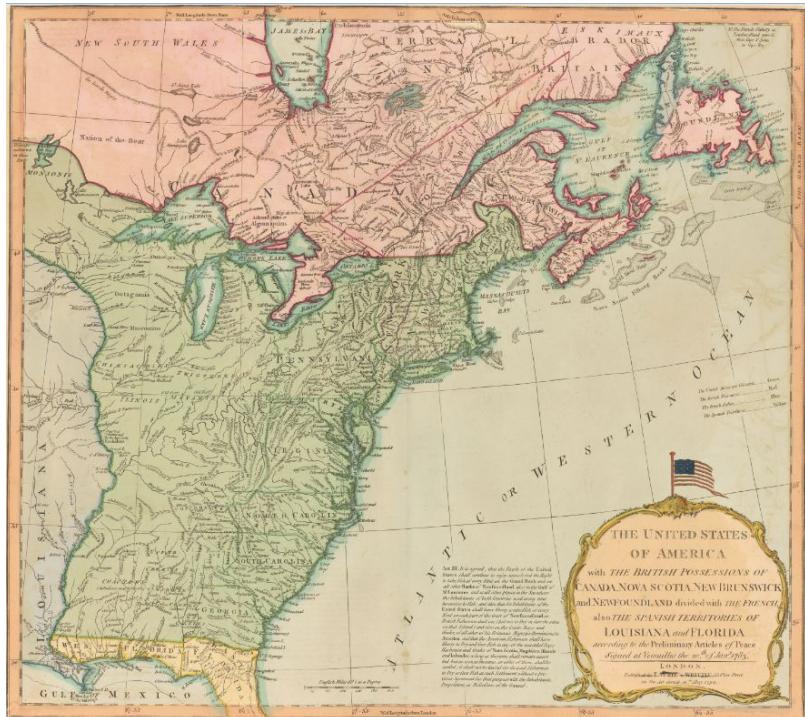
- Equally spaced lines of latitude
- Pseudo-conic

