Civil War Cartography

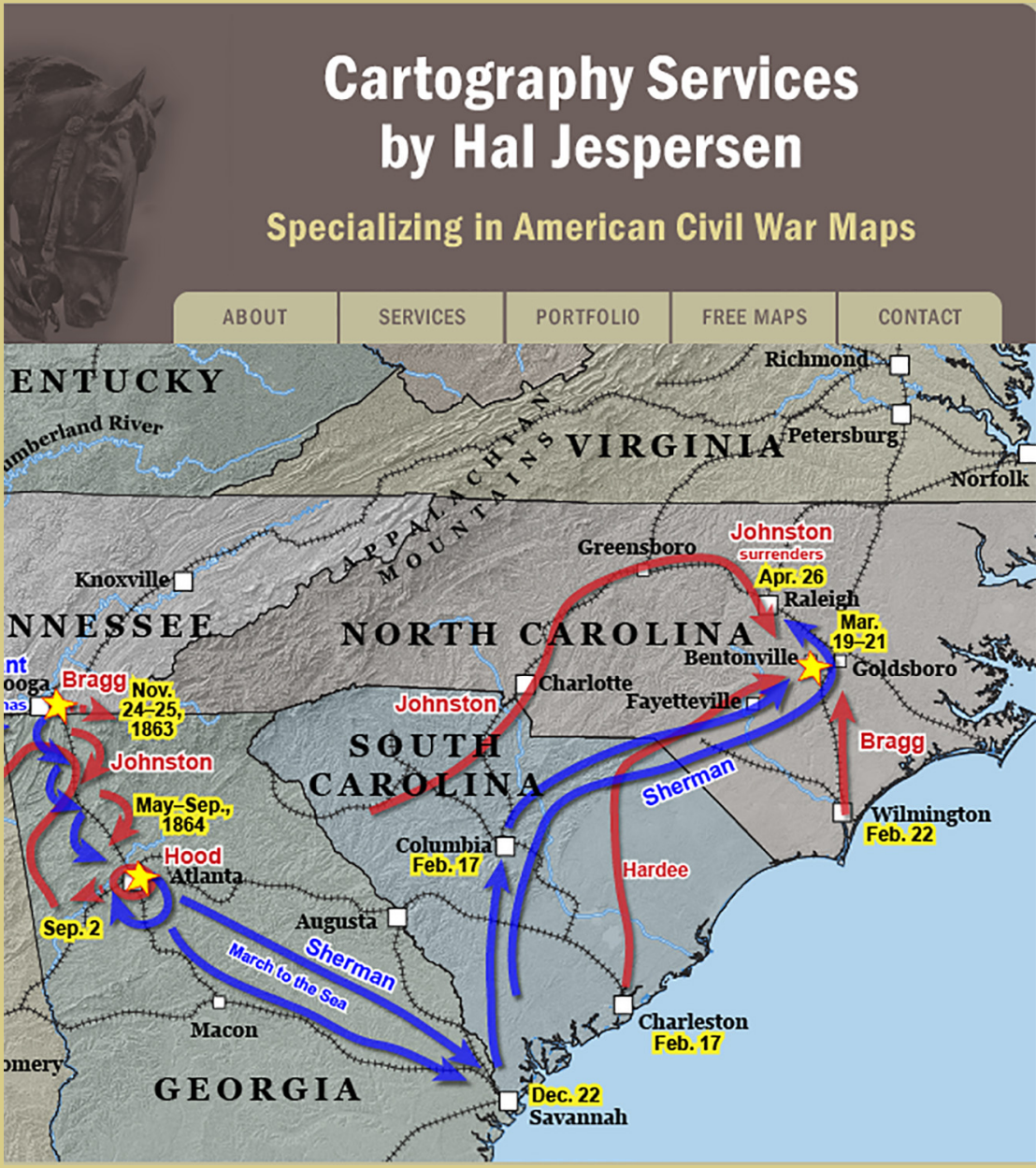
A presentation to the Old Baldy CWRT

Hal Jespersen

www.posix.com/CW

or www.cwmaps.com

January 10, 2019



Outline

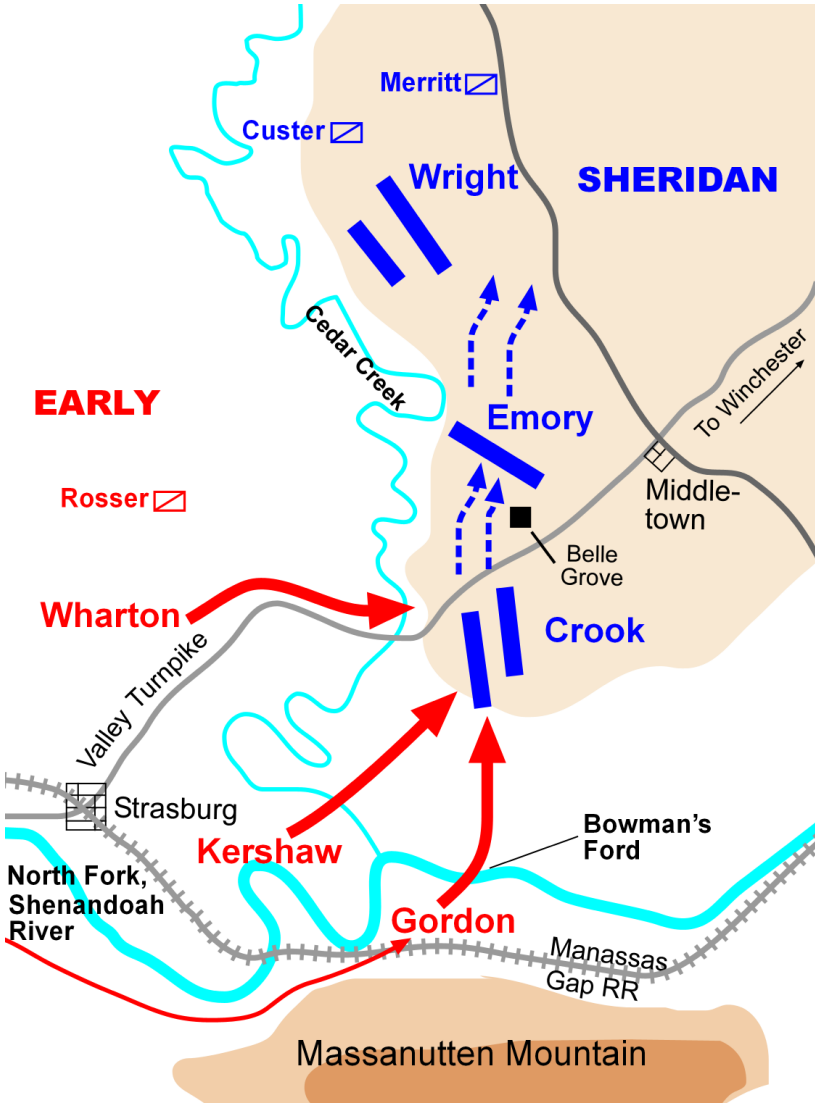
- My history in mapmaking
- Famous cartographers who influenced me
- How I work with authors
  - Determining content
  - Publication challenges and issues
- My mapmaking tools and workflow
- Technical aspects of cartography: projection, elevation, data sources
- Accuracy of 19c maps

Hal's Civil War Mapmaking

- Creating maps since about 2005
- Now a full-time hobby/business in "retirement" from the computer business
  - Over 3,000 maps for Wikipedia, books, presentations, displays

My Early Work

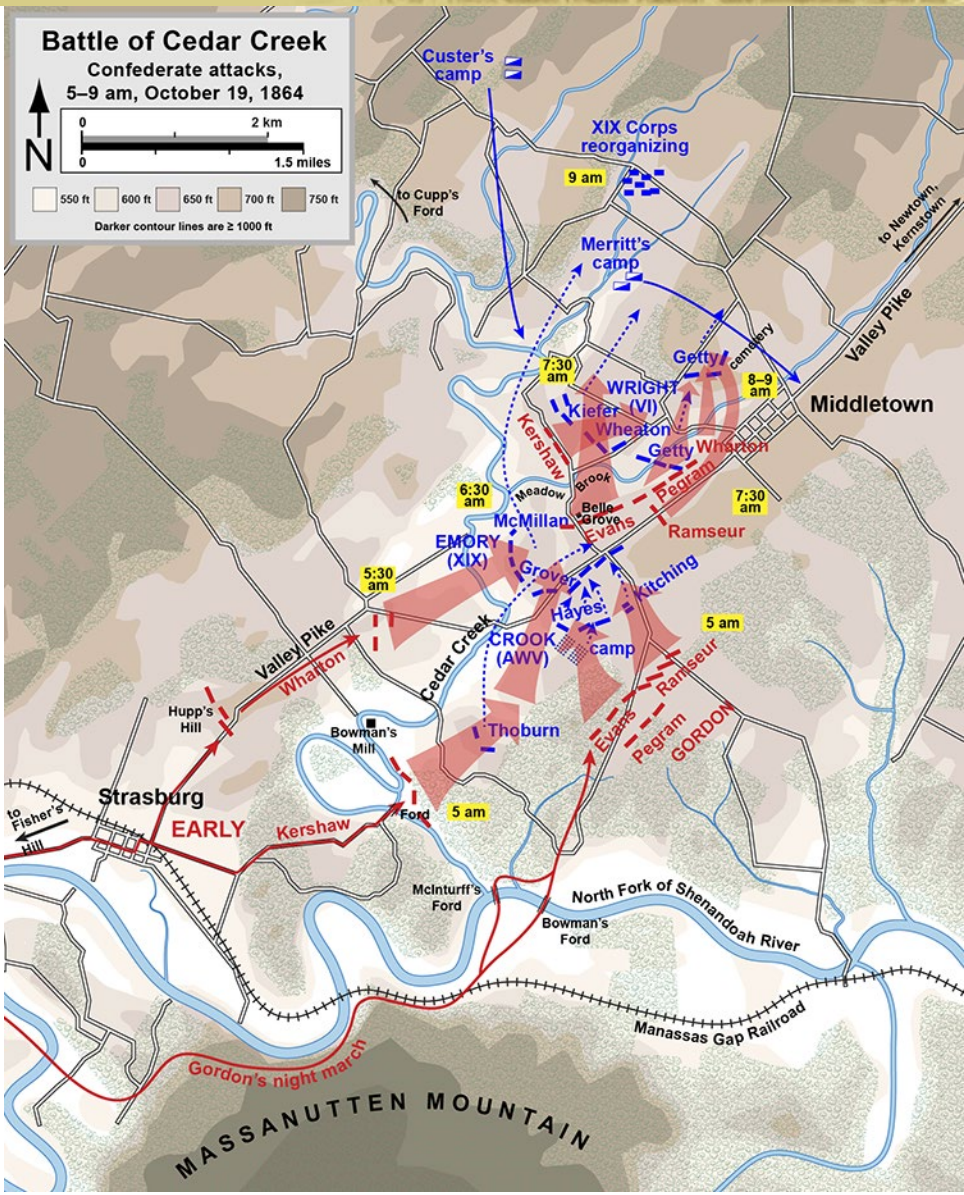
- Probably my first Wikipedia map (2005-ish)
- Emphasizing simplicity, but graphically crude
- Macromedia Freehand



Battle of Cedar Creek

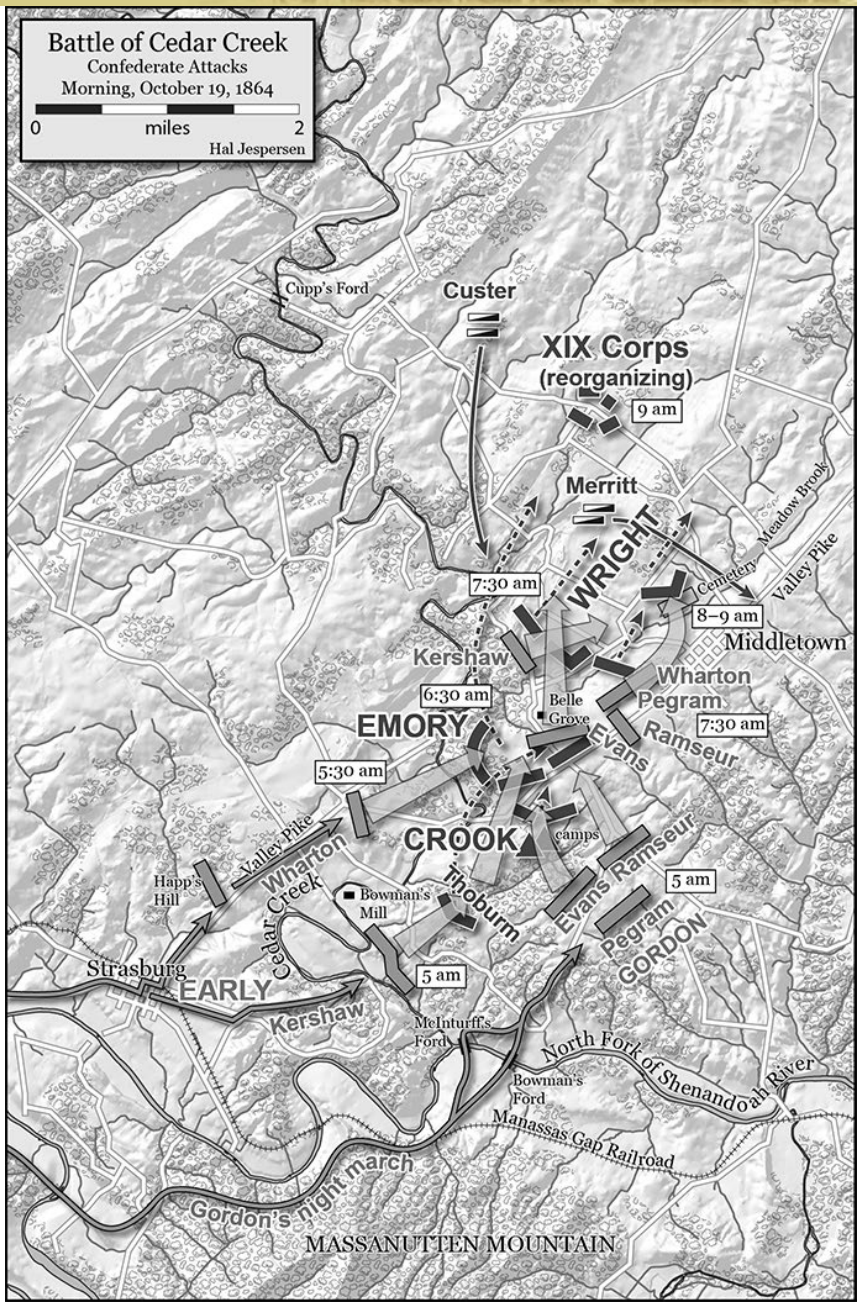
Later Version

- Replaced in Wikipedia in 2011
- More accurate terrain and features
- More battle detail
- But … a style impractical for most books



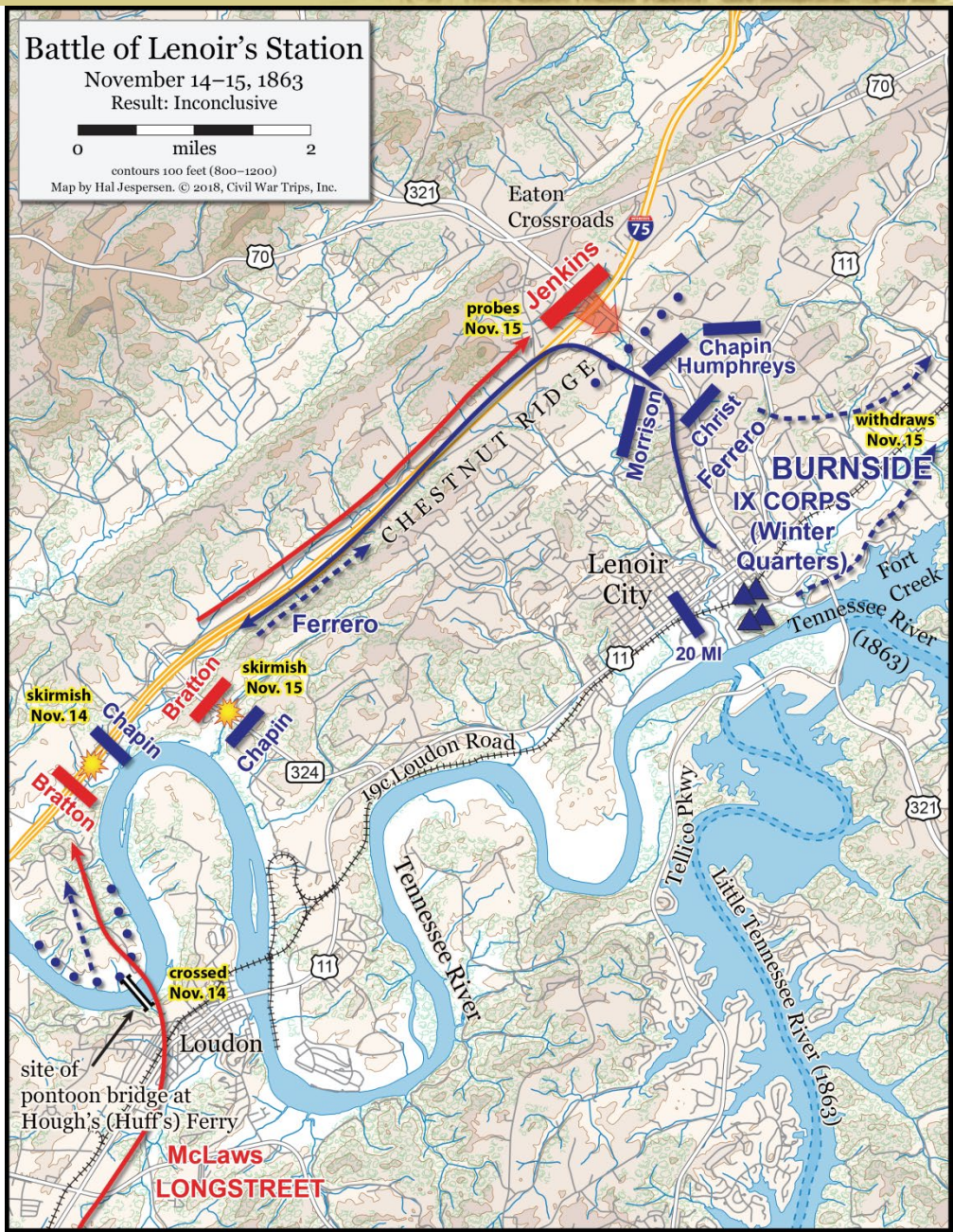
Book Version

- Shaded relief elevation
- Different feature styles for grayscale publication
- Not a successful map, although the authors were happy



Better Data Sources

- Instead of tracing old maps …
- Use government data to show accurate
  - Terrain elevation
  - Watercourses
  - Modern road and rail networks



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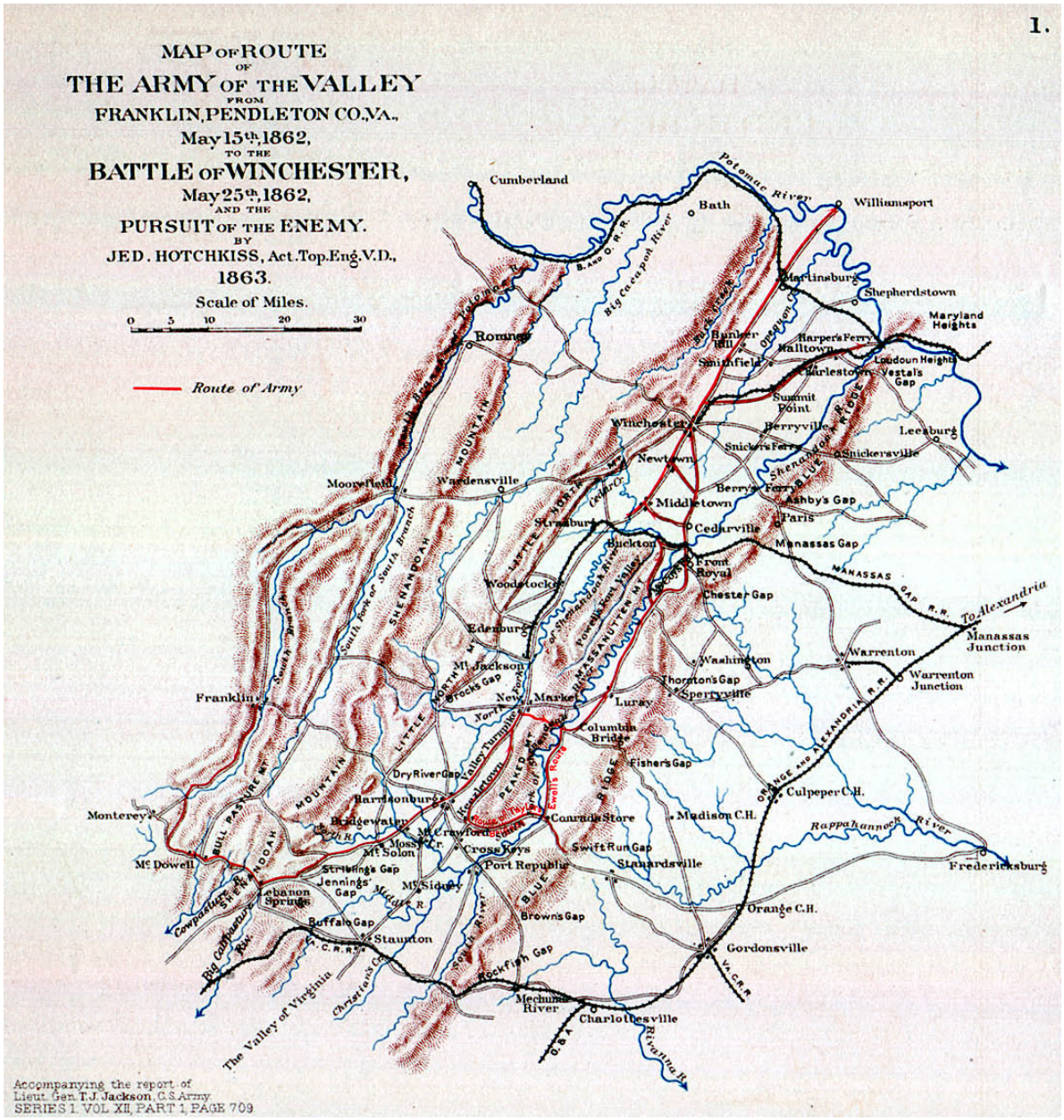
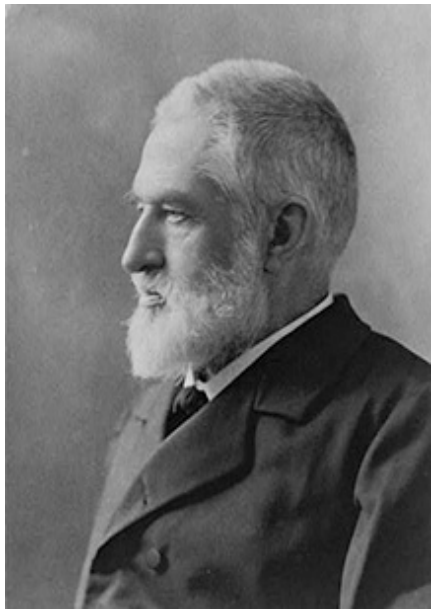
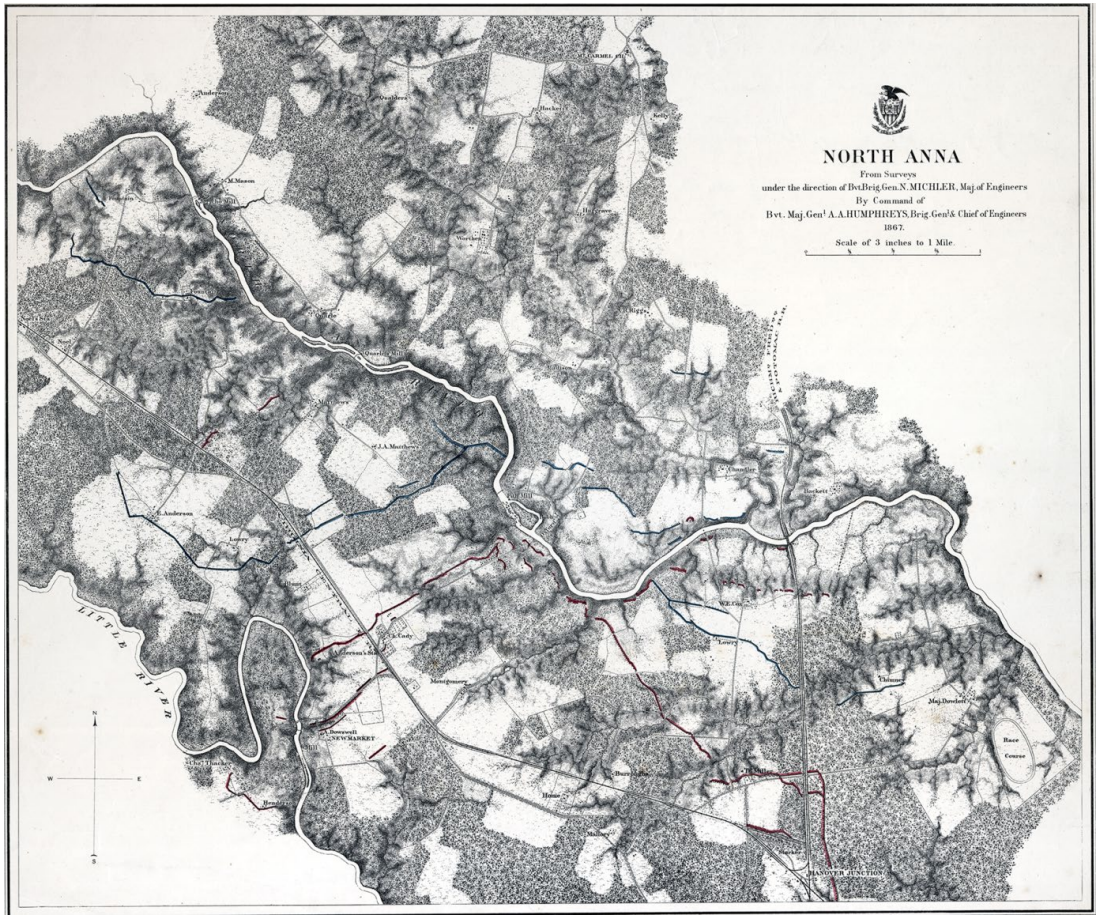
“Major” Jedediah Hotchkiss, CSA