Bellin - 1752



- Rectangular grid
- Cylindrical projection

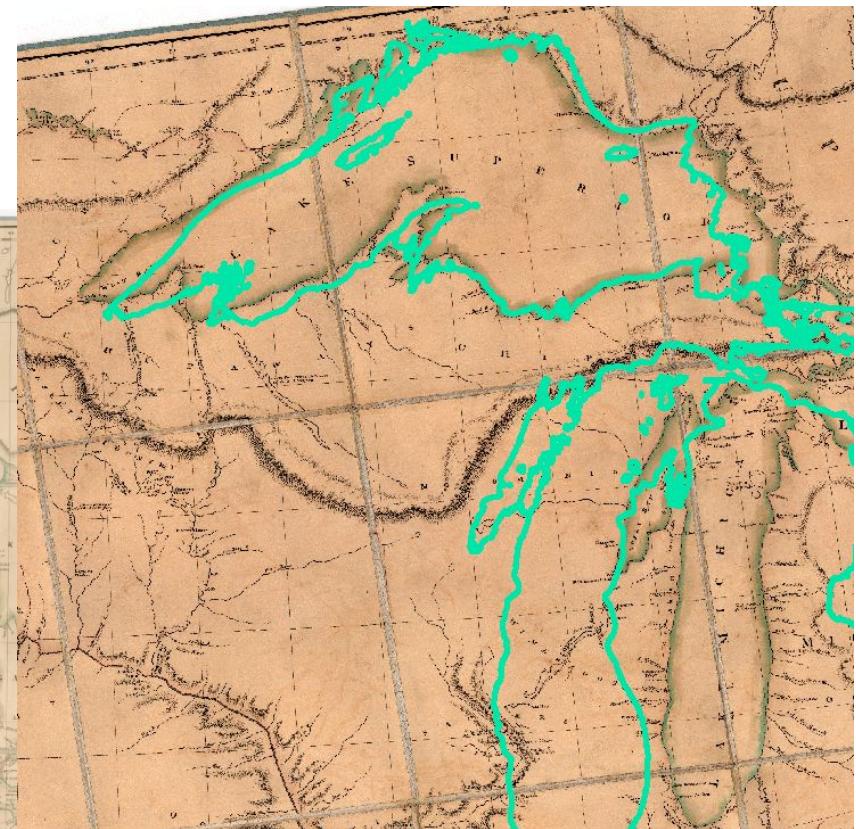
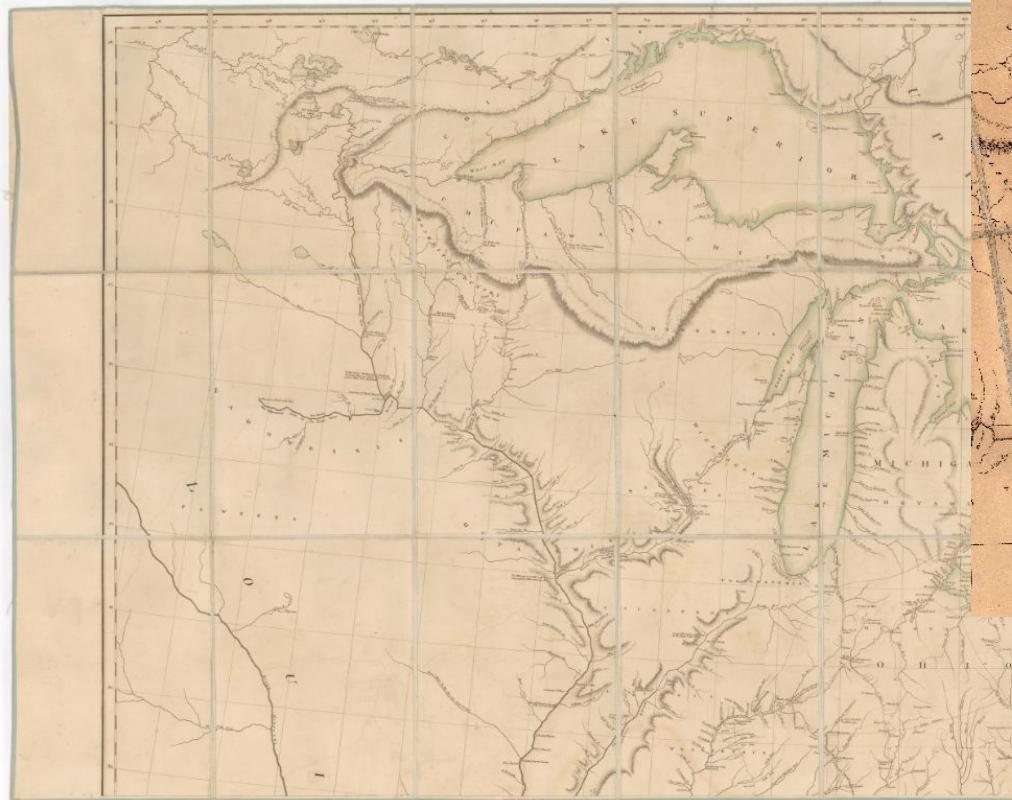
Laurie and Whittle - 1794



Conic Projection

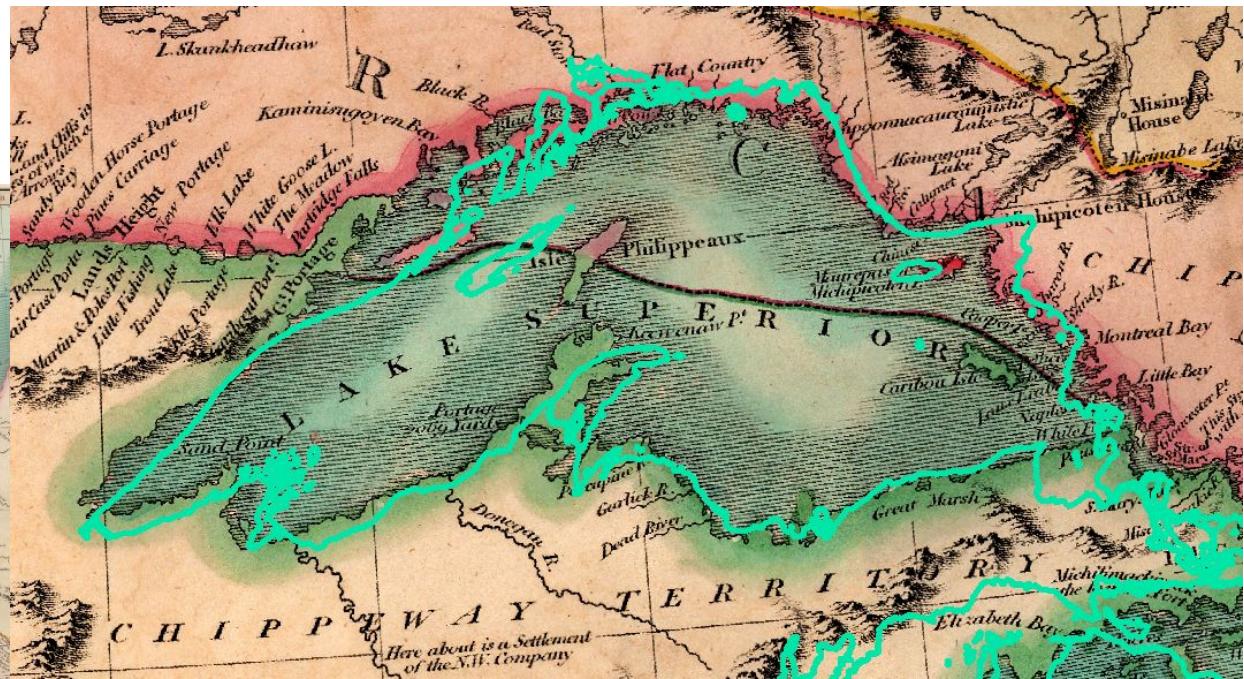
Curved lines of latitude

Arrowsmith - 1808