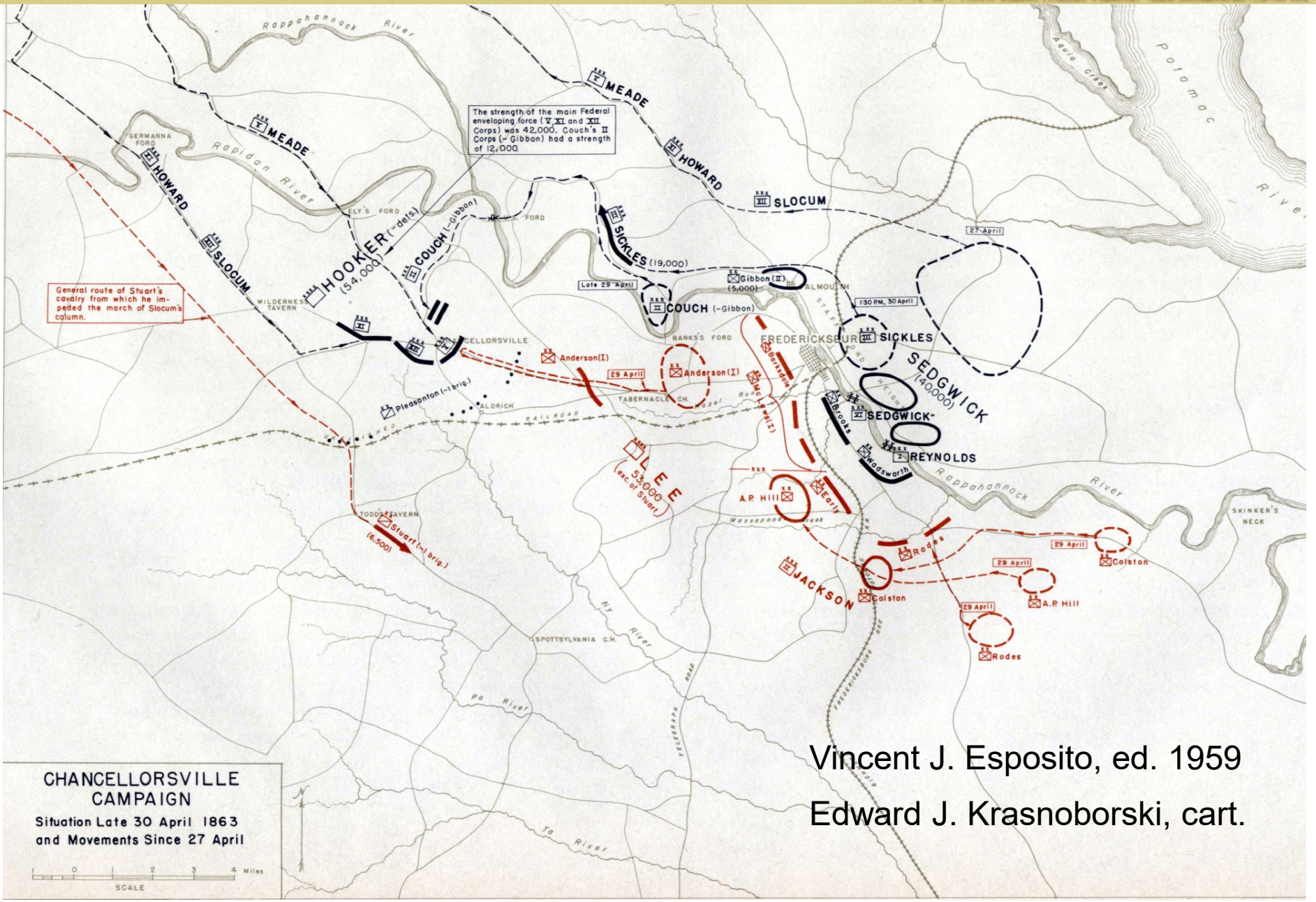
Nathaniel Michler

- Major, Army of the Potomac
- Collaborated with Capt. Peter Michie
- Most accurate battlefield maps



1867 map of North Anna battlefield

West Point Atlas of American Wars

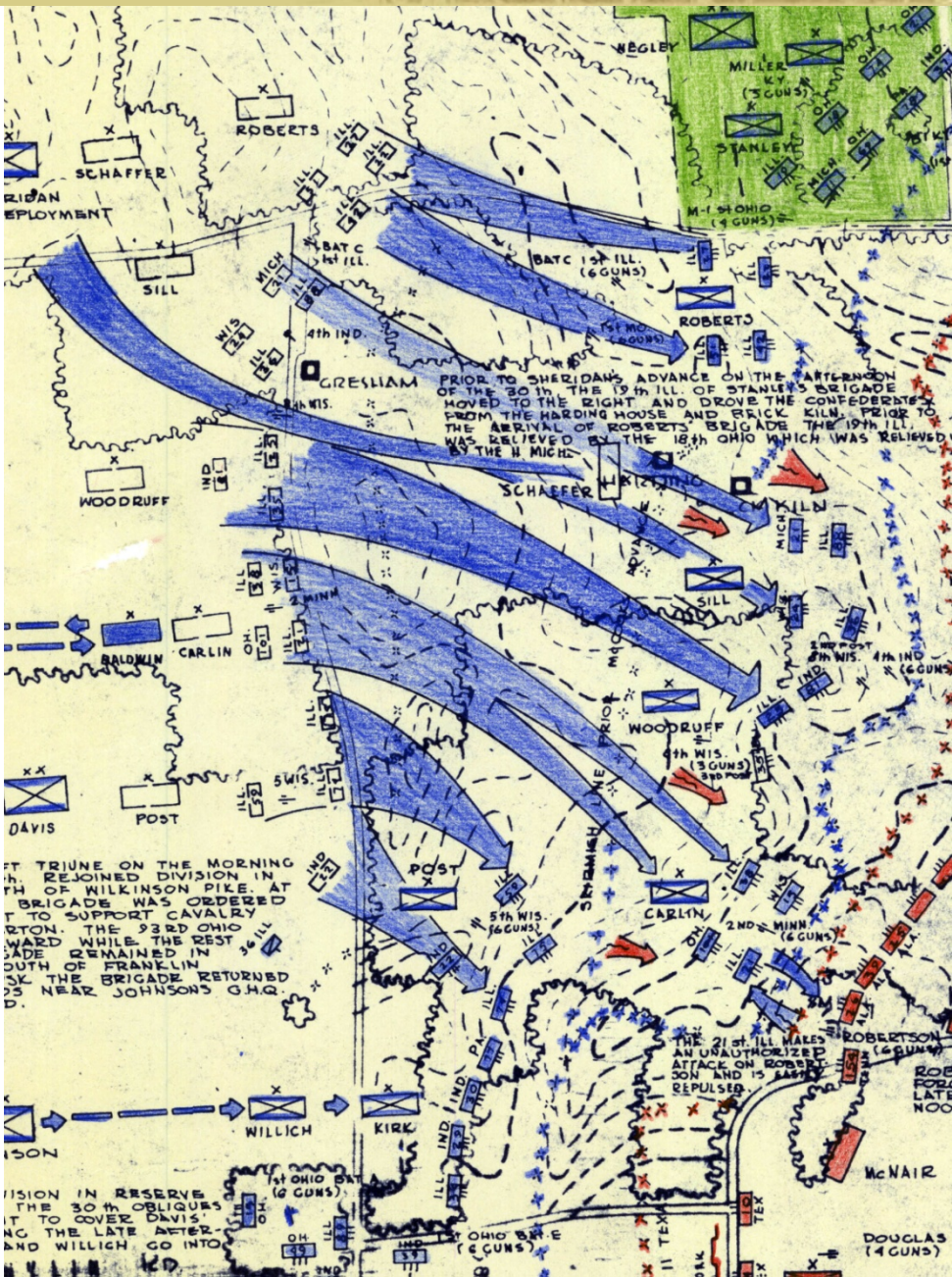


Vincent J. Esposito, ed. 1959

Edward J. Krasnoborski, cart.

Ed Bearss

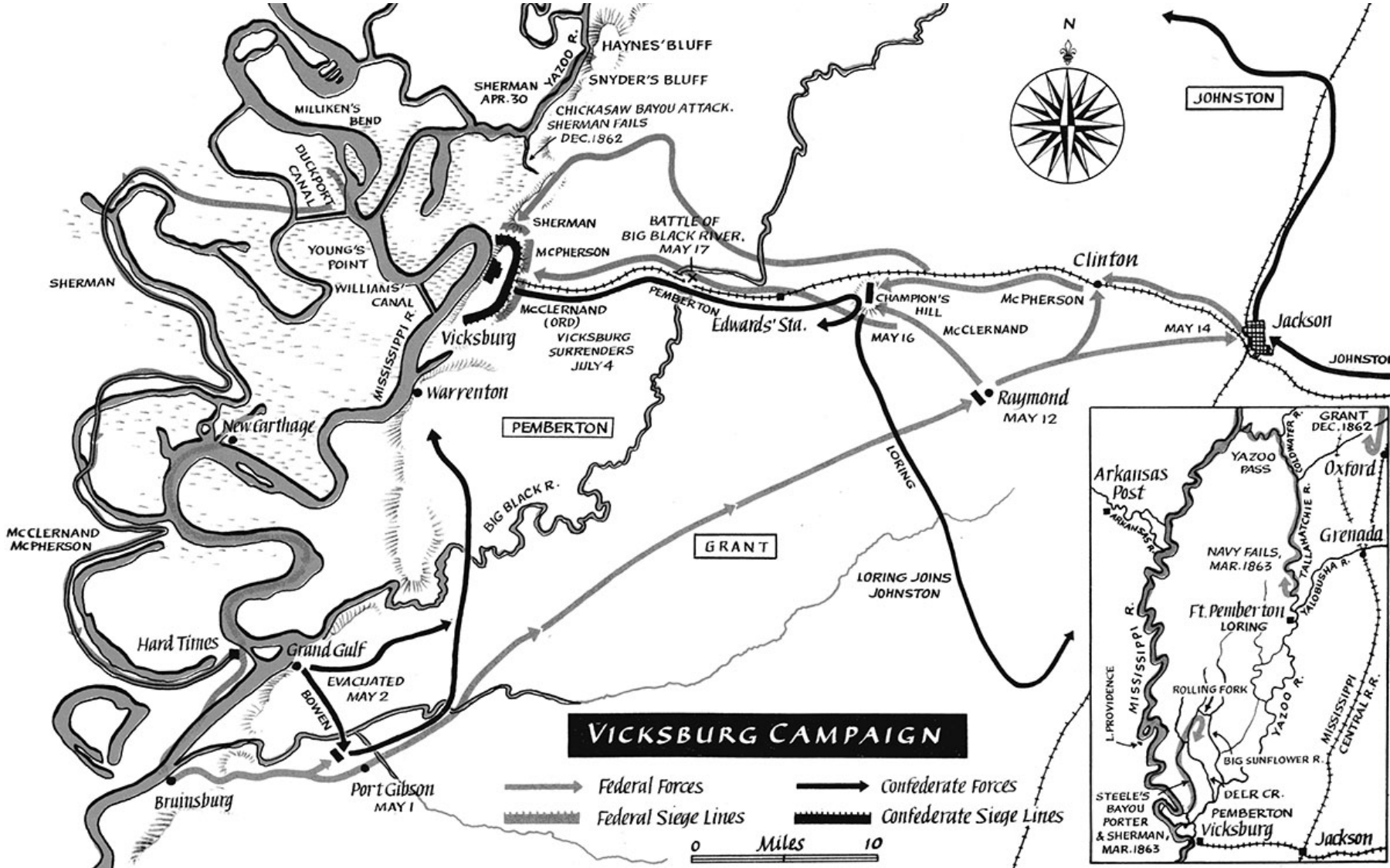
- Chief Historian, NPS
- Super tactical details