Conic projection, curved
latitudes

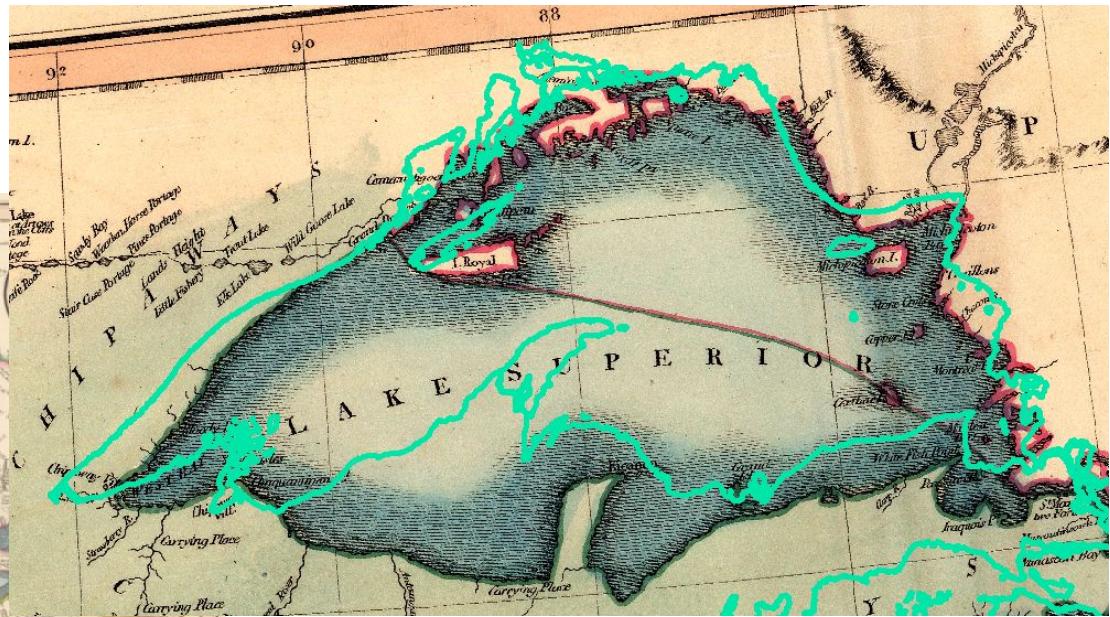
Cary - 1807



Conic projection