Snippet of one of 16 Stones River maps

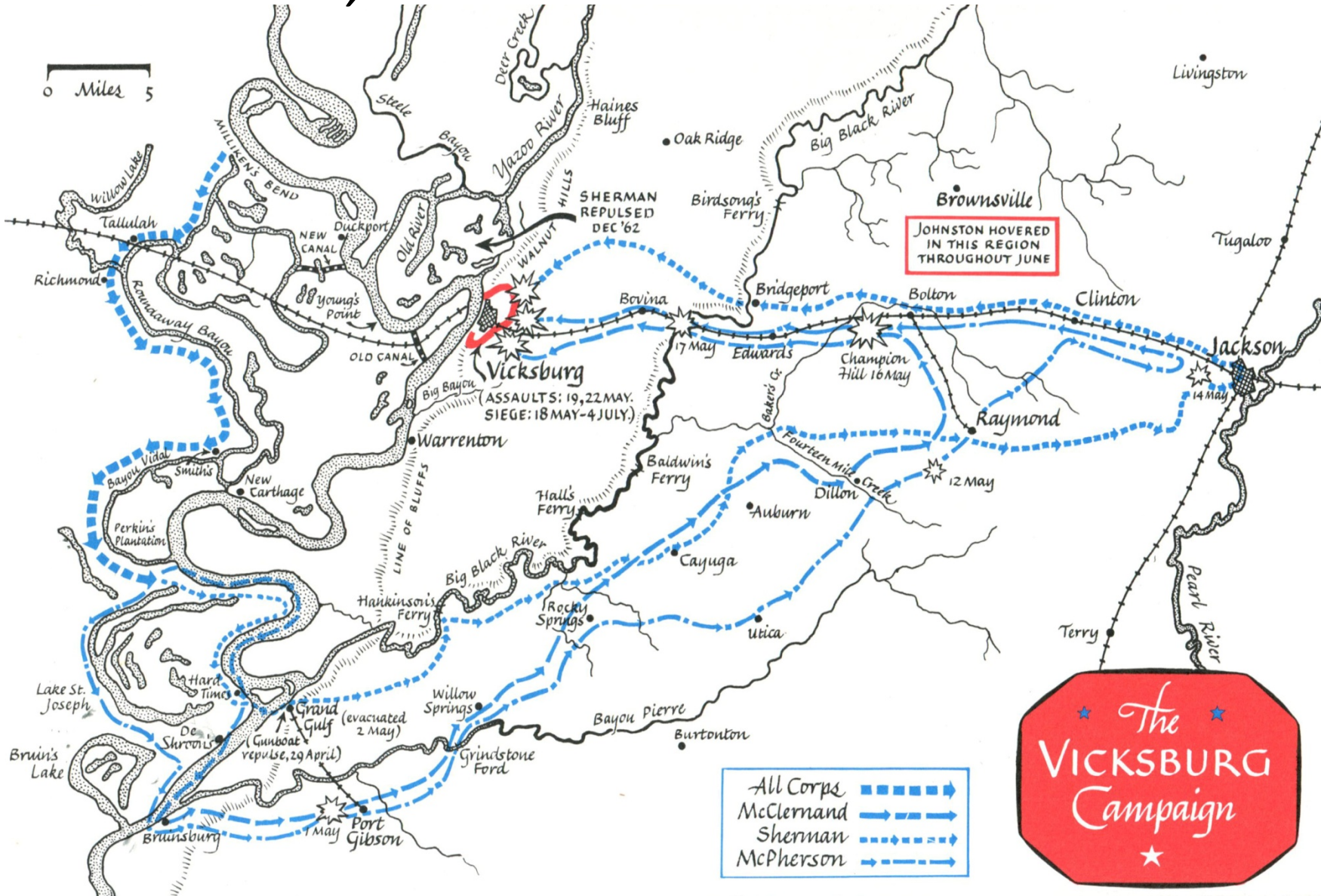
Samuel H. Bryant, Bruce Catton

- *Centennial History of the Civil War*

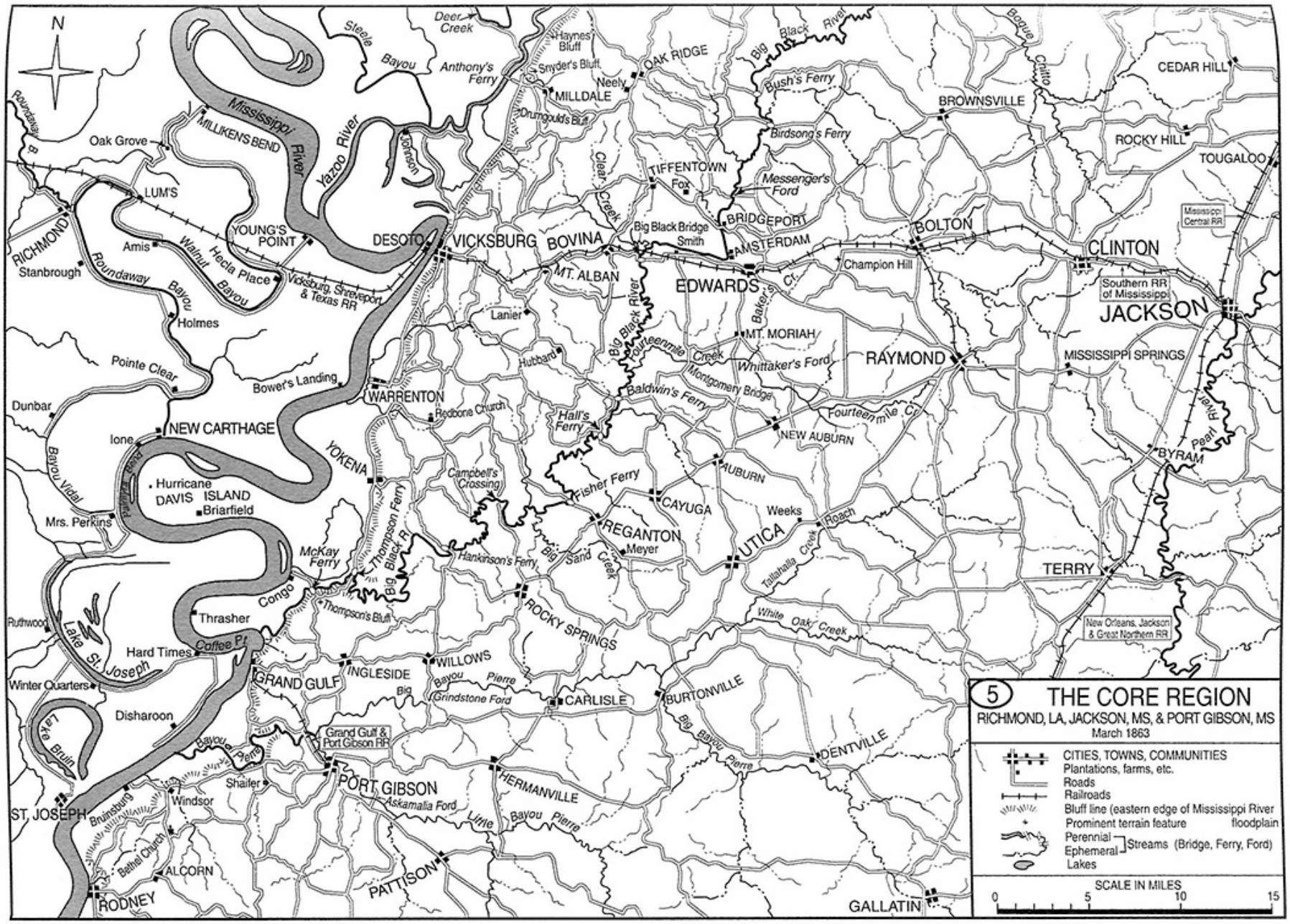


George Annand, Shelby Foote

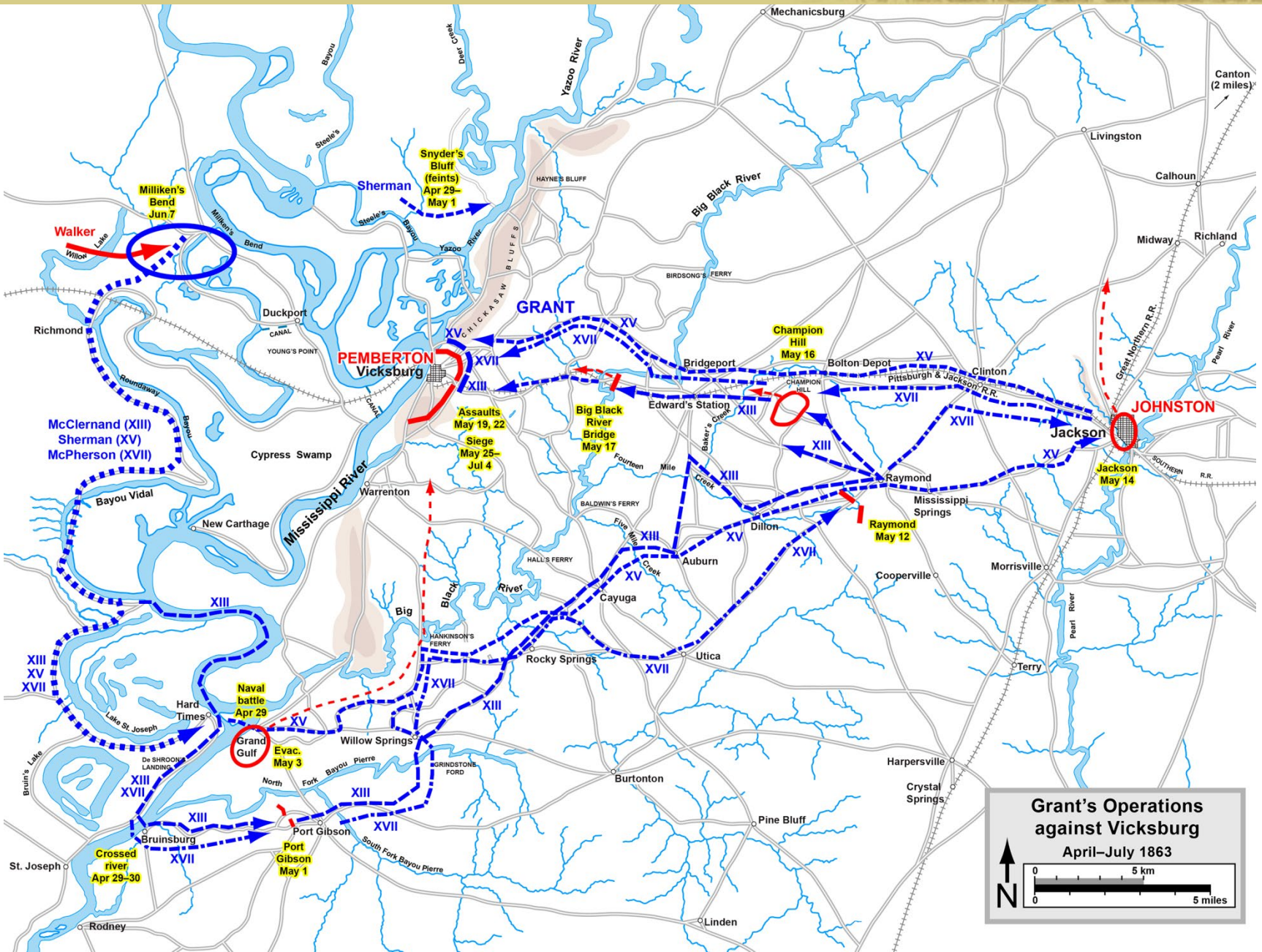
- *The Civil War, a Narrative*



Warren Grabau – *Ninety-Nine Days*

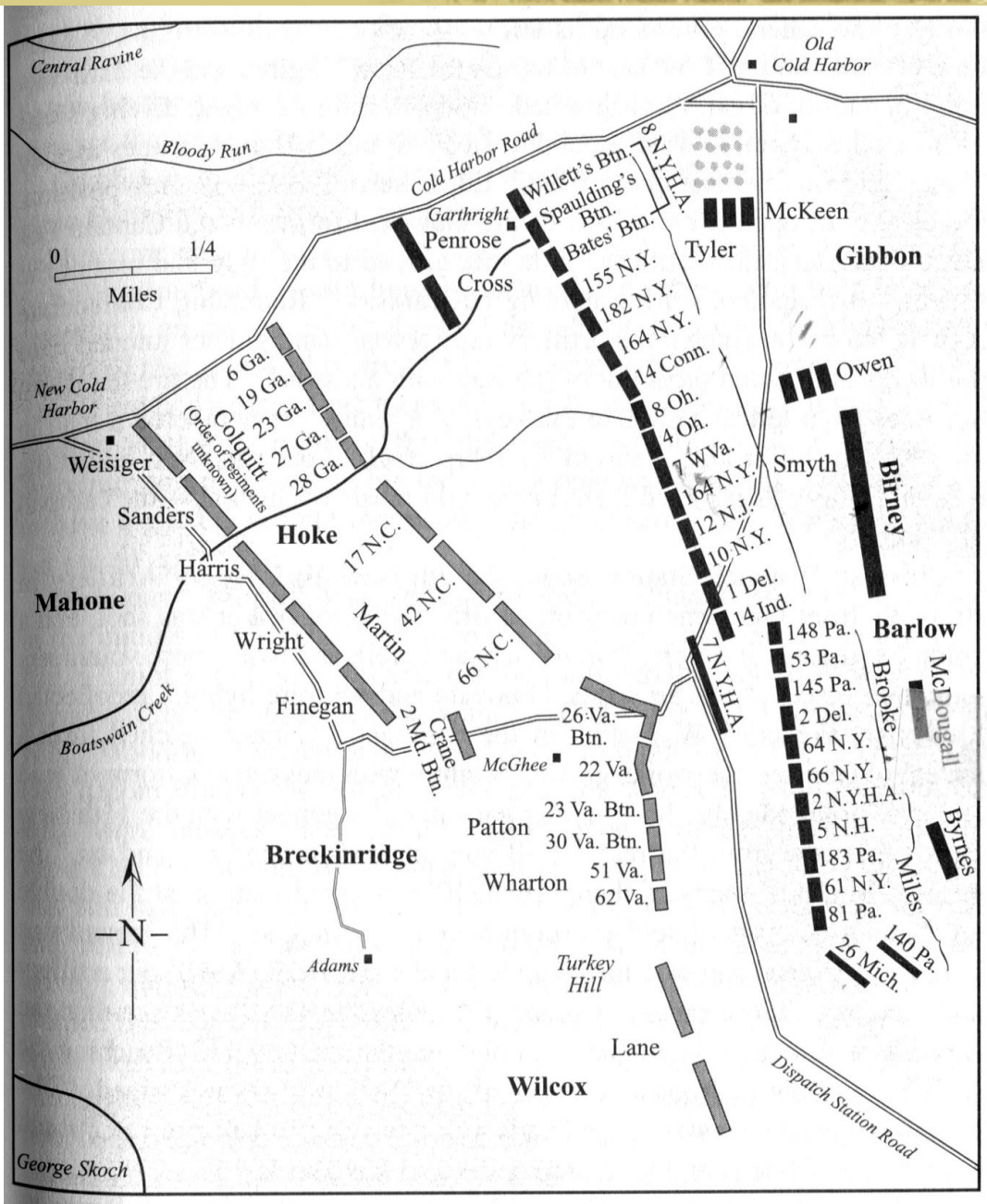


My Vicksburg Campaign Map



George Skoch

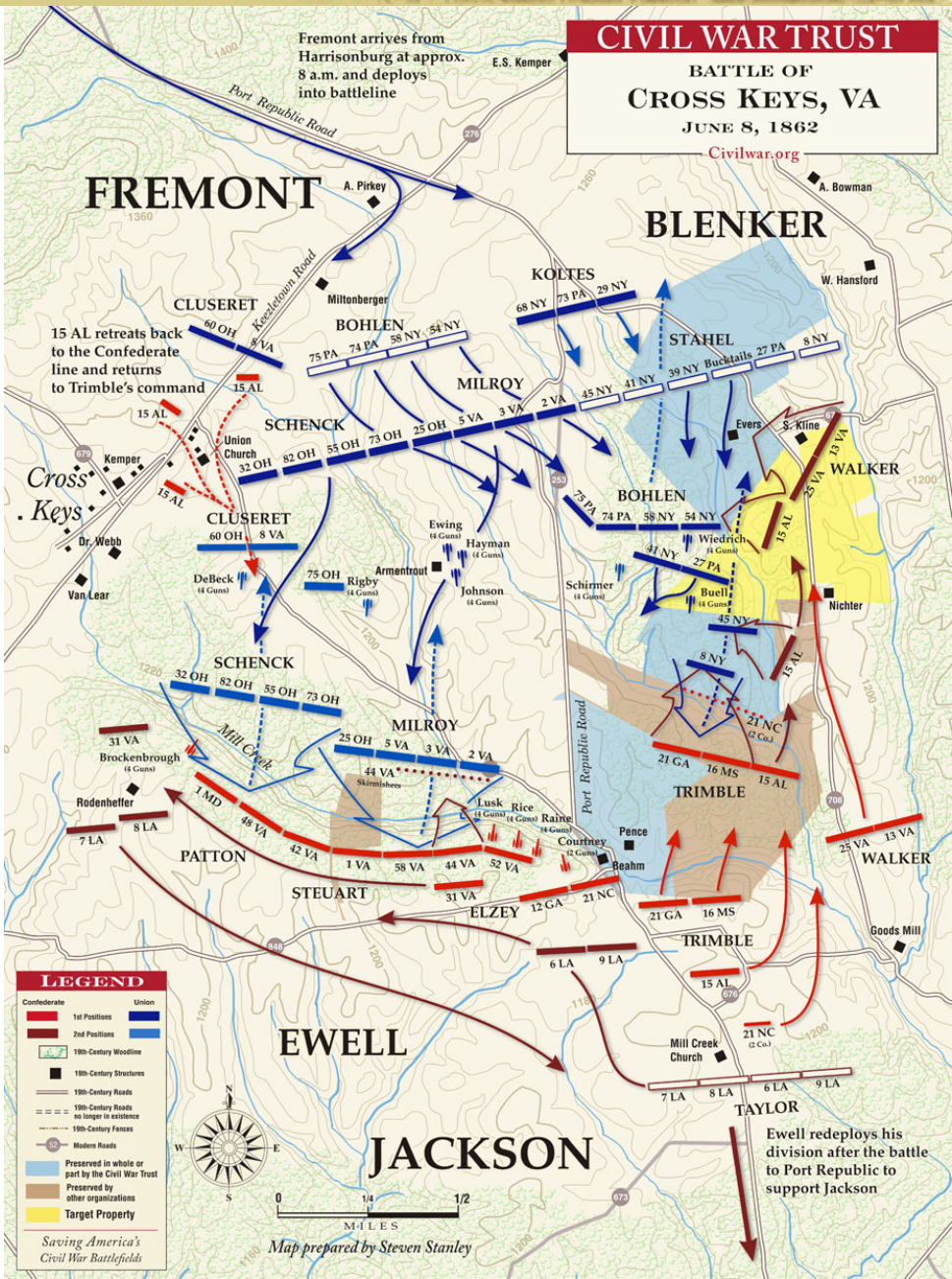
- Prolific cartographer of the Eastern Theater



Gordon Rhea's
Cold Harbor

Steve Stanley

- Civil War Trust
- Excellent topographic backgrounds
- Too much action on a single map



David Greenspan

- *American Heritage Pictorial History of the Civil War*

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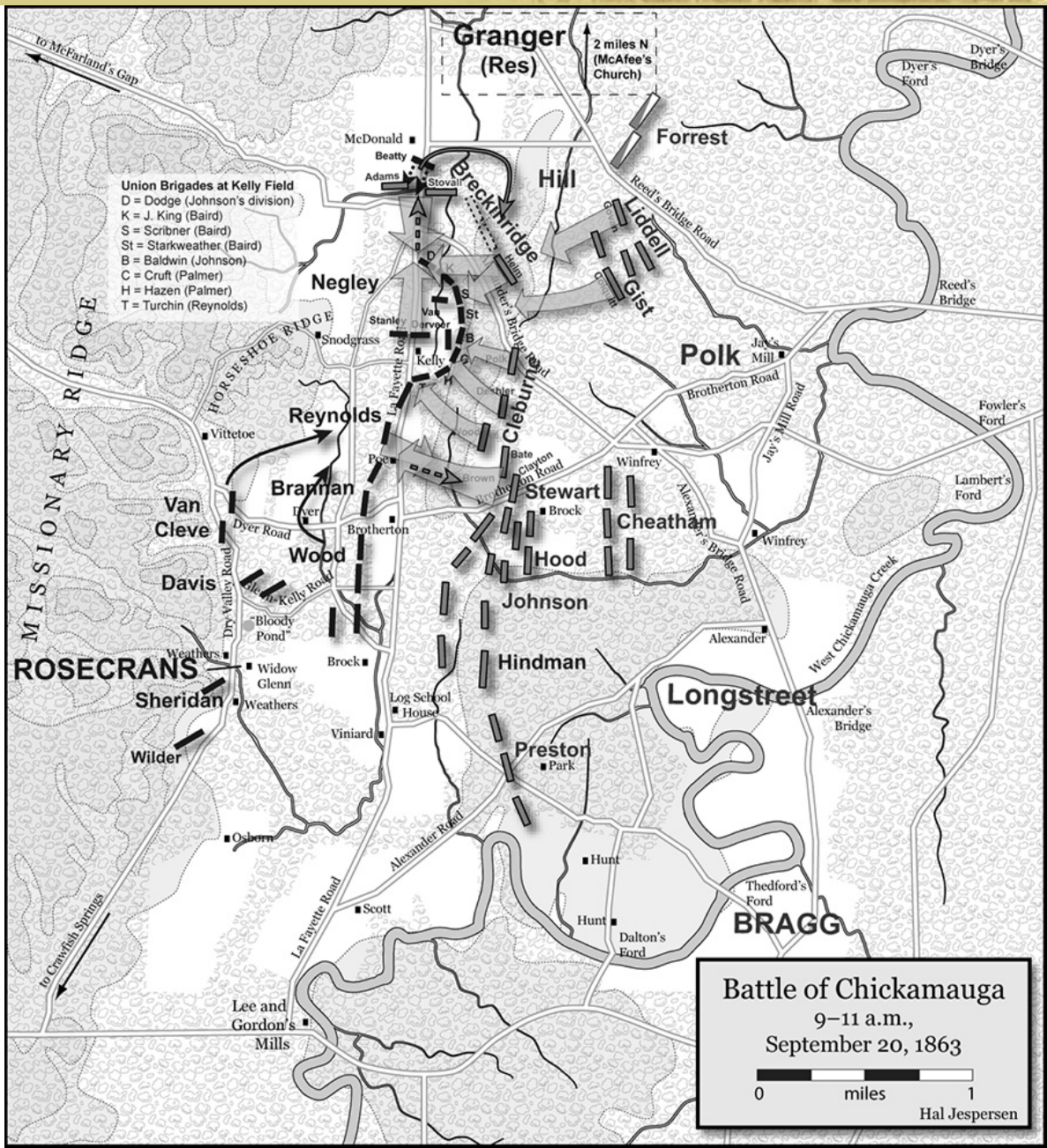
Working with Clients

- Vast majority of my work comes from referrals: free Wikipedia maps, previous work for publishers
- Over 180 clients/projects so far
- Four ways they can provide me input …

Types of Input, I

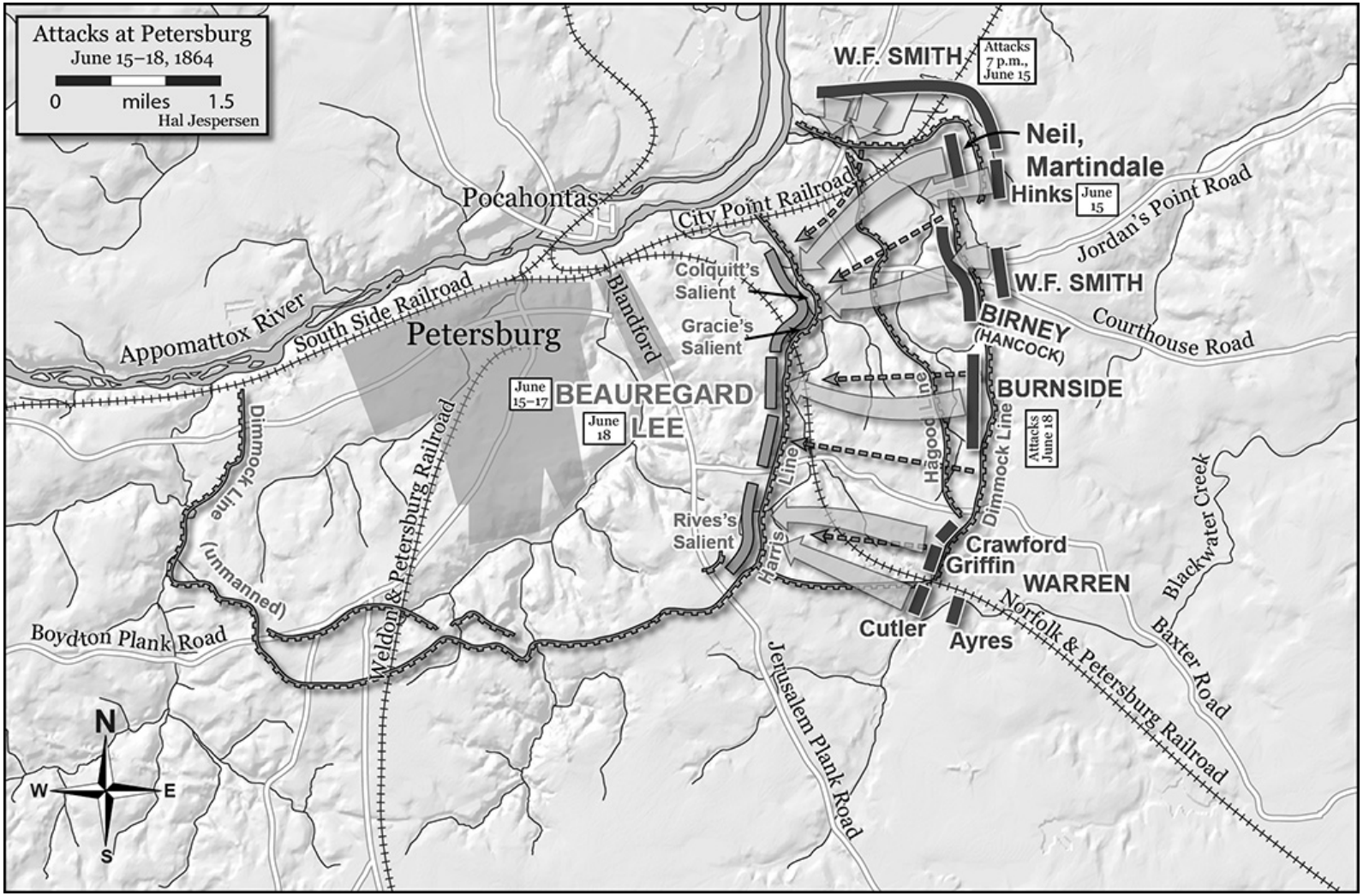
- Convert free Wikipedia map



Frank Varney, *General Grant and the Rewriting of History*

Types of Input, II

- Well-known battle or campaign

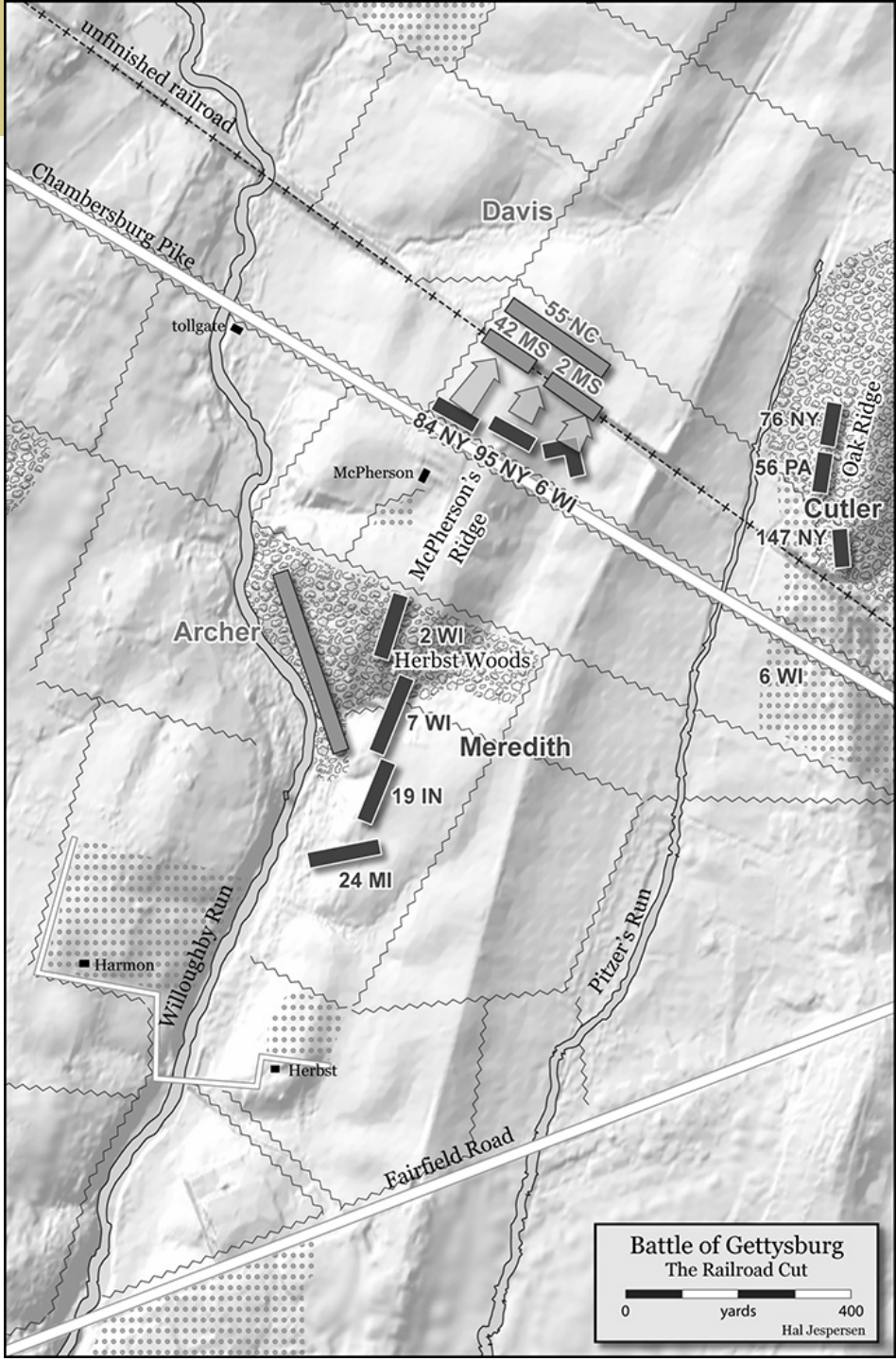


For history of 62nd Pennsylvania, by Ernie Spisak

Types of Input, III

- Less well-known, but published maps exist

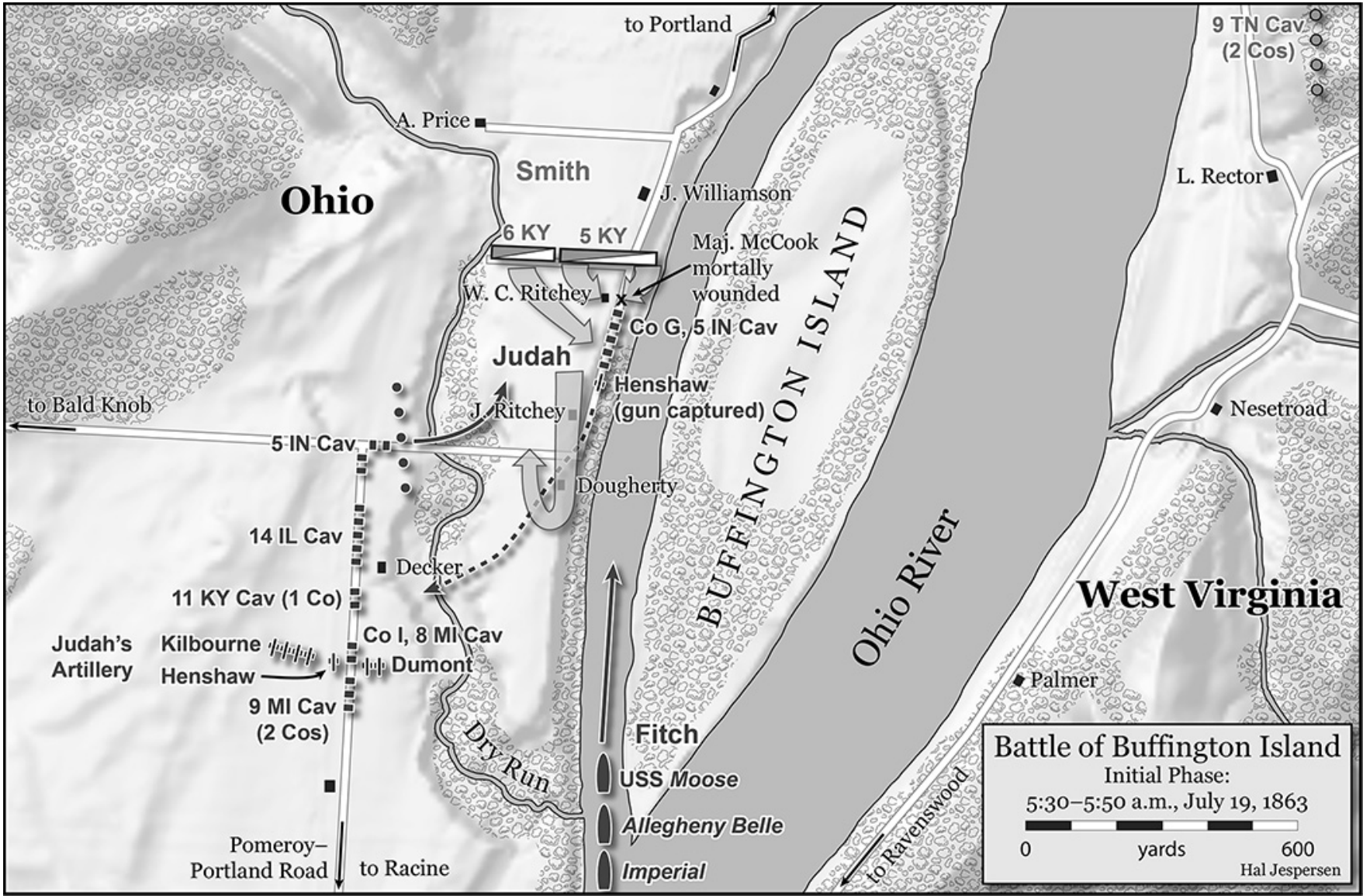
Lance Herdegen, *The Iron Brigade in Civil War and Memory*



Types of Input, IV

- Author provides sketch map

David Mowery,
Morgan's Great Raid



Publication Challenges

- Grayscale more challenging than full color
- Small size
  - Typically 4.75 x 7 inches, one quarter the size of a Wikipedia map
  - Limited space for type; publishers frown on type smaller than 6 point
- Proof reading?

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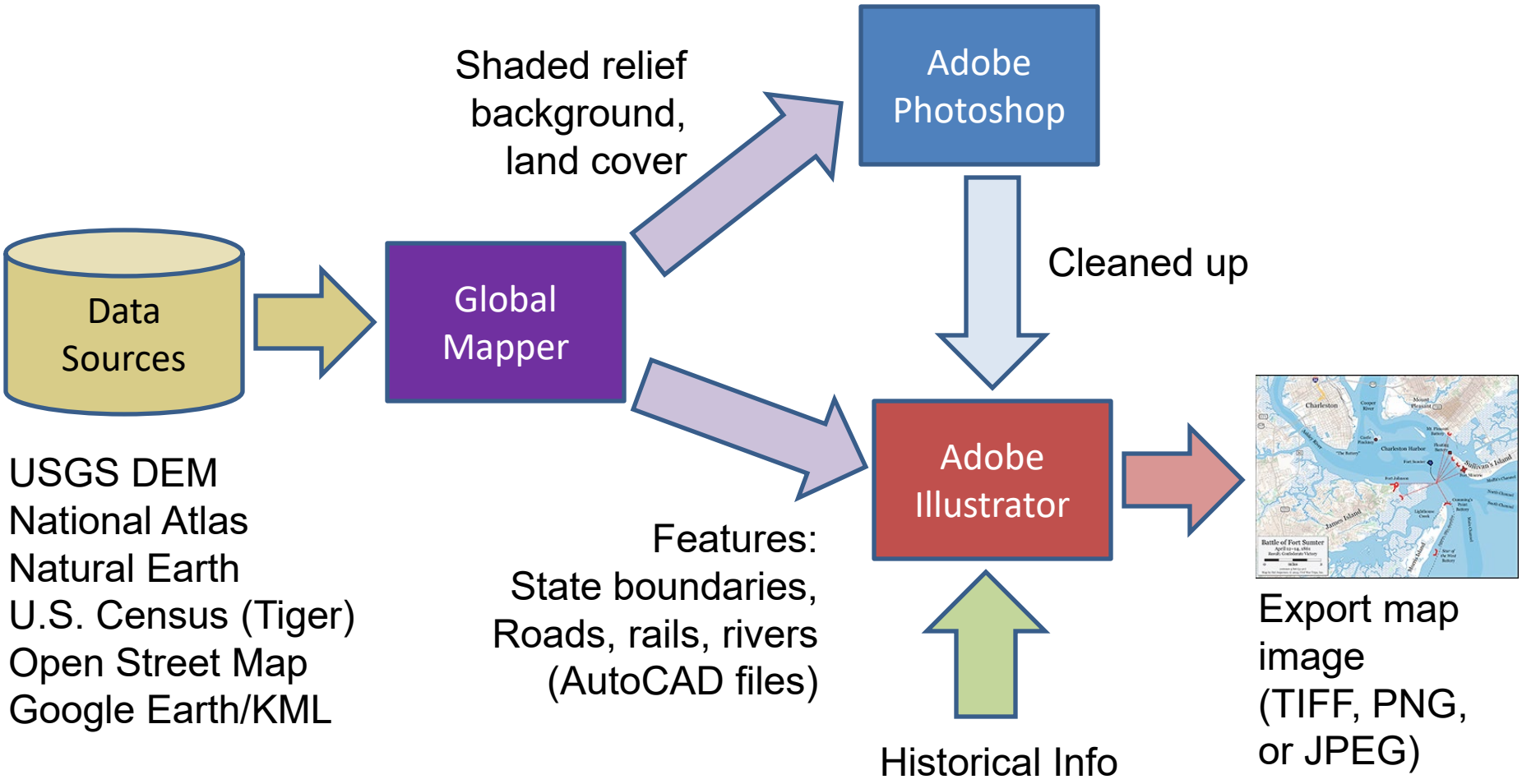
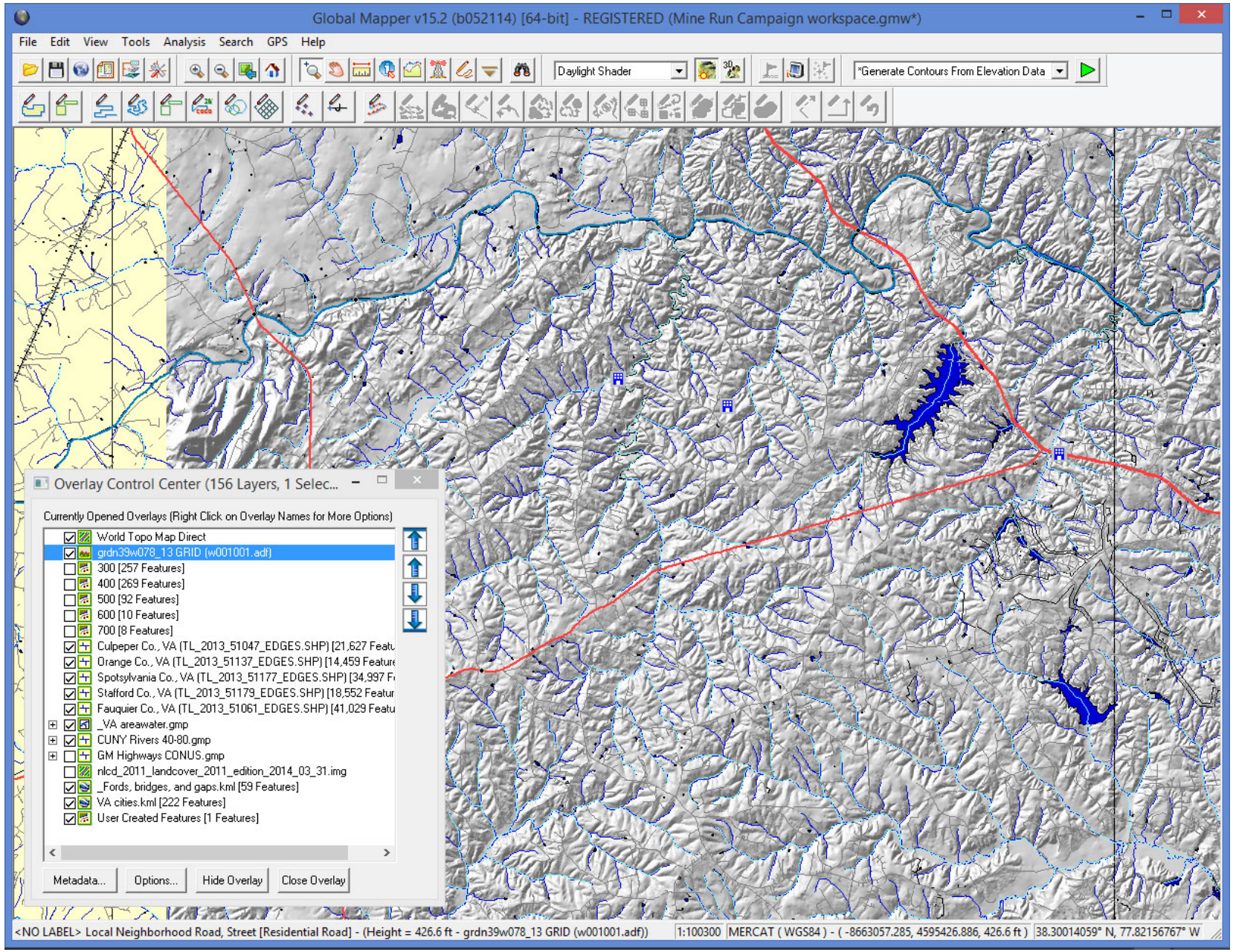
My Cartography Workflow



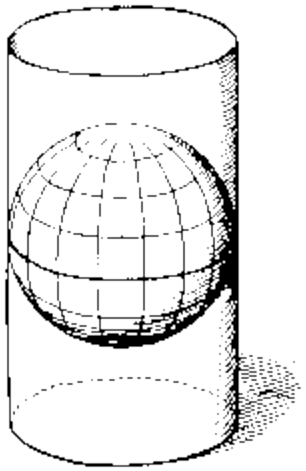
Global Mapper – Blue Marble Geographics

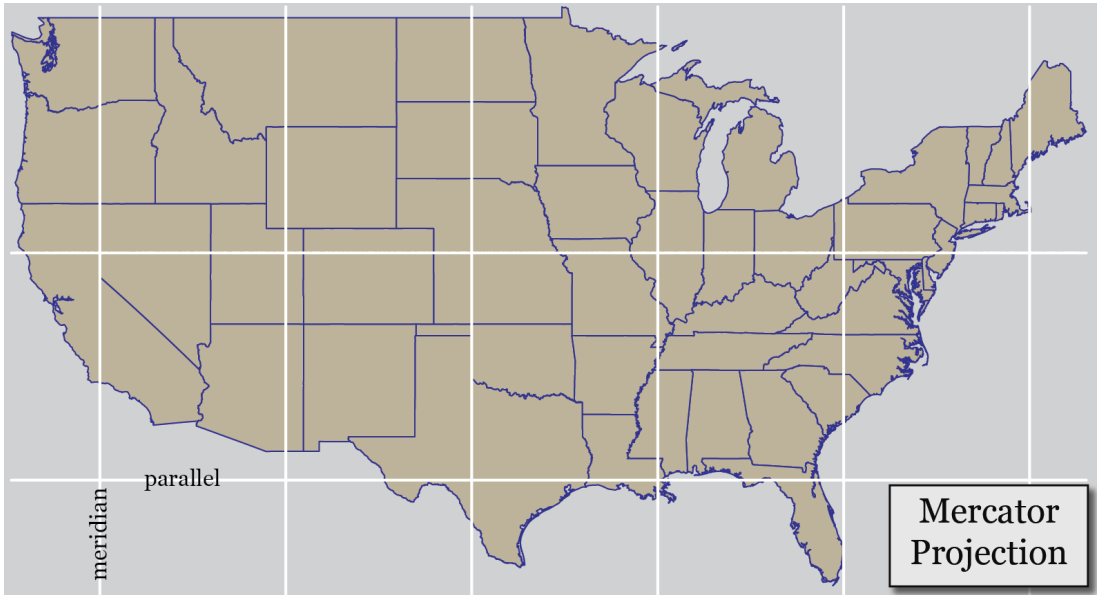


Projection – Mercator

- How to portray a spherical area on a flat surface?
- Mercator used by most online maps
- Easy to calculate routes and distances between points, but areas increase as you move farther from the Equator

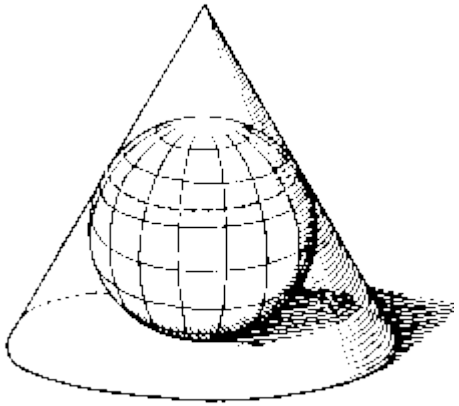
Gerardus Mercator, 1569



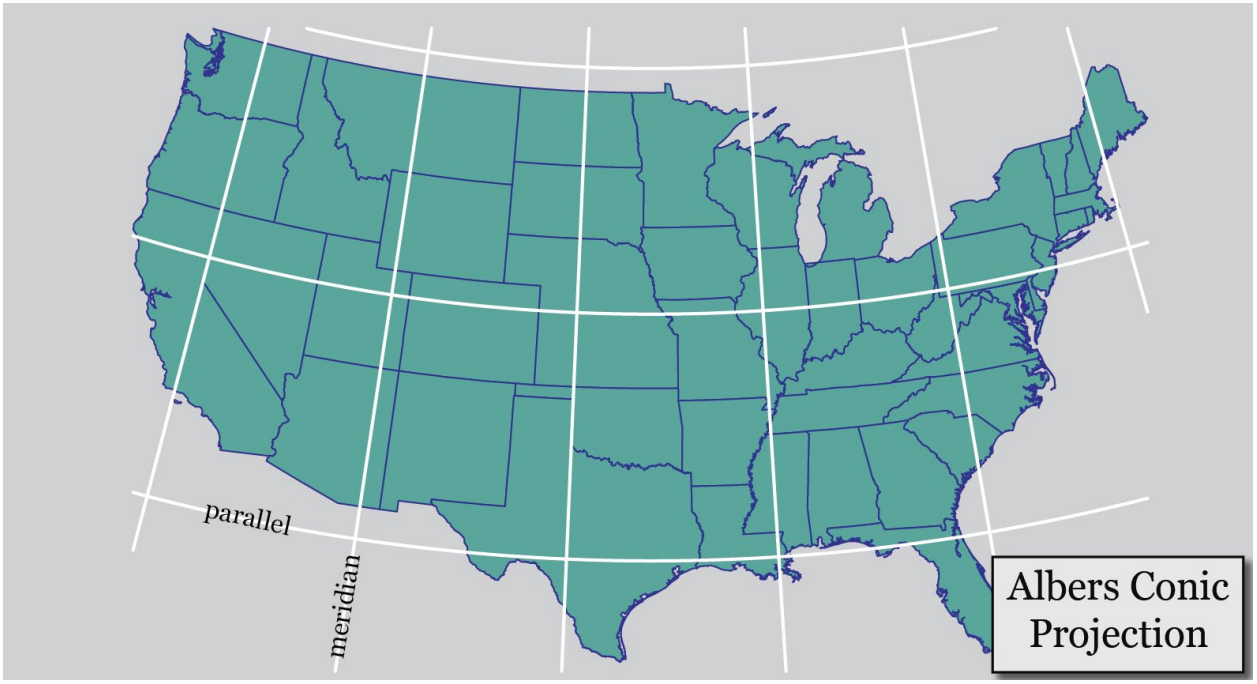


Projection – Albers Conic

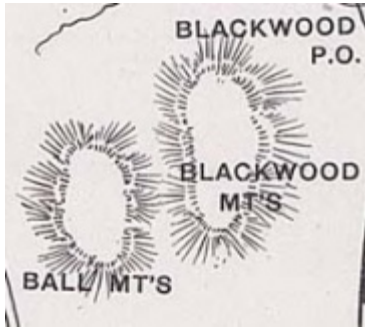
- Albers Conic Equal Area projection a more natural look for wide areas
- Areas equalized, but North not always straight up, and the East–West lines between points are curves

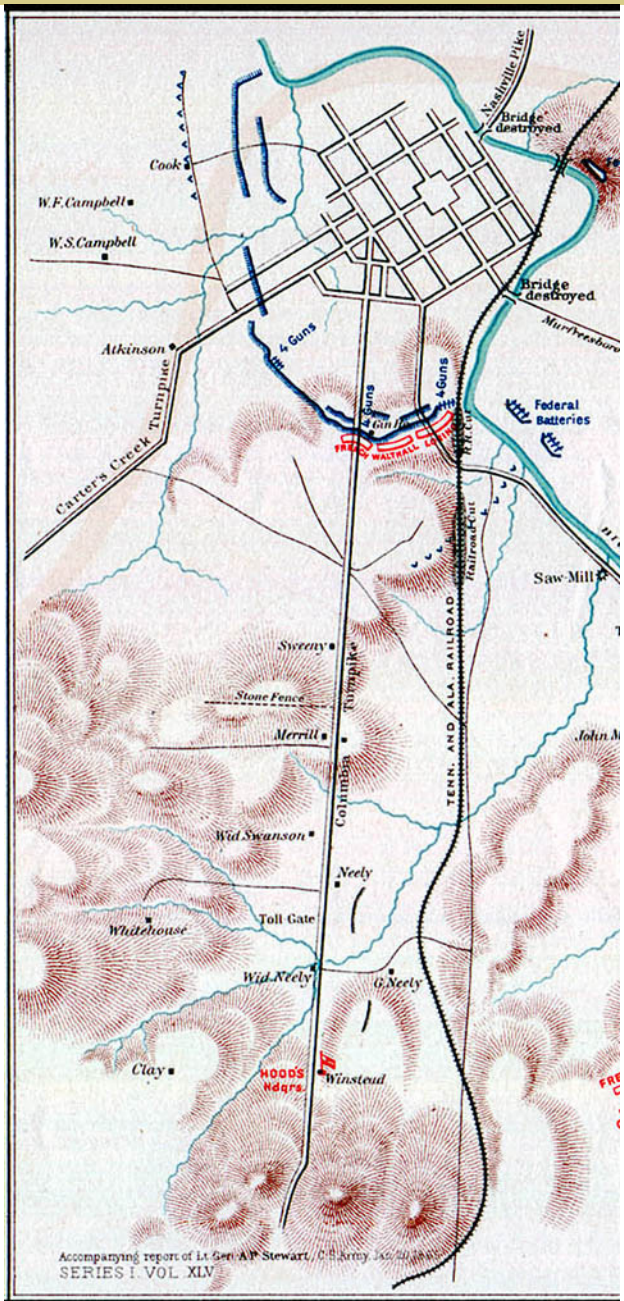


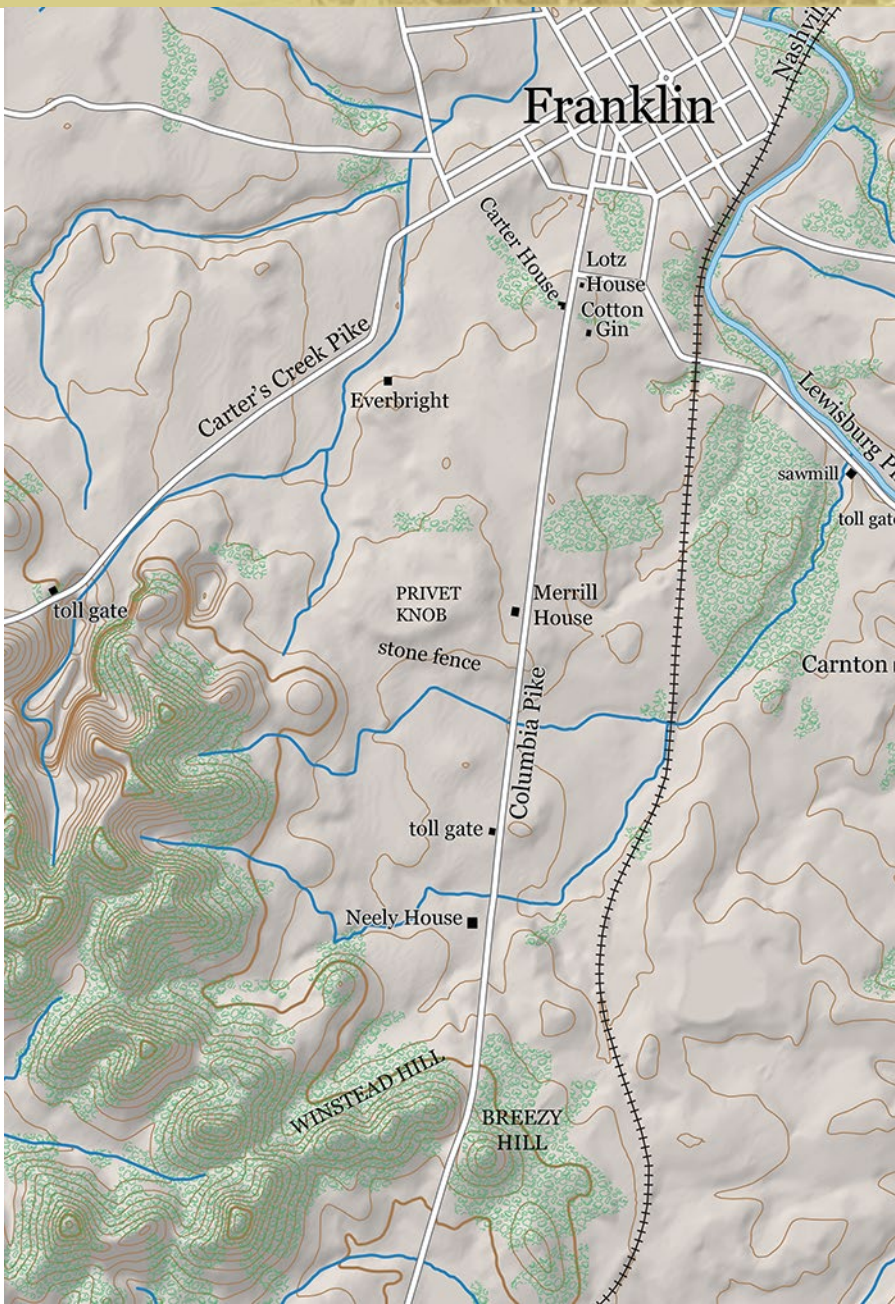
Heinrich Albers, 1805



Elevation: Hachures



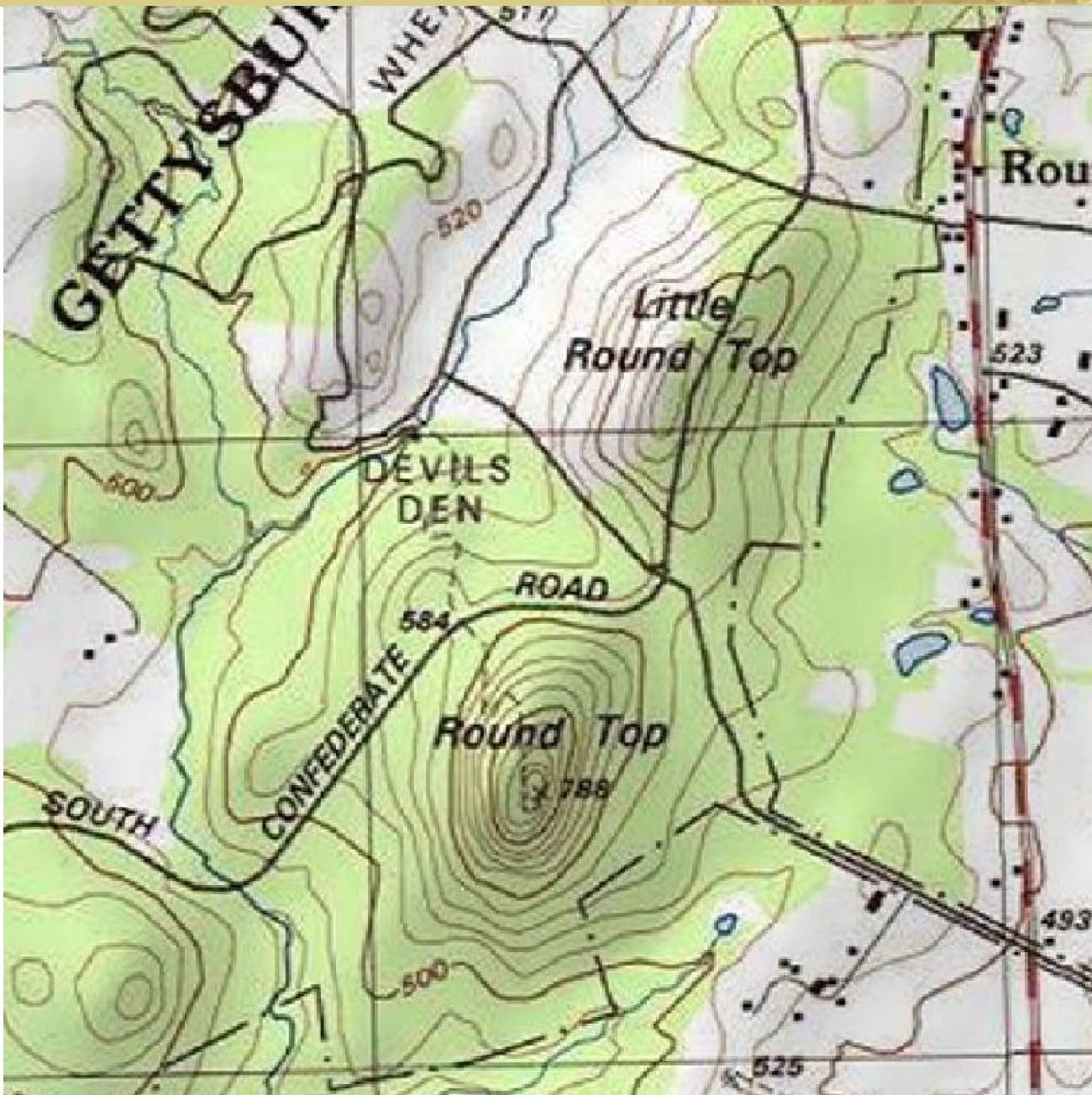




OR Atlas, plate 73/3

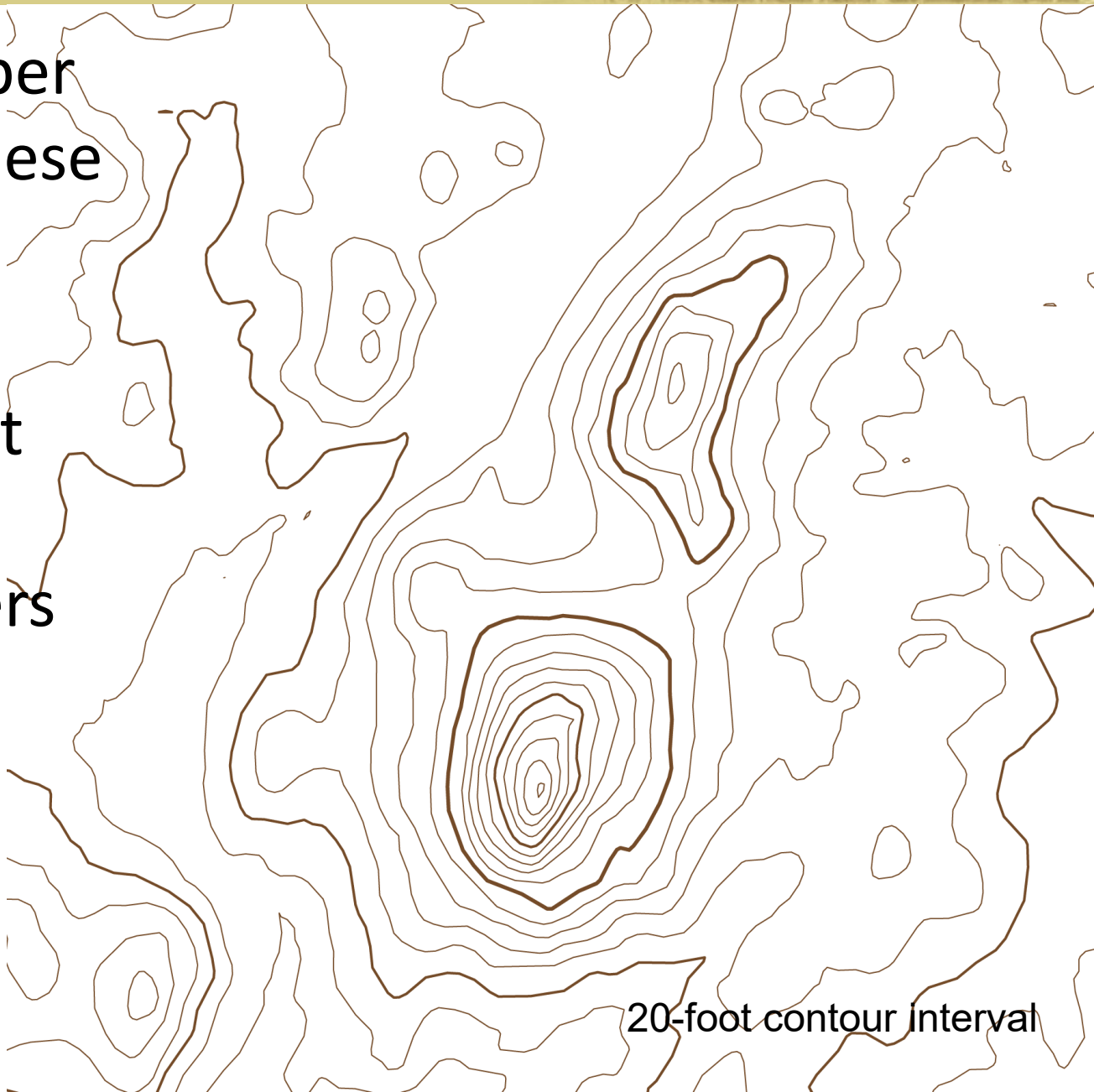
Elevation: Contour Lines

- Familiar format from USGS and military topographic maps



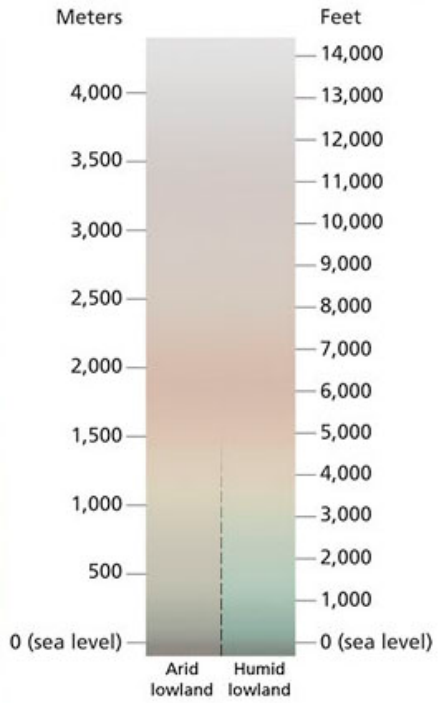
Elevation: Contour Lines, II

- Global Mapper generates these lines pretty easily
- Not the most intuitive for casual readers