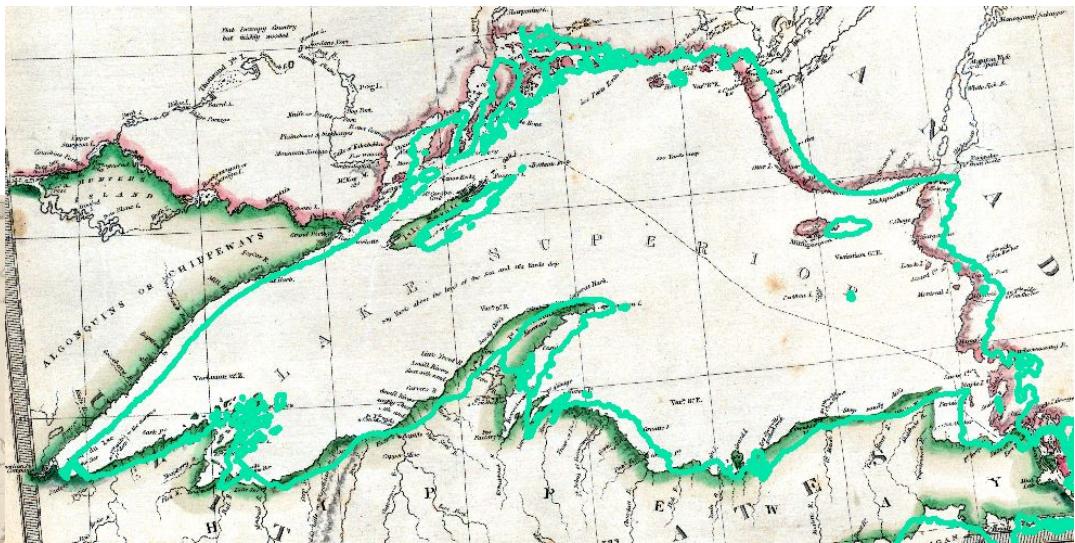
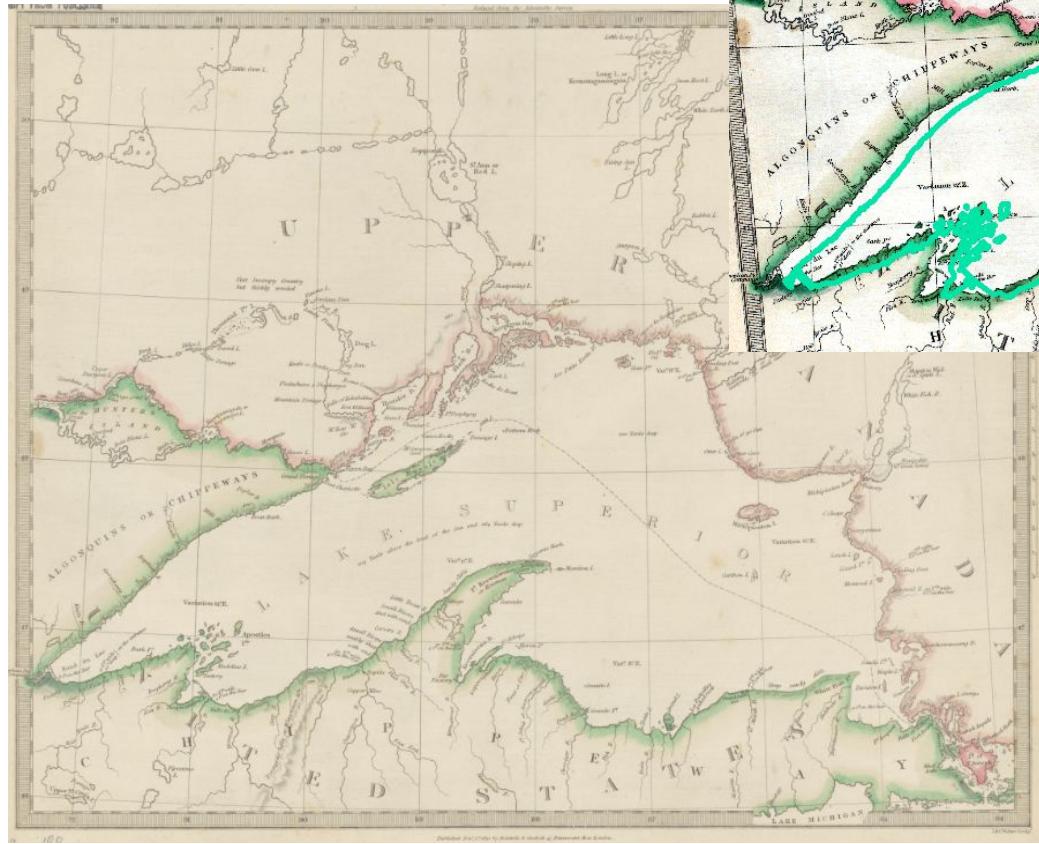
Area digitized to only 1.02x larger
than actual

Cary - 1821



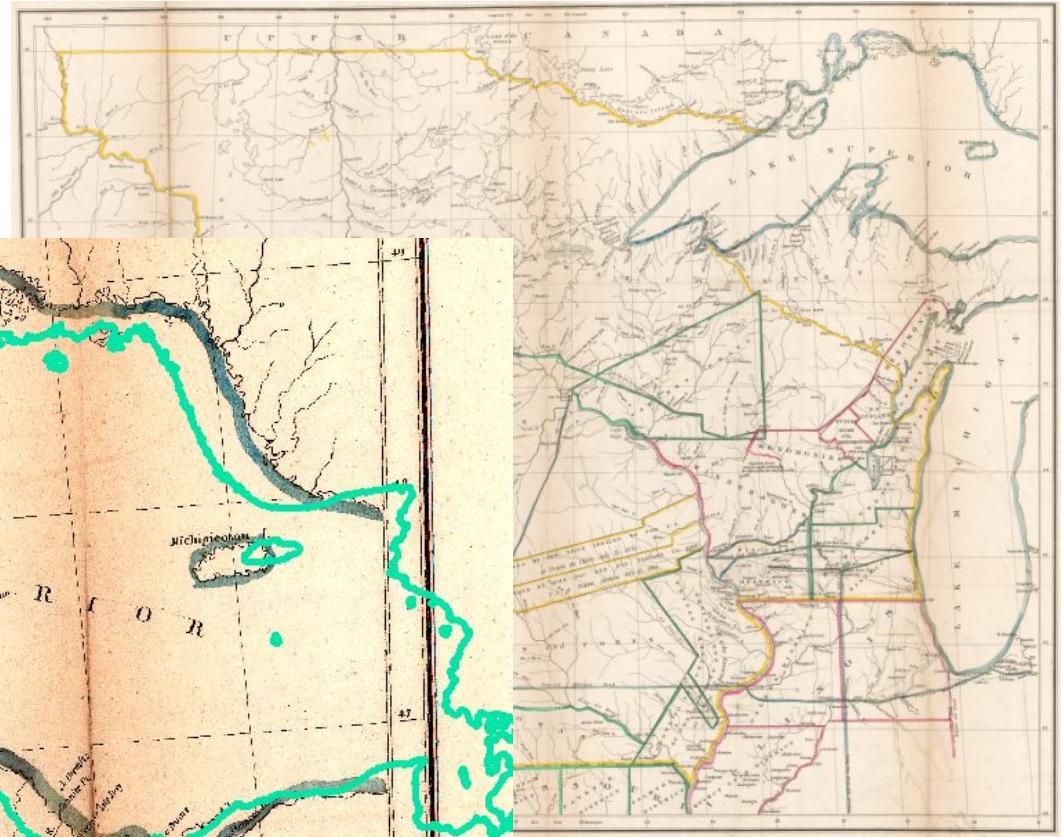
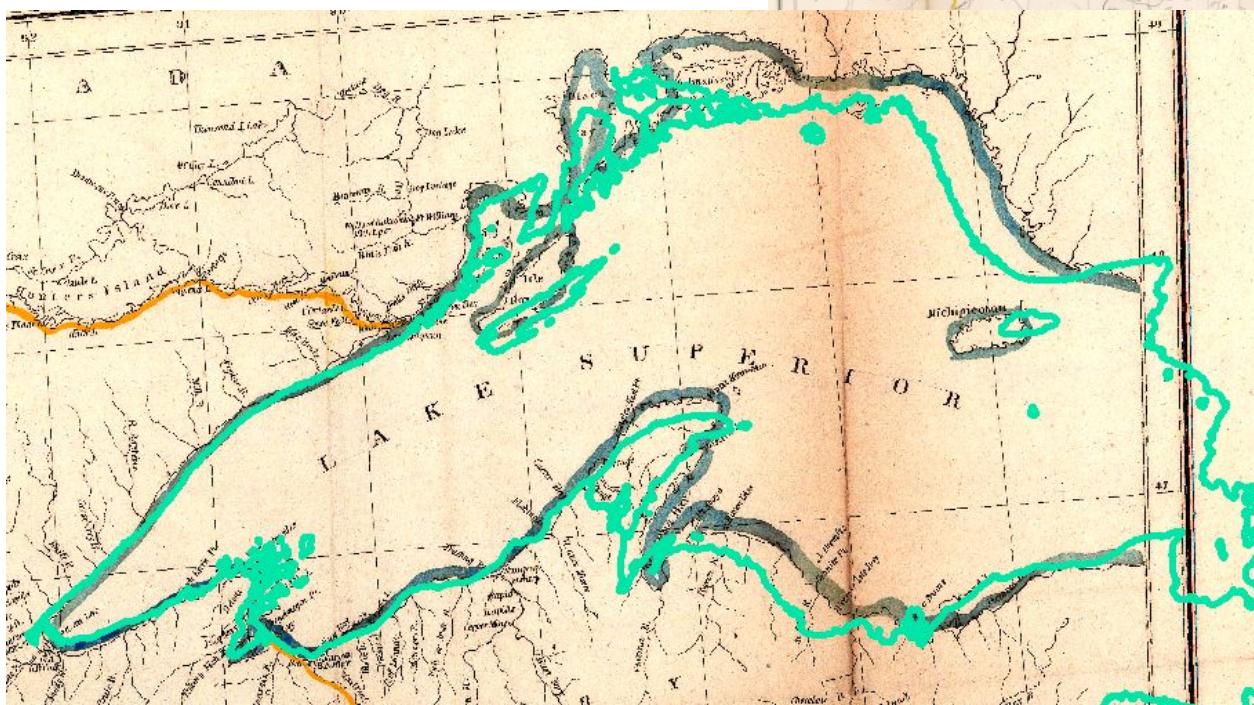
Amazingly inaccurate considering
his work only 14 years prior