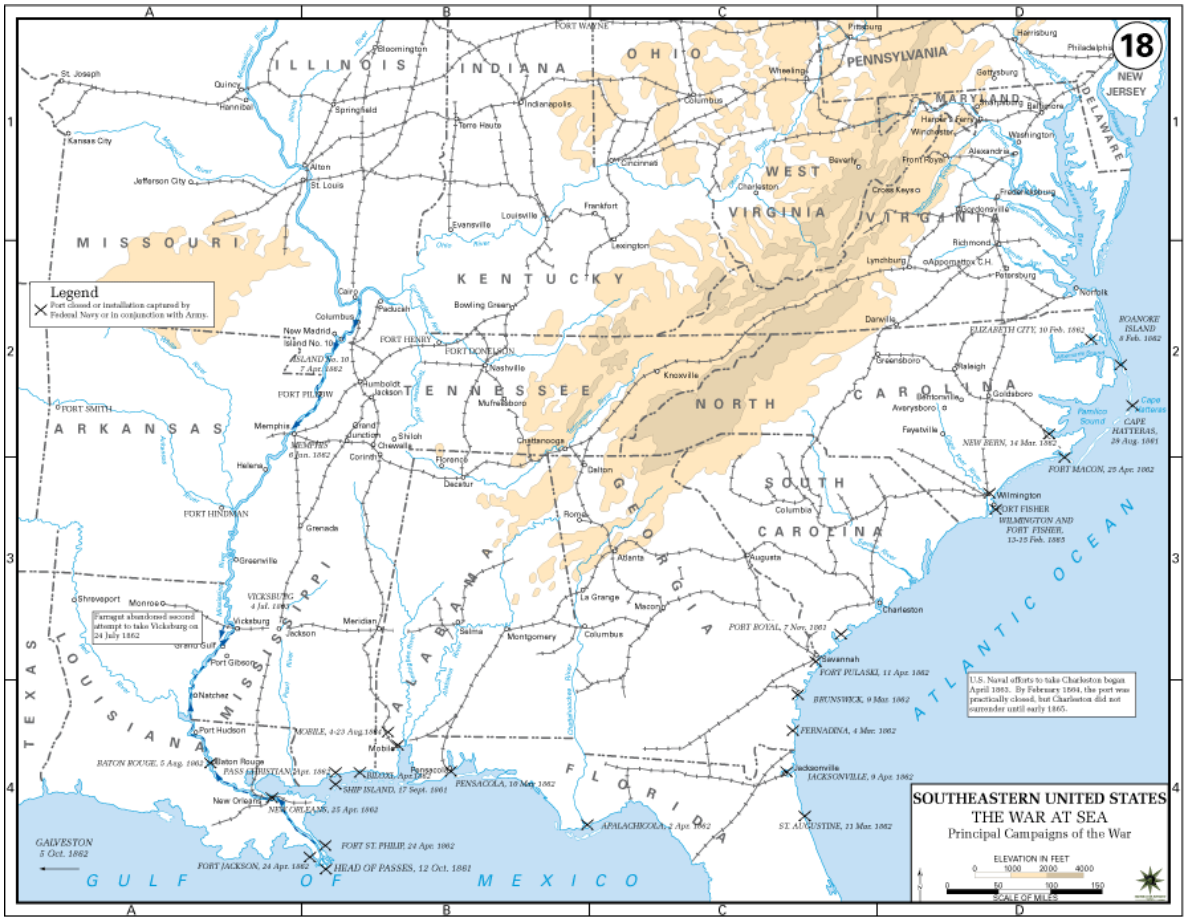
Elevation: Hypsometry

- Color shading indicates elevation
- Most-used color palette selected so that higher elevations look more “arid”

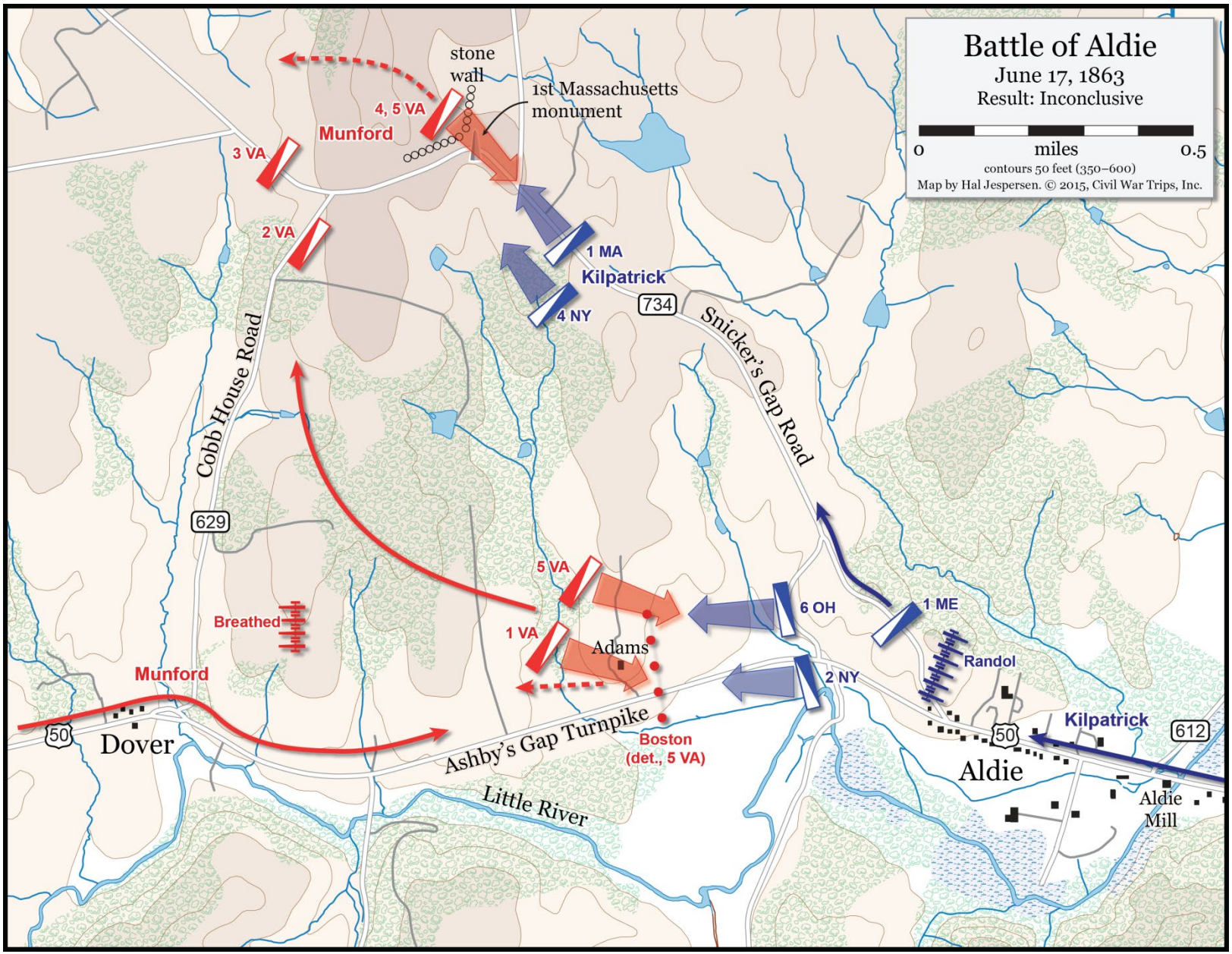


Elevation: Hypsometry, II

- My version of hypsometry is inspired by the later color editions of the *West Point Atlas*
- Colors areas defined by contour lines

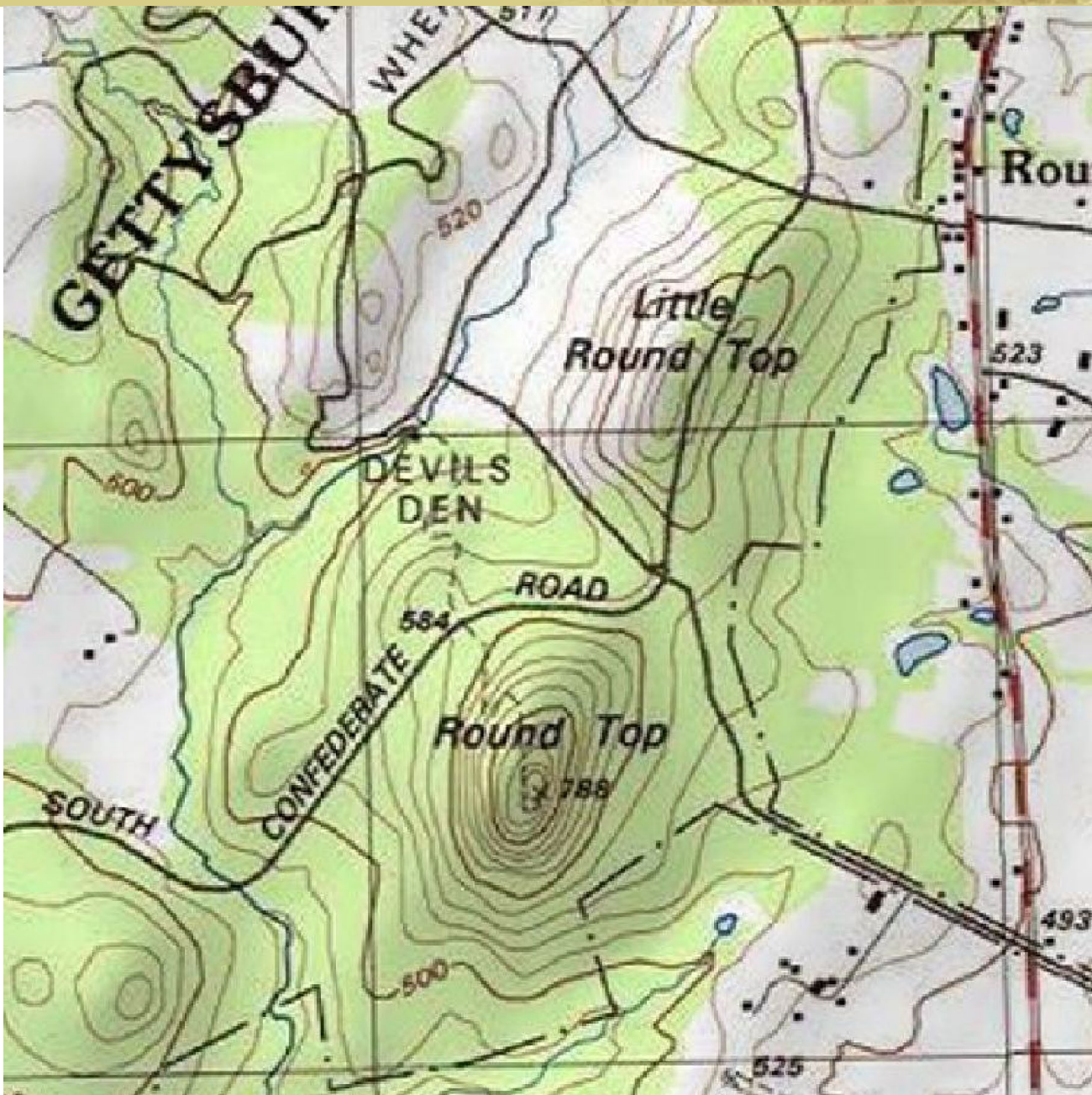


Elevation: Hypsometry, III



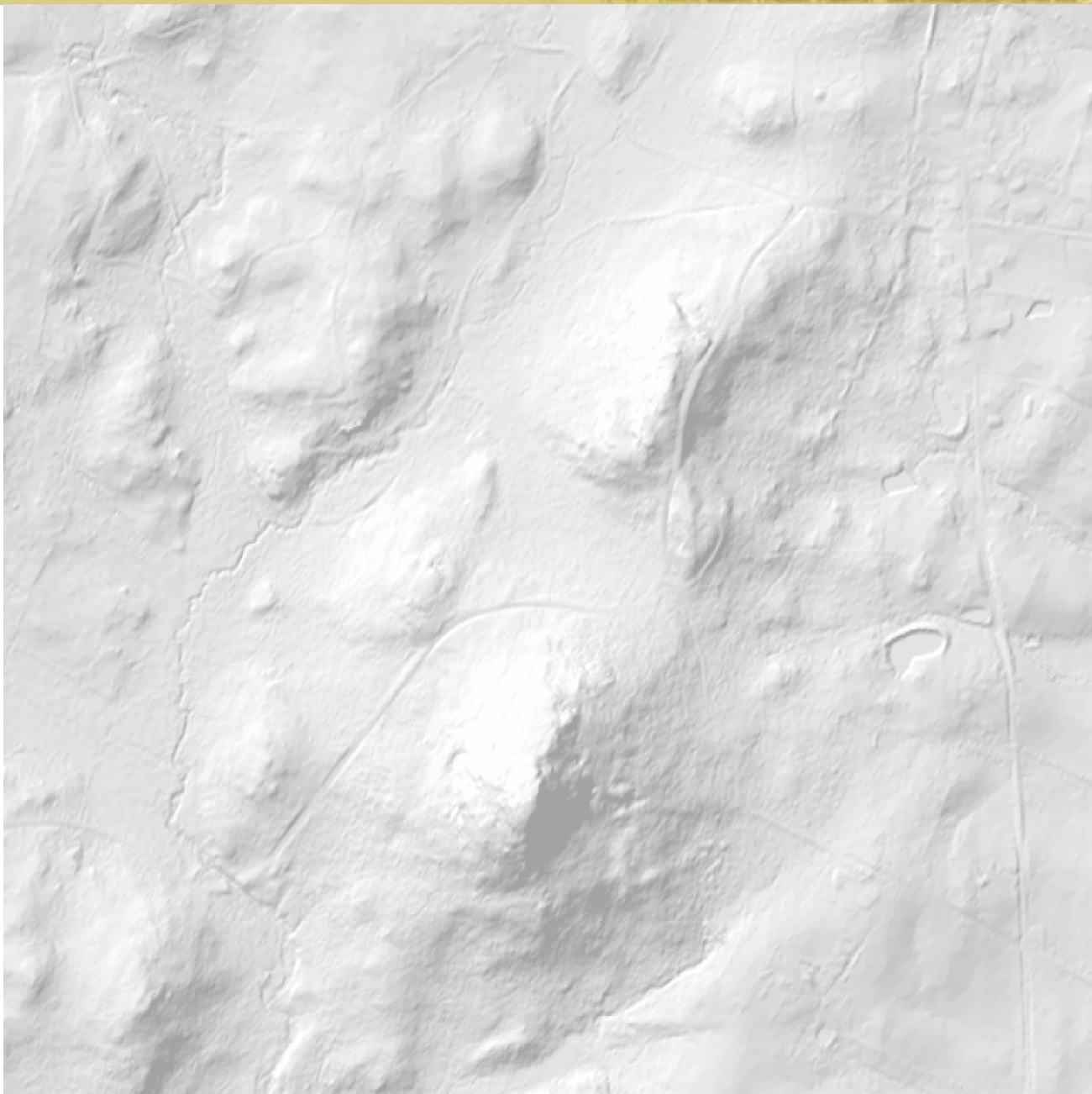
Elevation: Shaded Relief

- Shaded relief is even more intuitive



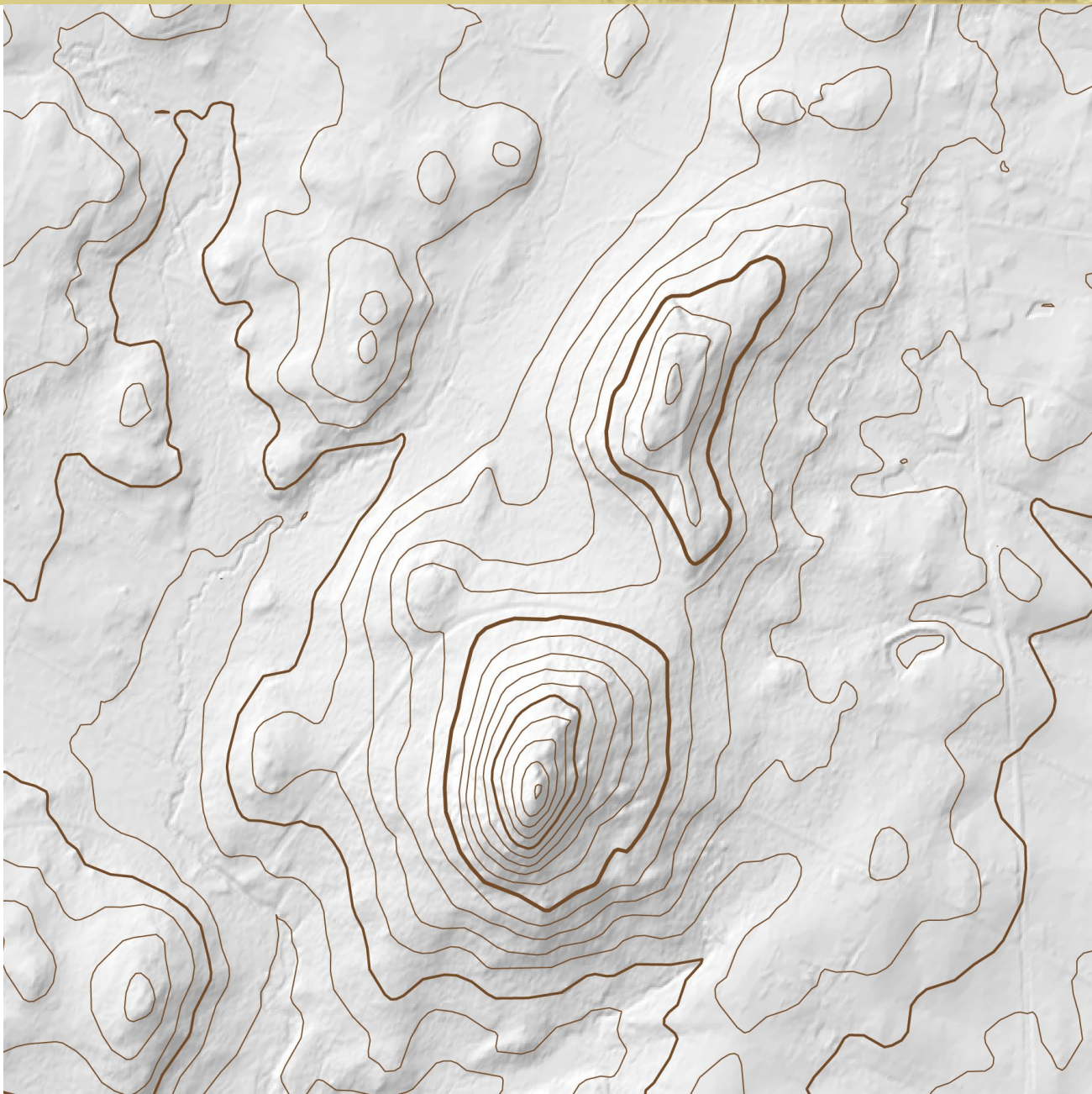
Elevation: Shaded Relief, II

- Pseudo 3-D effect for hills and valleys



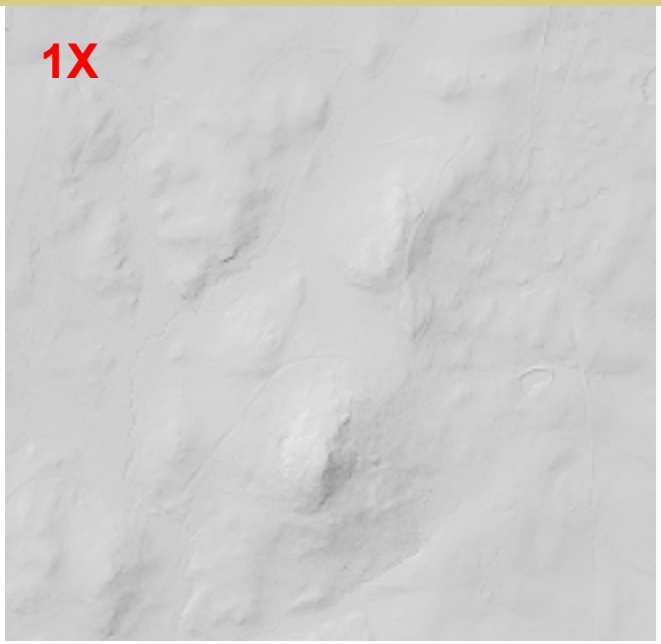
Elevation: Shaded Relief, III

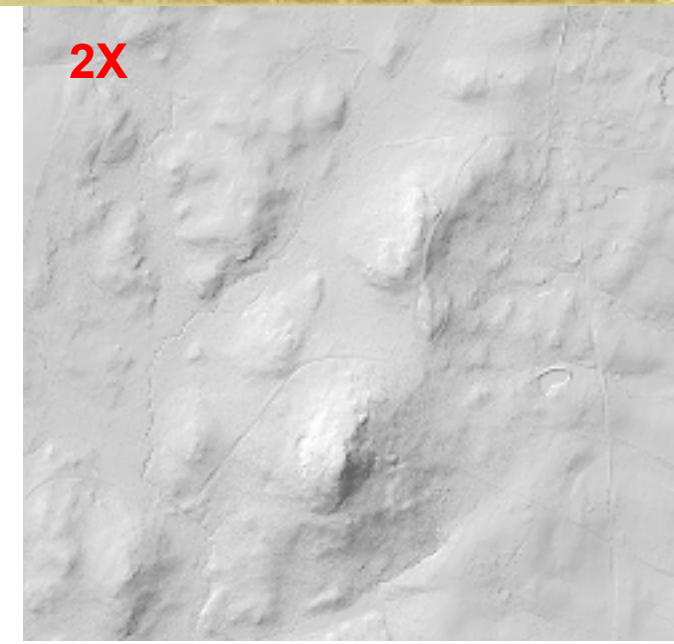
- Combining shaded relief with contour lines can be even better
- Works best for relatively small battlefield areas

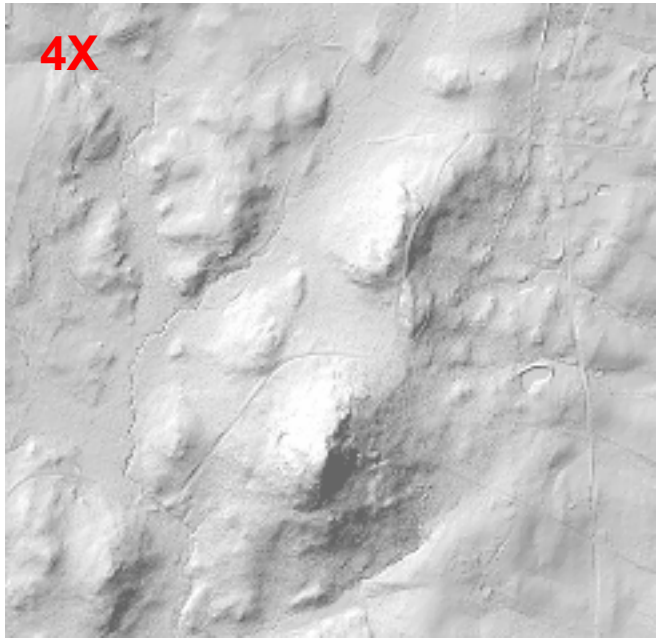


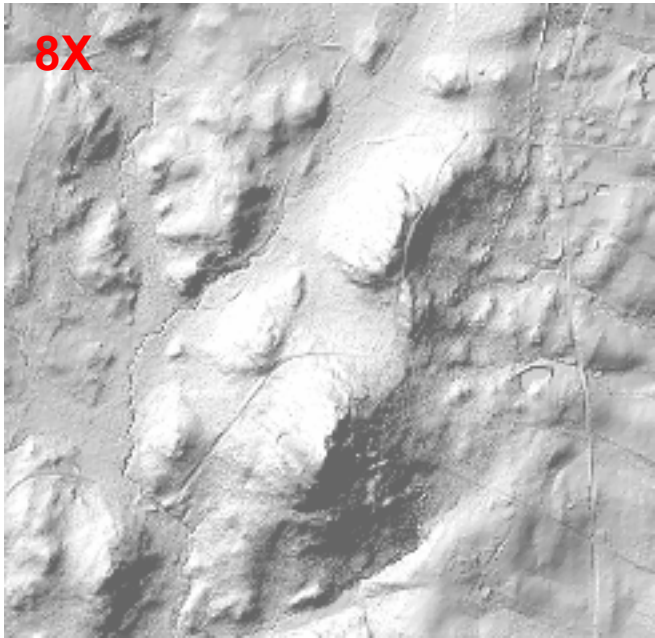
Elevation Exaggeration

- Exaggeration provides more “natural” look
- Battlefields 4X, theater 6–12X
- Sun altitude and azimuth also can be adjusted; here, 40°/315°, or upper left corner









Shaded Relief: DEM

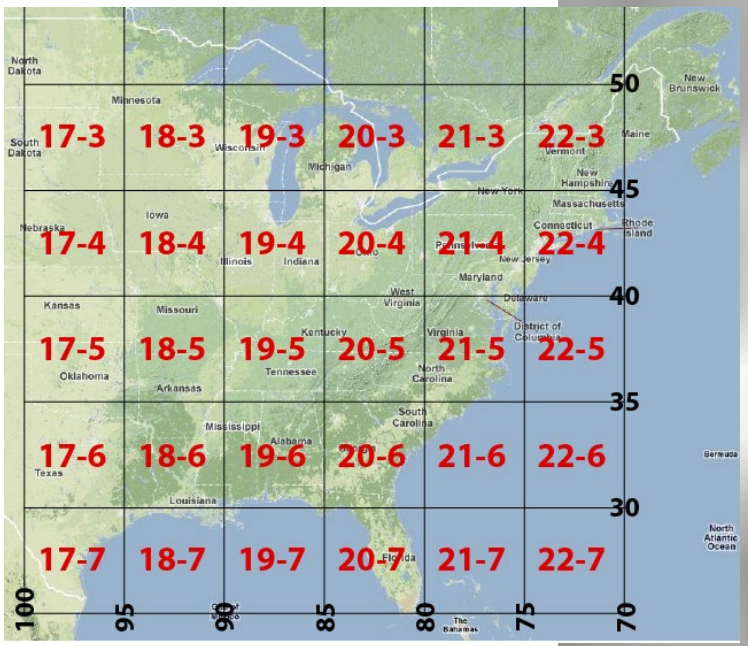
- Digital Elevation Model (DEM) data is manipulated by Global Mapper to create the pseudo 3-D shading effect
- Government DEM available for free, in different resolutions

Grid	Resolution	Source
3 arc-seconds	90 meters	SRTM (Shuttle Radar Topography Mission) worldwide dataset
1.5 arc-seconds	45 meters	ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer)
1 arc-second	30 meters	SRTM US-only
1/3 arc-second	10 meters	NED (National Elevation Data), all US
1/9 arc-second	3 meters	NED, selected US areas, mostly coastal

1 arc-second = $^{1}/_{1,296,000\text{th}}$ of Earth's circumference

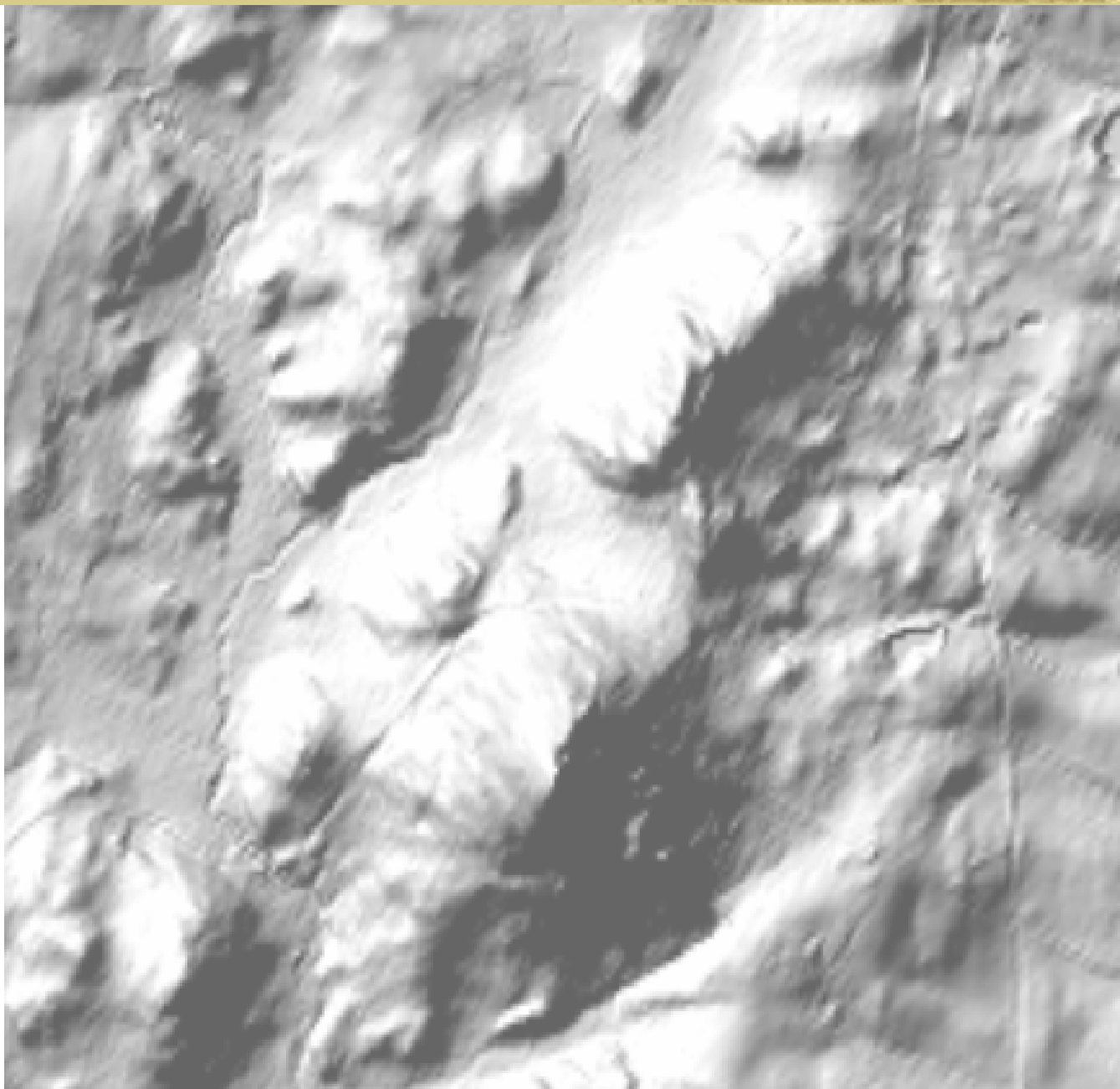
DEM Examples: SRTM 30m, 1 arc-sec

- Useful only for wide areas (campaigns, theaters)



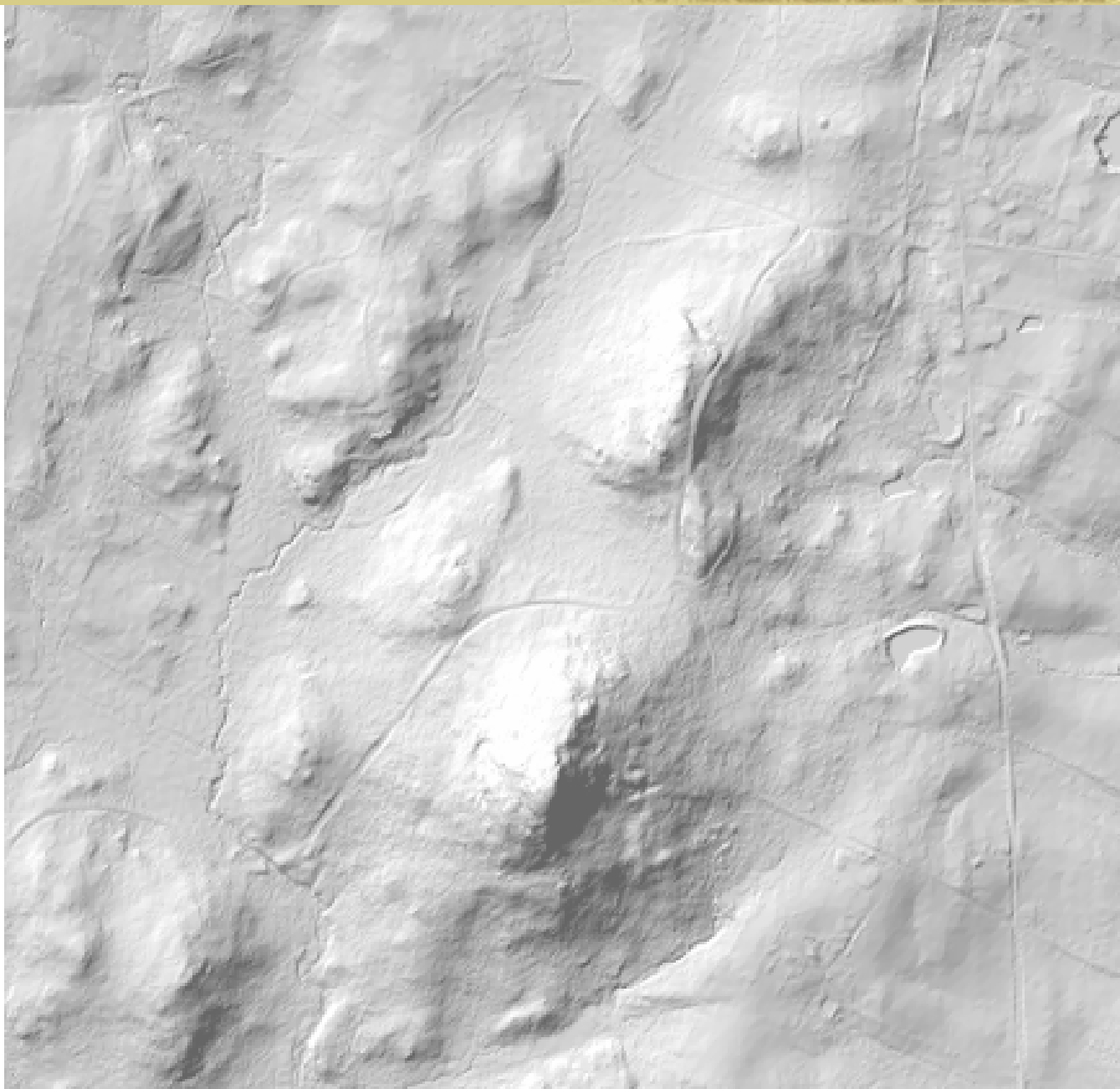
DEM Examples: NED 10m, 1/3 arc-sec

- Mostly used for battlefield maps

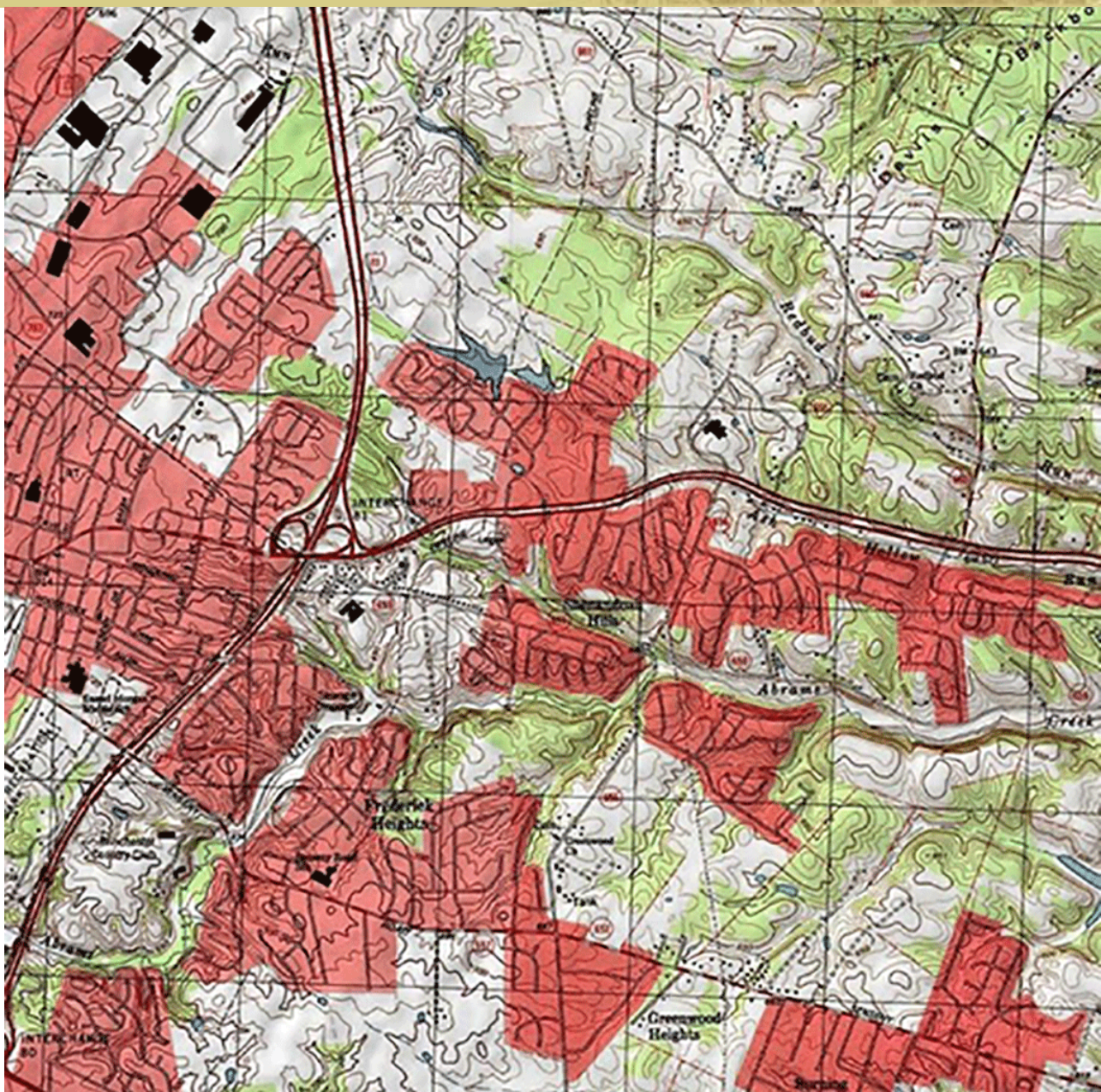


DEM Examples: NED 3m, 1/9 arc-sec

- Rarely available for Civil War battlefields
- Lots of cleanup is necessary

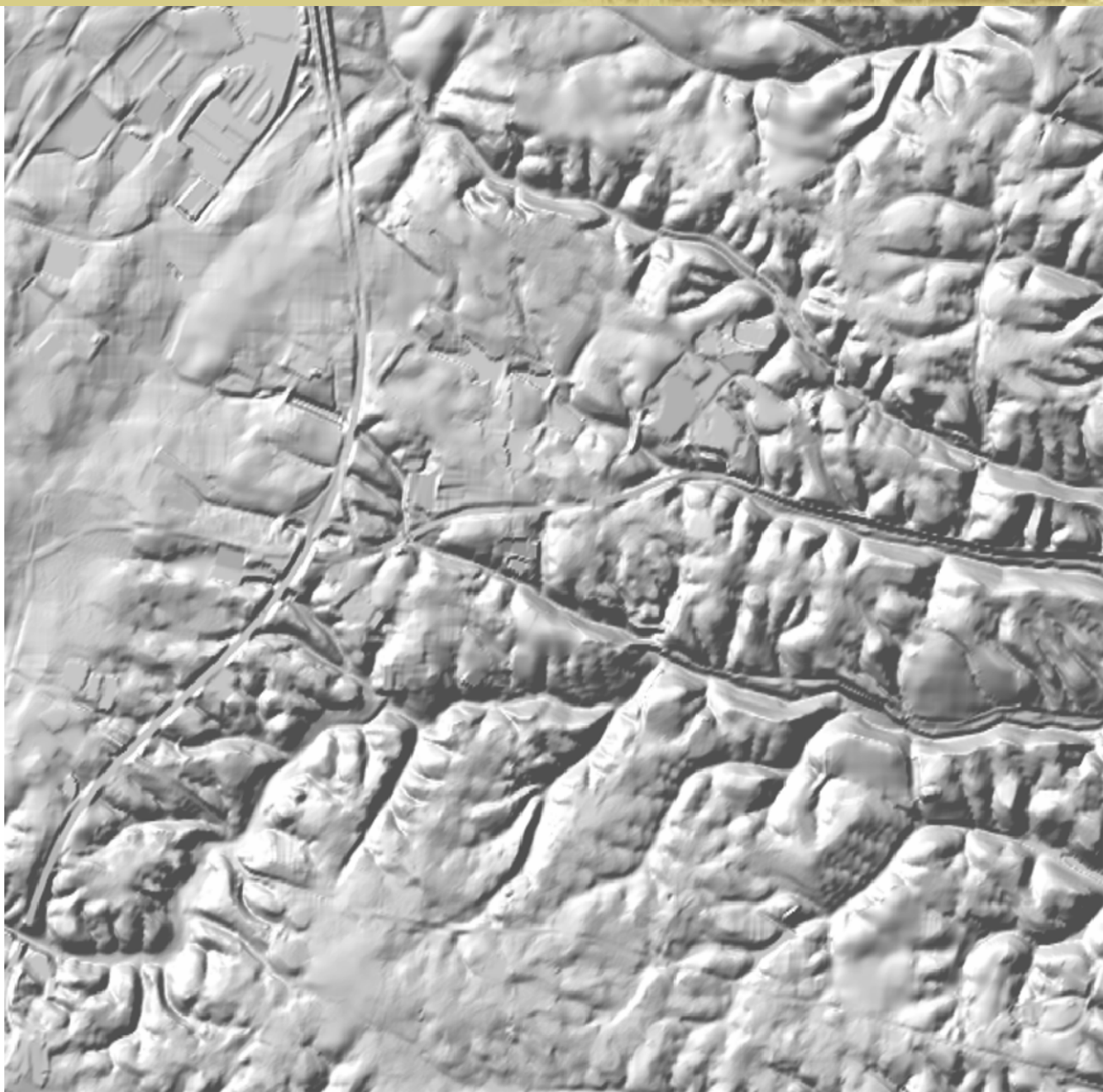


Cleanup



Third Winchester Battlefield – USGS

Cleanup, II



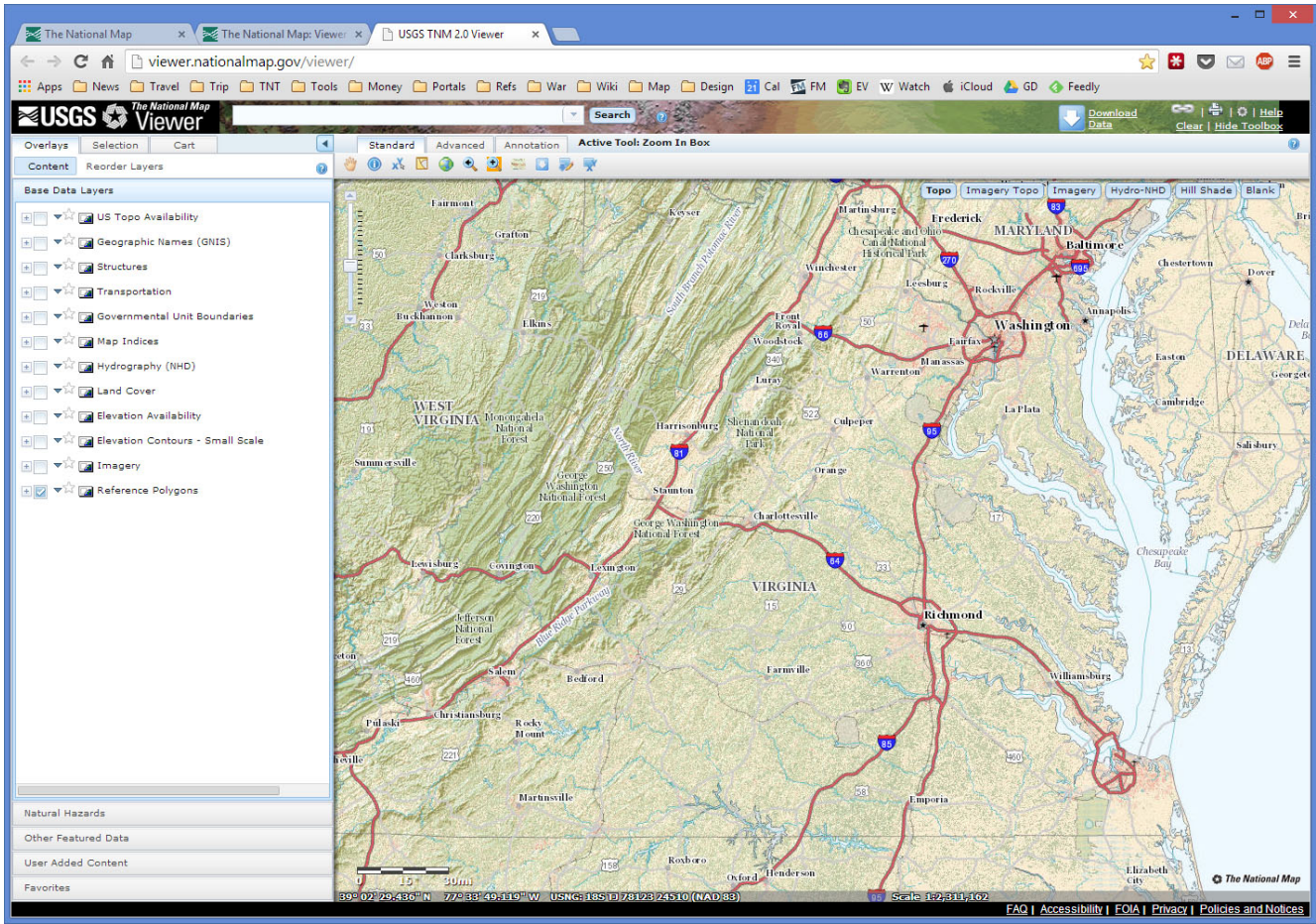
Raw Global Mapper Output, 4X

Cleanup, III

Cleanup with
Photoshop

Other Public Domain Data Sources

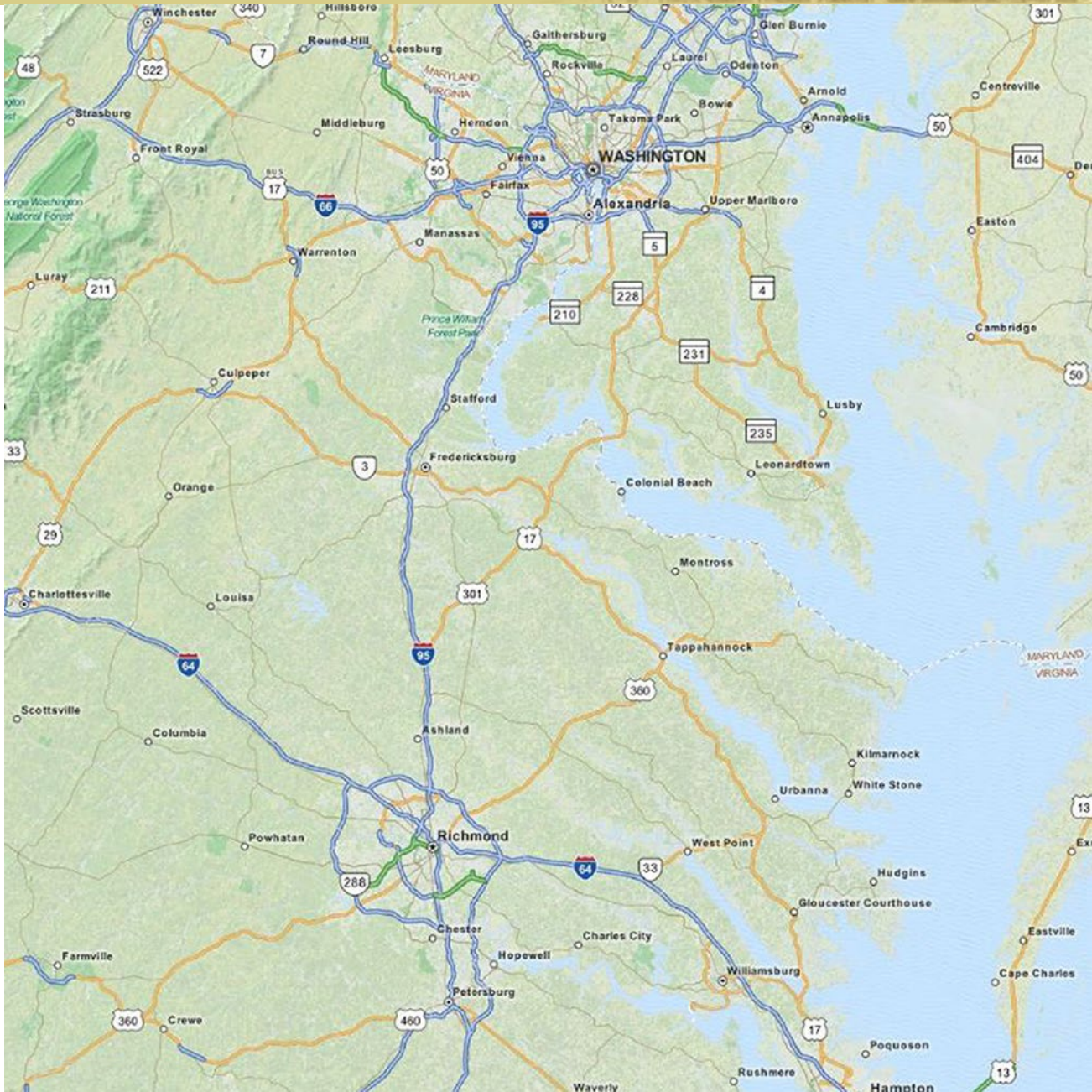
- USGS National Map
  - State and county boundaries
  - Rivers and lakes
  - Highways
  - Railroads