Sheet IV - 1832



Society for the Diffusion of
Useful Knowledge

Burr - 1836



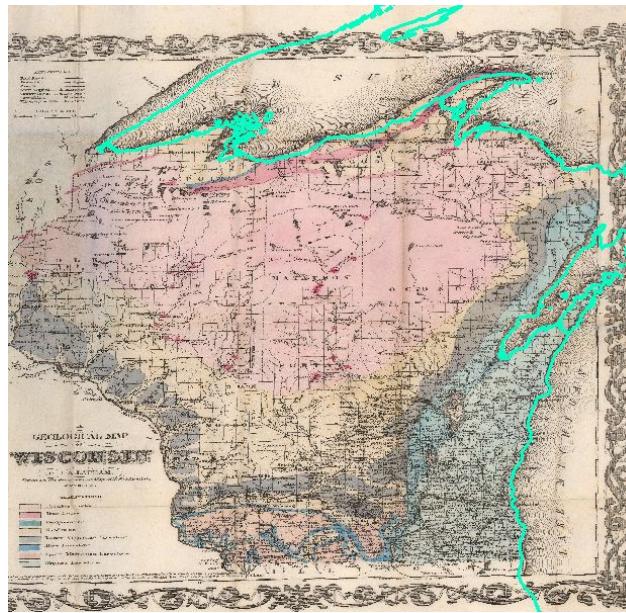
Dyer & Pasmore - 1857



No lat/lon
Purely for
shape since
it is
corrected for
size and
location

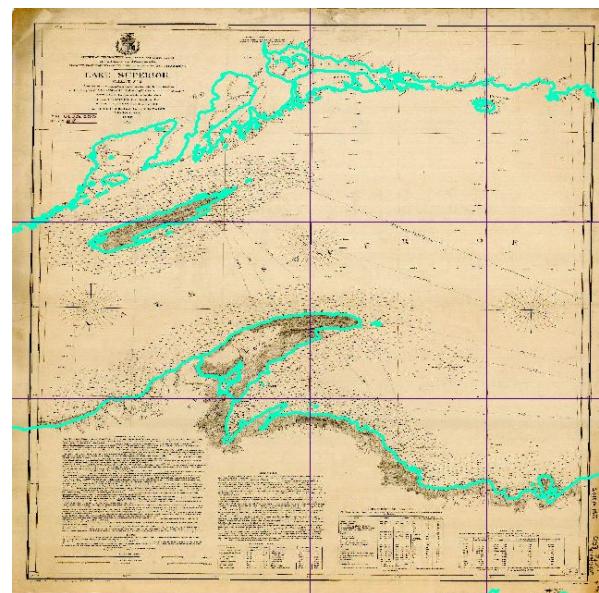
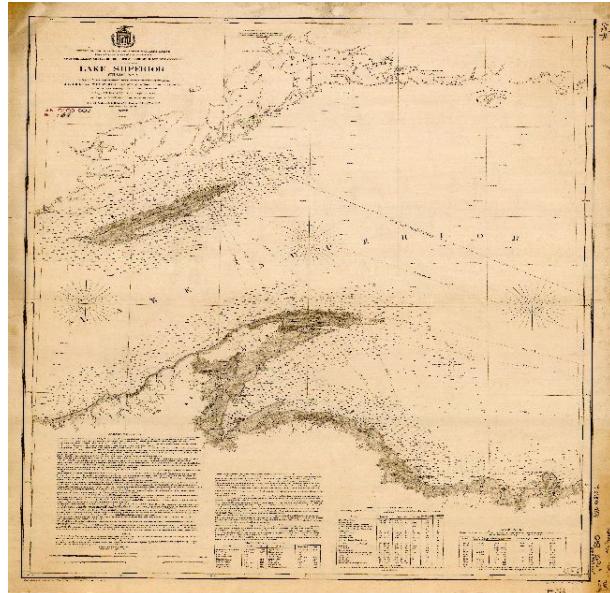
Lapham - 1865

A Geological Map of Wisconsin



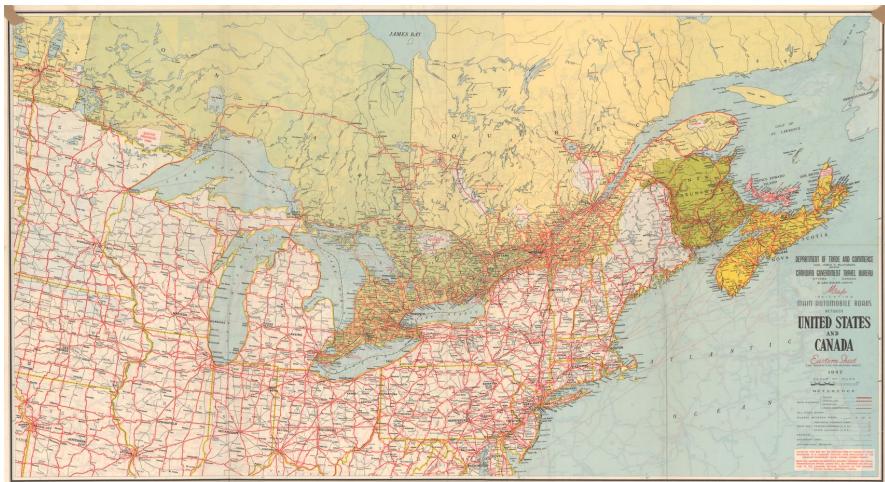
- Equally spaced lines of longitude
- Cylindrical projection

U.S. Lake Survey, Lake Superior - 1870



- Polyconic Projection

Province of Ottawa, Canada -1947



- Polyconic Projection