viewer.nationalmap.gov

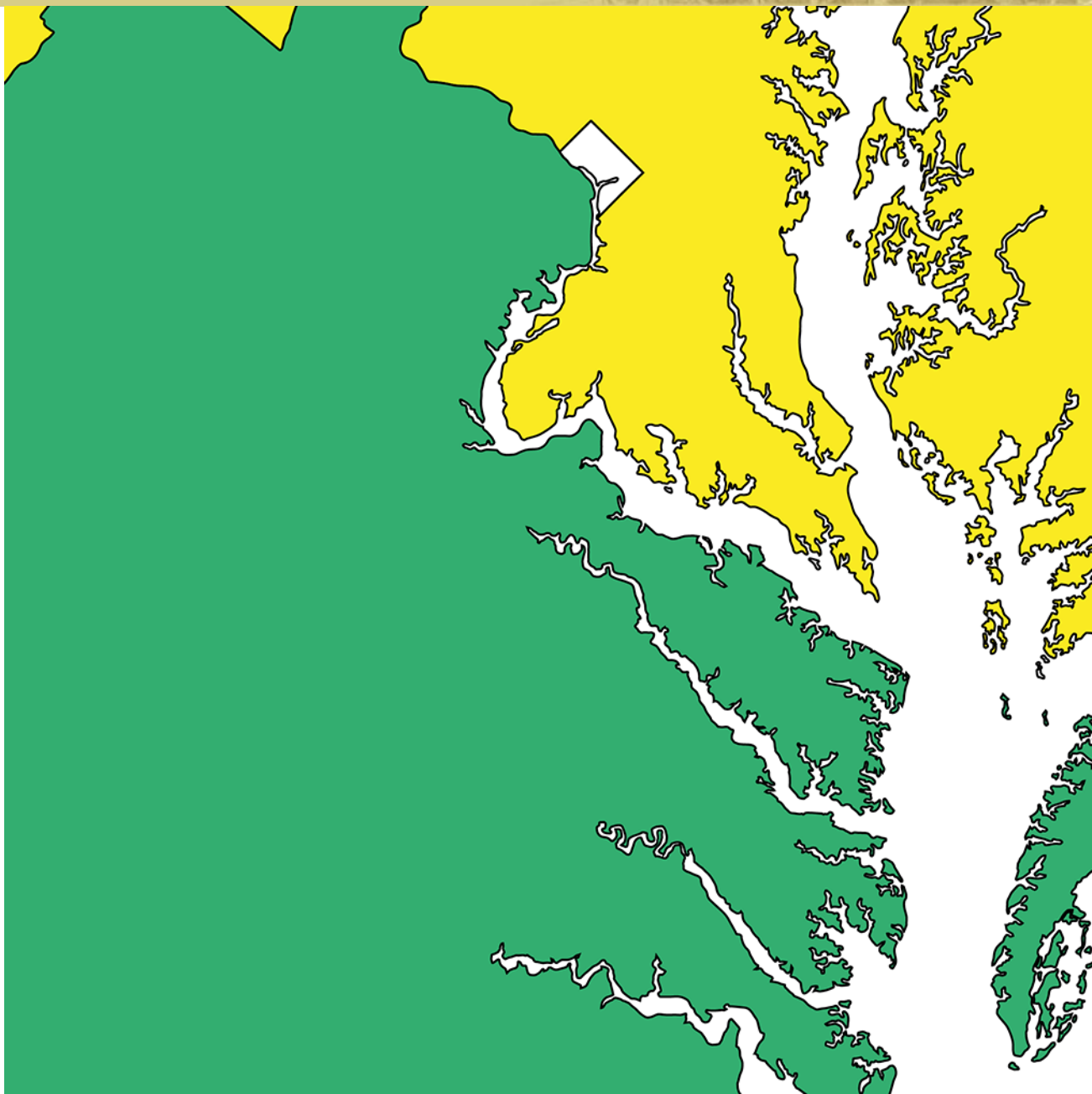
USGS National Map

- Lots of high-level data

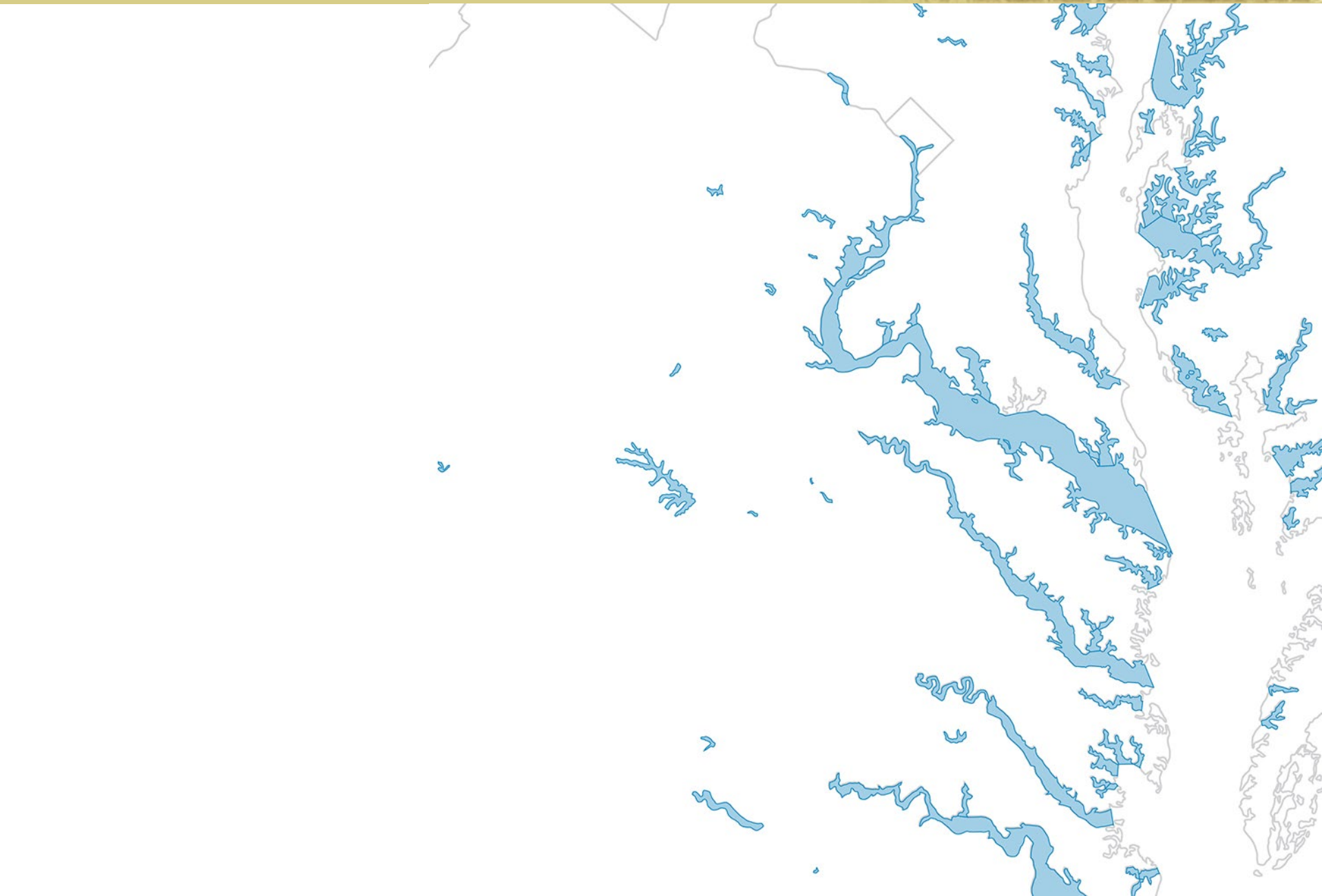


Open Street Map background

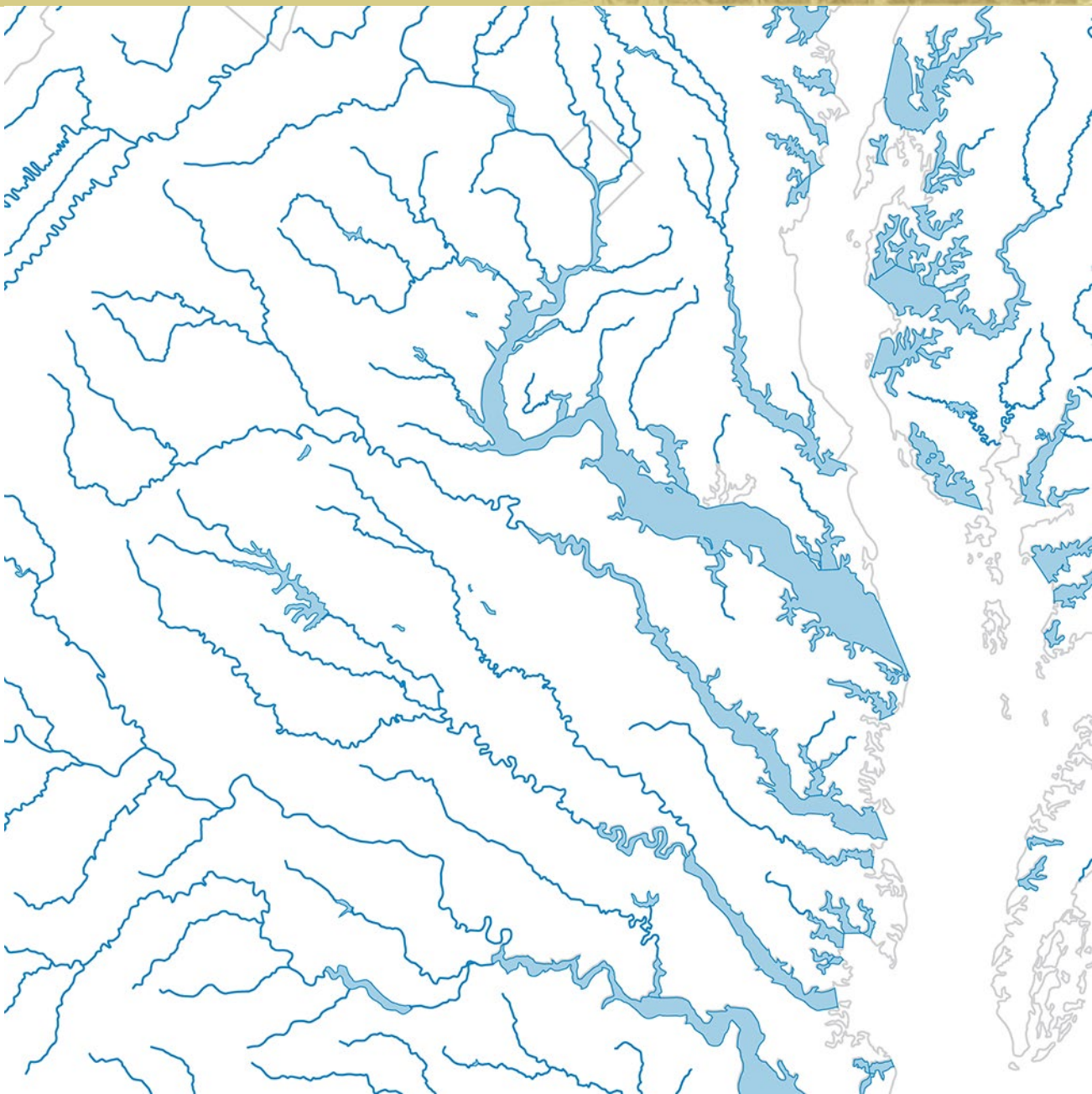
National Atlas: State Outlines



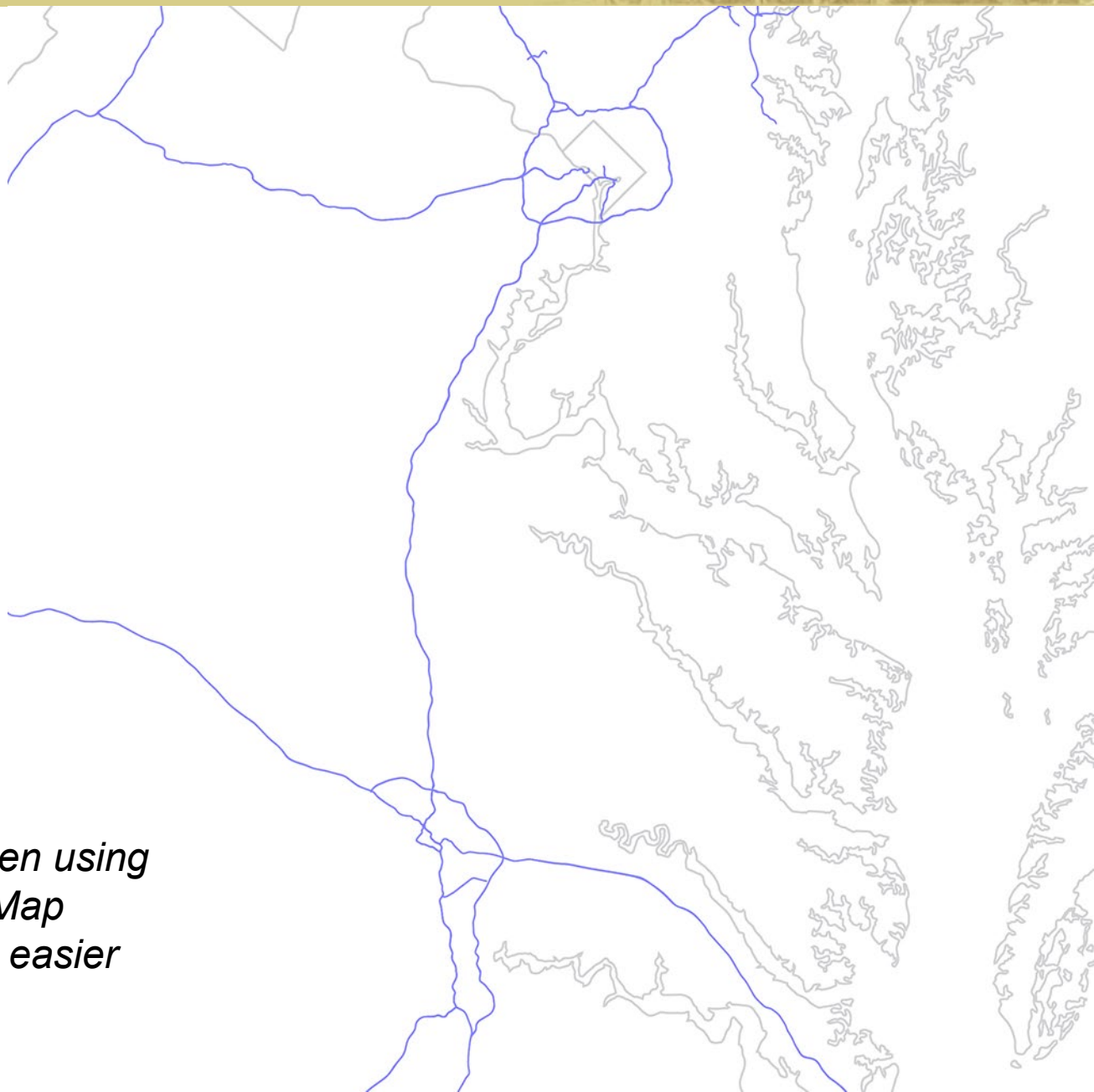
National Atlas: Lakes, Big Rivers



National Atlas: Rivers

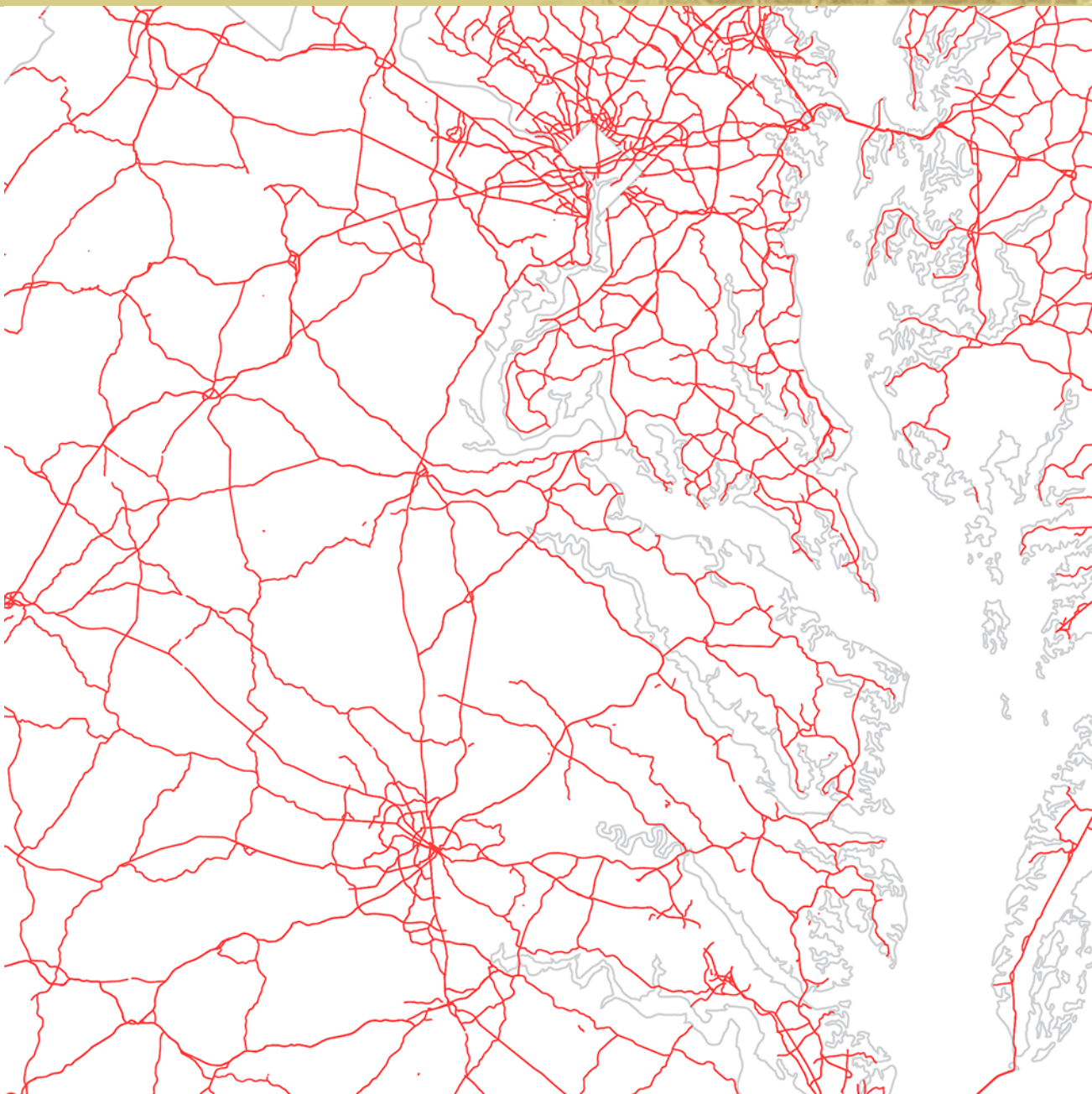


National Atlas: Primary Roads

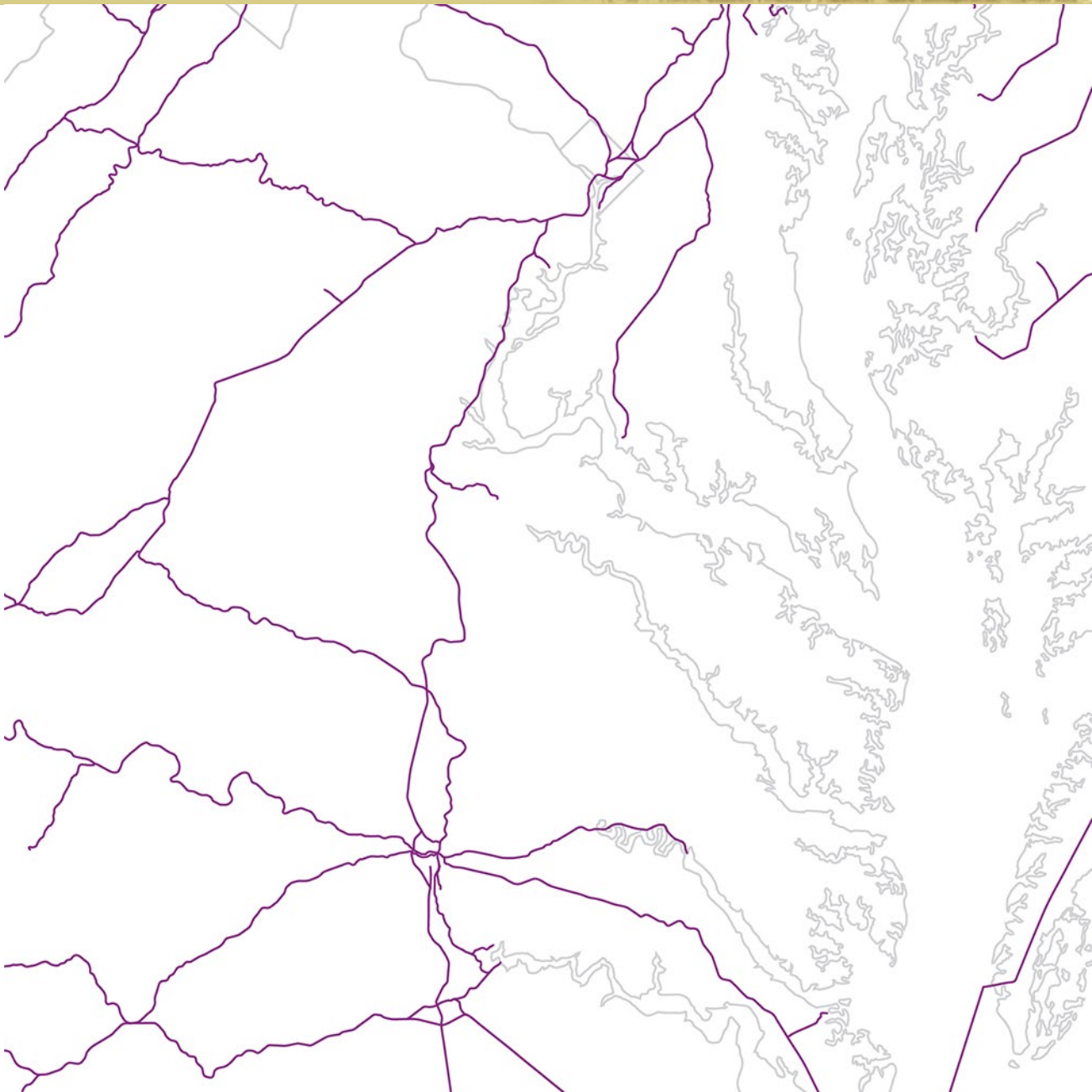


In recent years I have been using roads from Open Street Map because they are slightly easier to work with

National Atlas: Secondary Roads

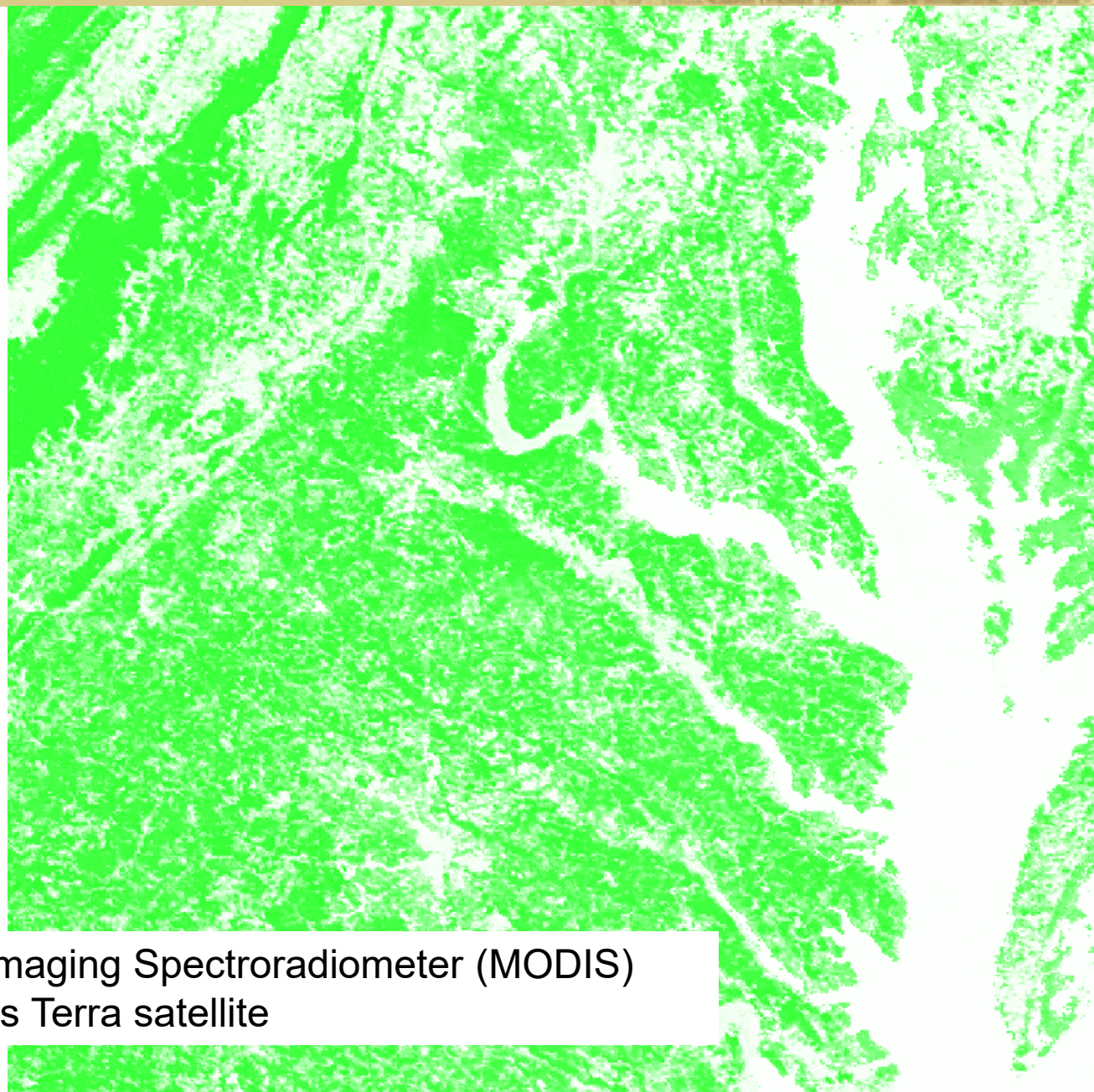


National Atlas: Railroads



Tree Cover

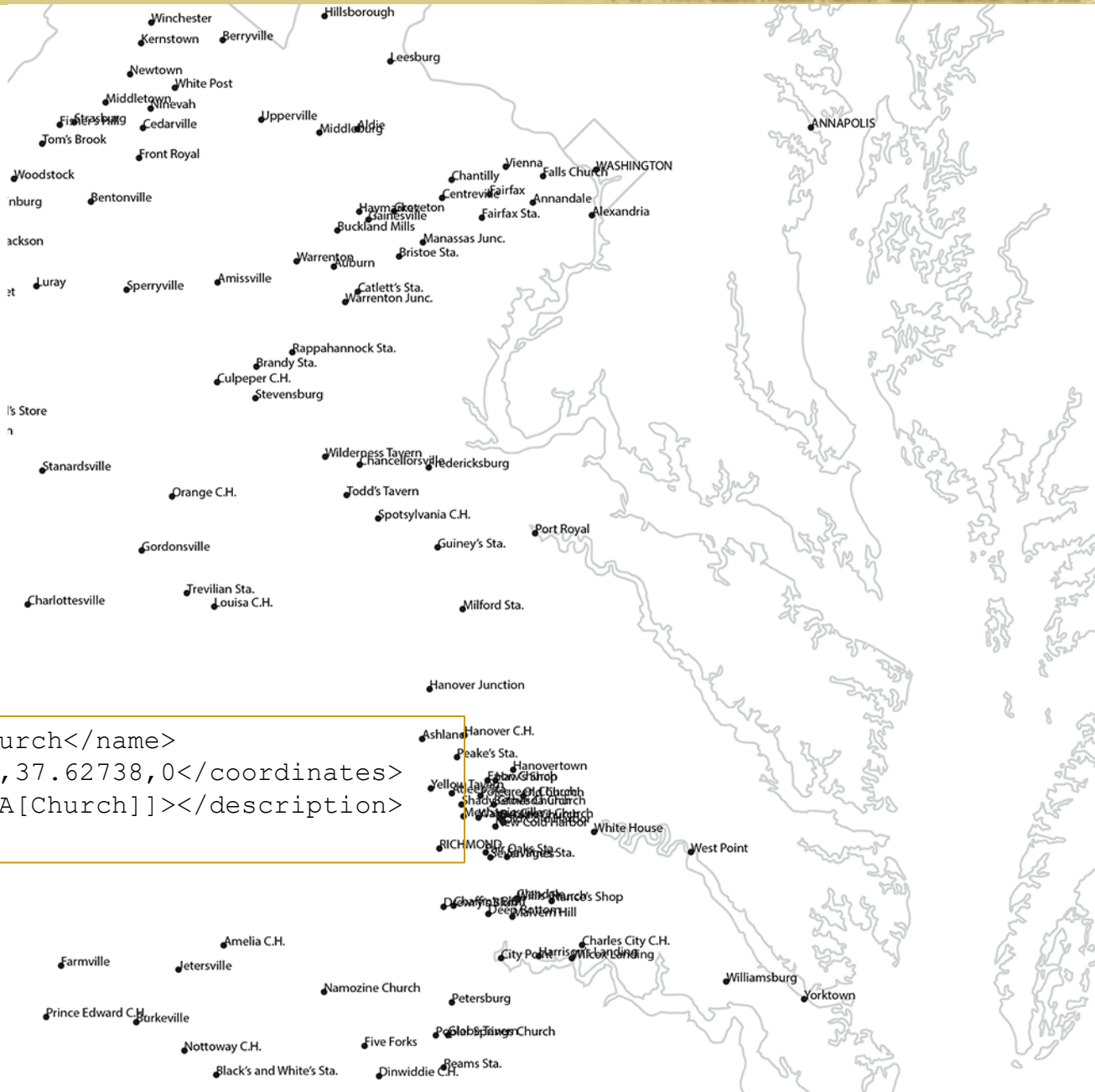
- Landsat Vegetation Continuous Fields (VCF) database
- 1 pixel = 30 meters
- Only useful for wide areas



MODerate-resolution Imaging Spectroradiometer (MODIS) sensor onboard NASA's Terra satellite

KML Data

- Raw coordinates and labels
- Easy to create in Google Earth

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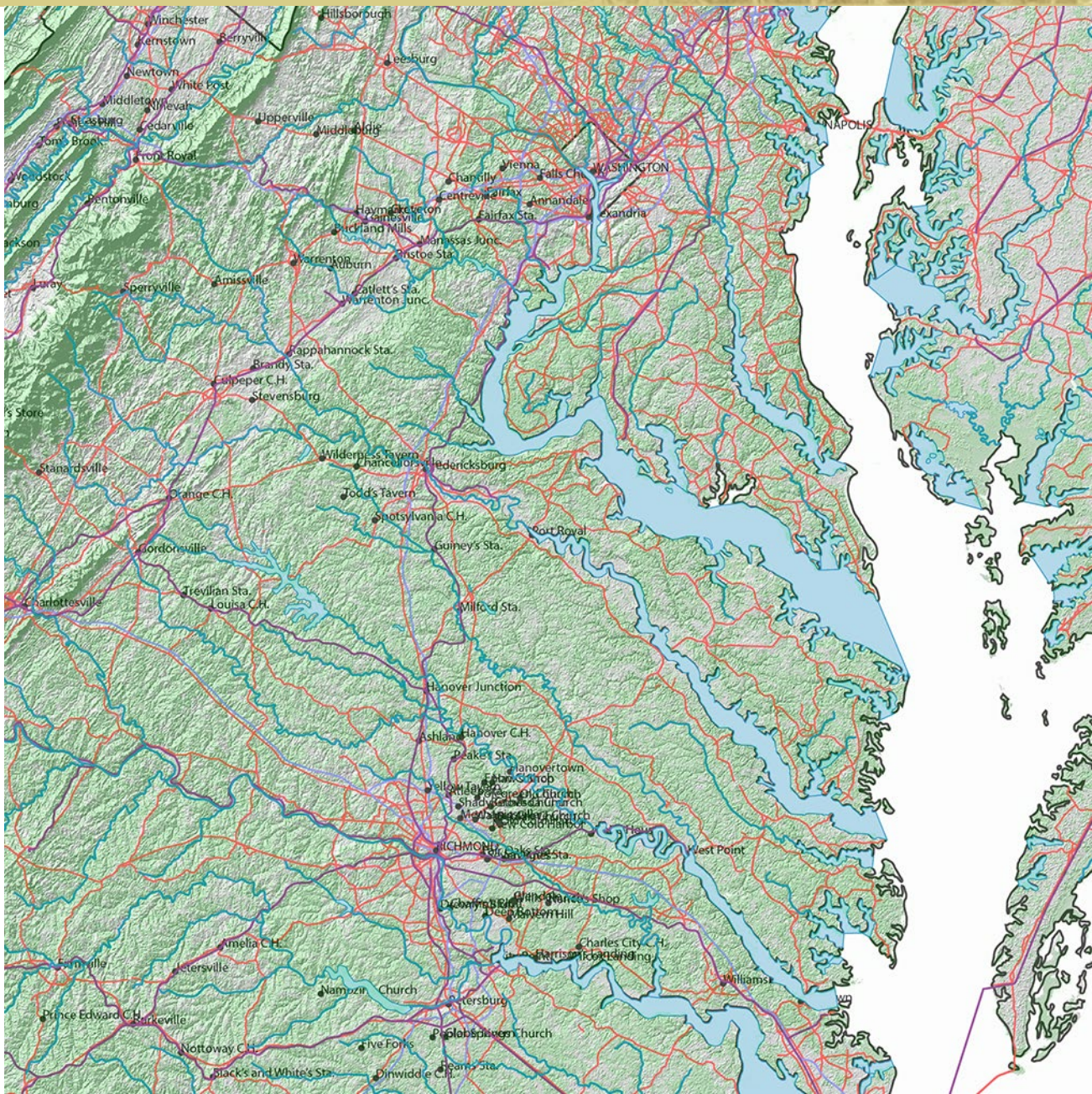
Put All the Layers Together

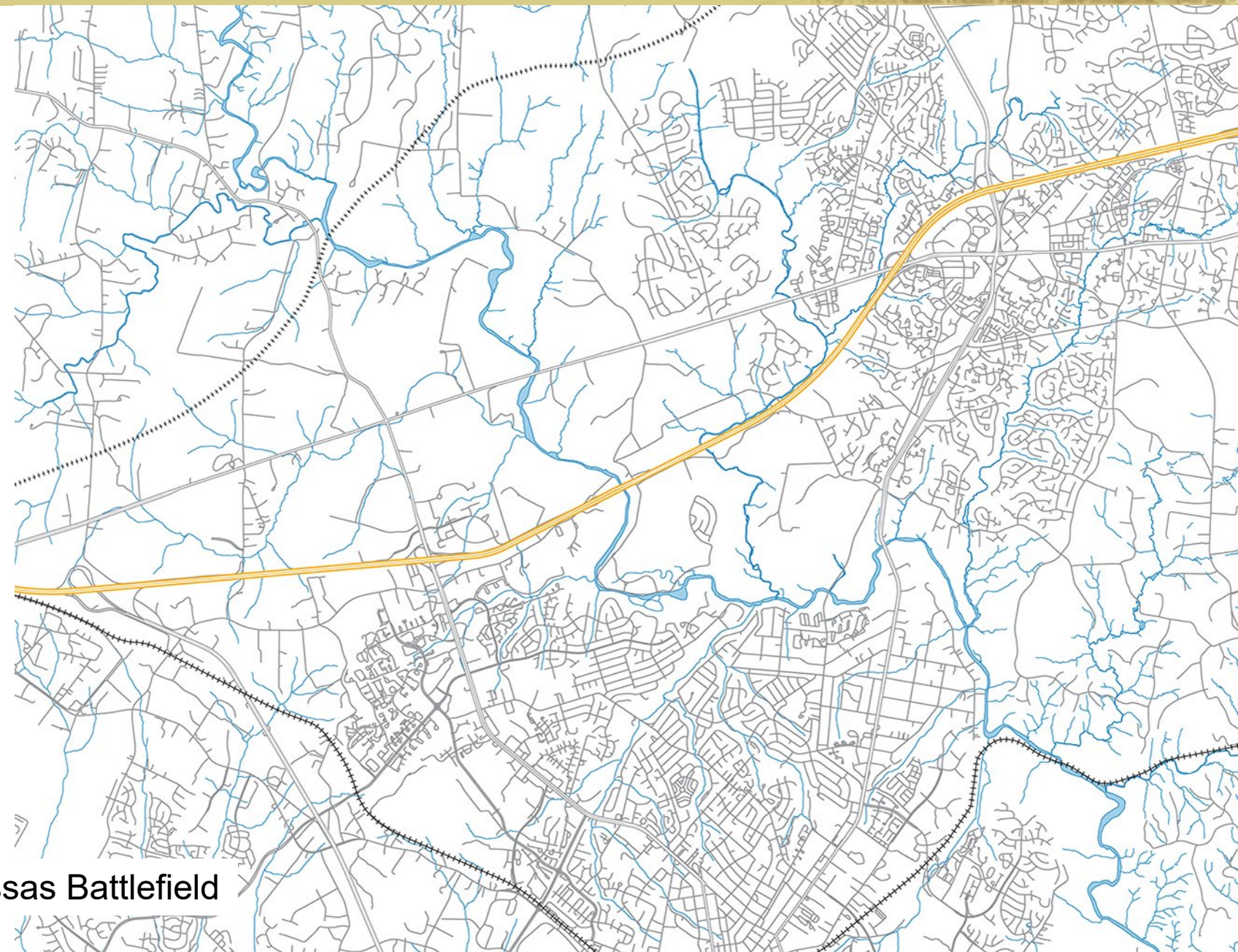
- Lots of work still required



Other Public Domain Data Sources, II

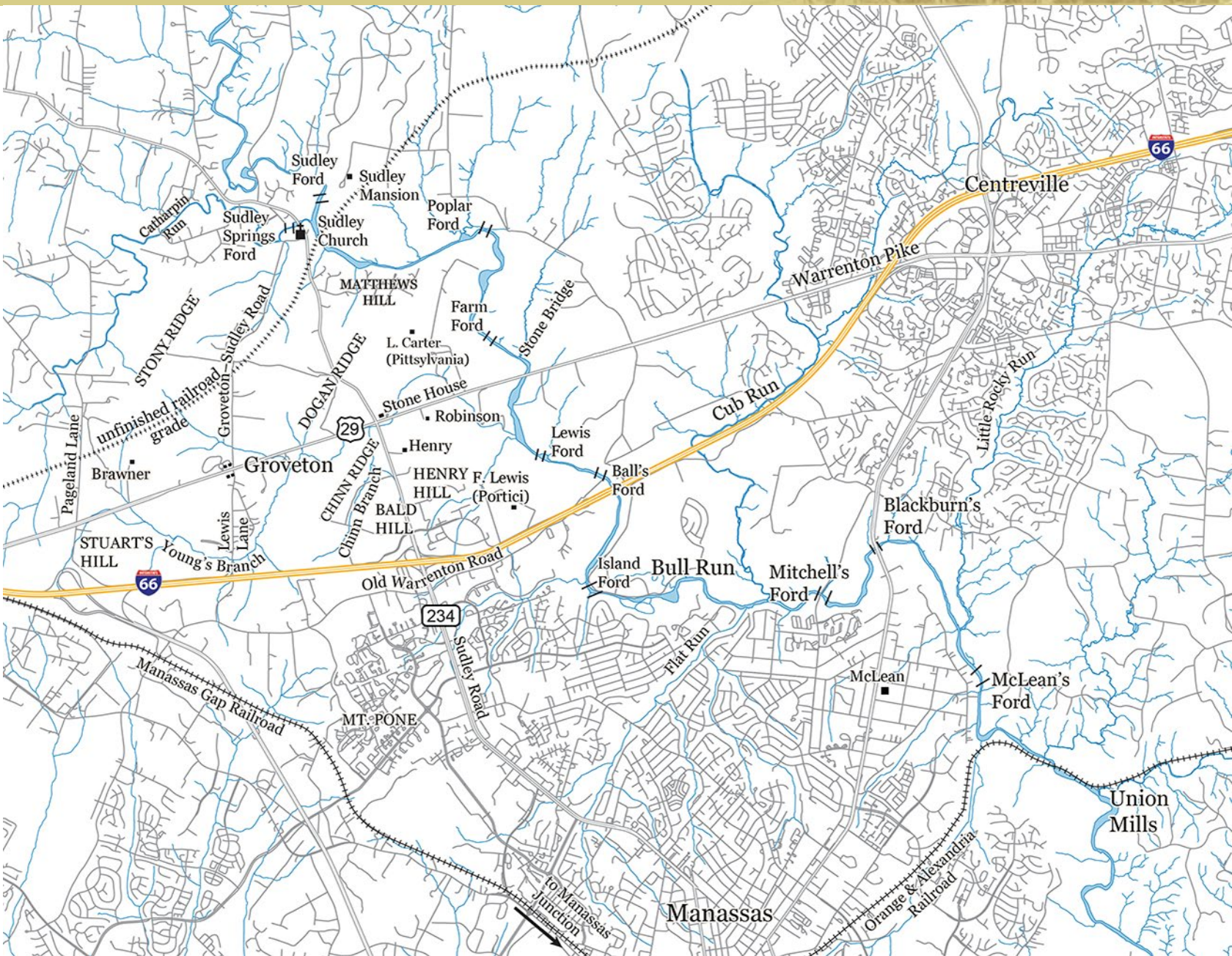
- US Census Bureau
  - "Topologically Integrated Geographic Encoding and Referencing" (TIGER)
  - County-level files, abundant detail
  - Streets, alleys, highway lanes, creeks, rivers, lakes, boundaries, power lines, etc.
- Open Street Map & Natural Earth projects
  - Similar to USGS National Atlas, but worldwide, and community supported

TIGER



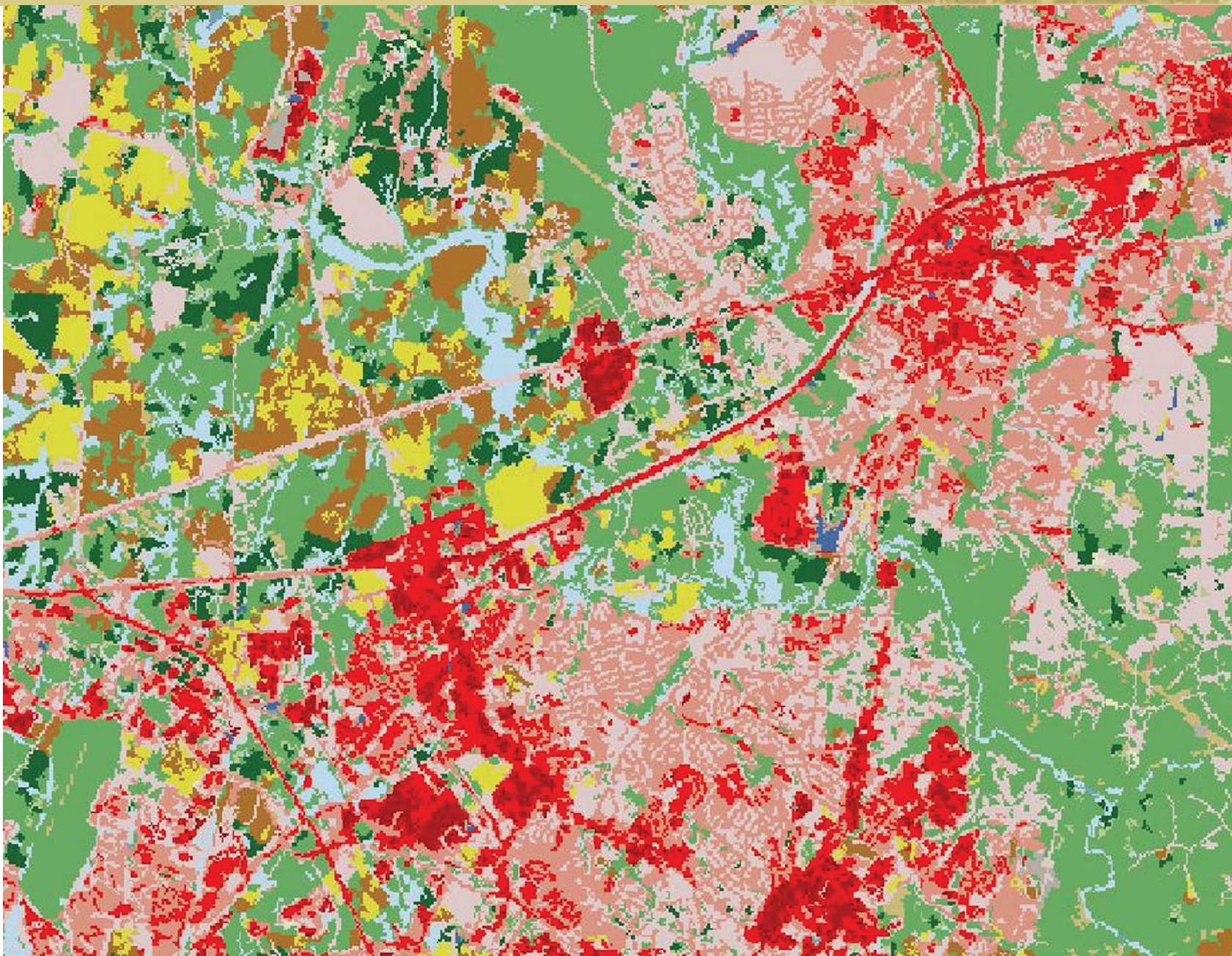
Manassas Battlefield

TIGER, II

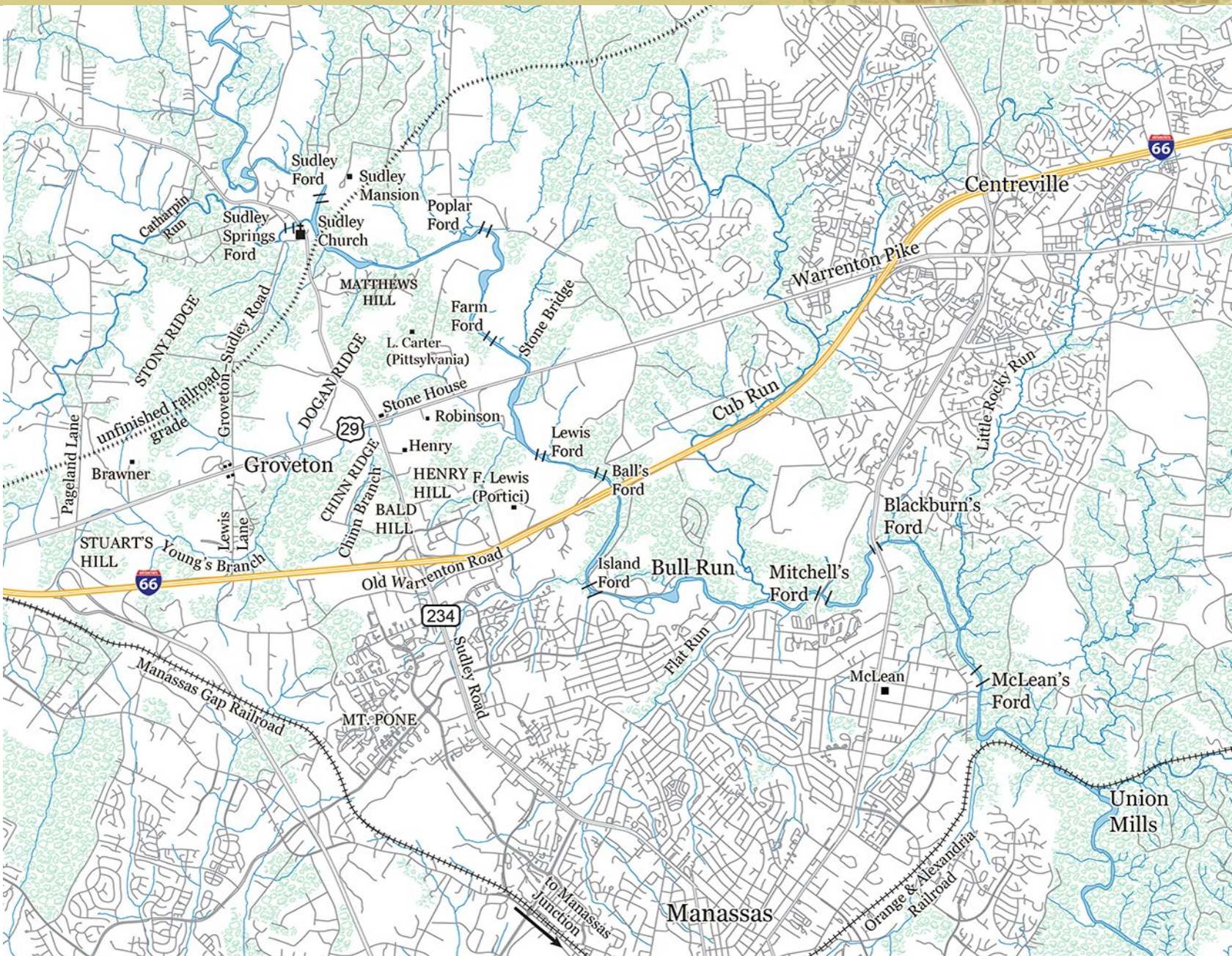


Sudley Ford
Sudley Mansion
Poplar Ford
Catharpin Run
Sudley Springs Ford
Sudley Church
MATTHEWS HILL
Farm Ford
Stone Bridge
L. Carter (Pittsylvania)
STONY RIDGE
Groveton–Sudley Road
DOGAN RIDGE
unfinished railroad grade
Stone House
Robinson
29
Henry
Lewis Ford
Ball's Ford
Pageland Lane
Brawner
Groveton
CHINN RIDGE
Chinn Branch
HENRY HILL
F. Lewis (Portici)
BALD HILL
Lewis Lane
STUART'S HILL
Young's Branch
66
Old Warrenton Road
234
Island Ford
Bull Run
Mitchell's Ford
Blackburn's Ford
Cub Run
Warrenton Pike
Centreville
Little Rocky Run
Flat Run
McLean
McLean's Ford
Sudley Road
Manassas Gap Railroad
MT. PONE
Union Mills
to Manassas Junction
Manassas
Orange & Alexandria Railroad

National Land Cover Database



TIGER, III



Sudley Ford
Sudley Mansion
Poplar Ford
Catharpin Run
Sudley Springs Ford
Sudley Church
MATTHEWS HILL
Farm Ford
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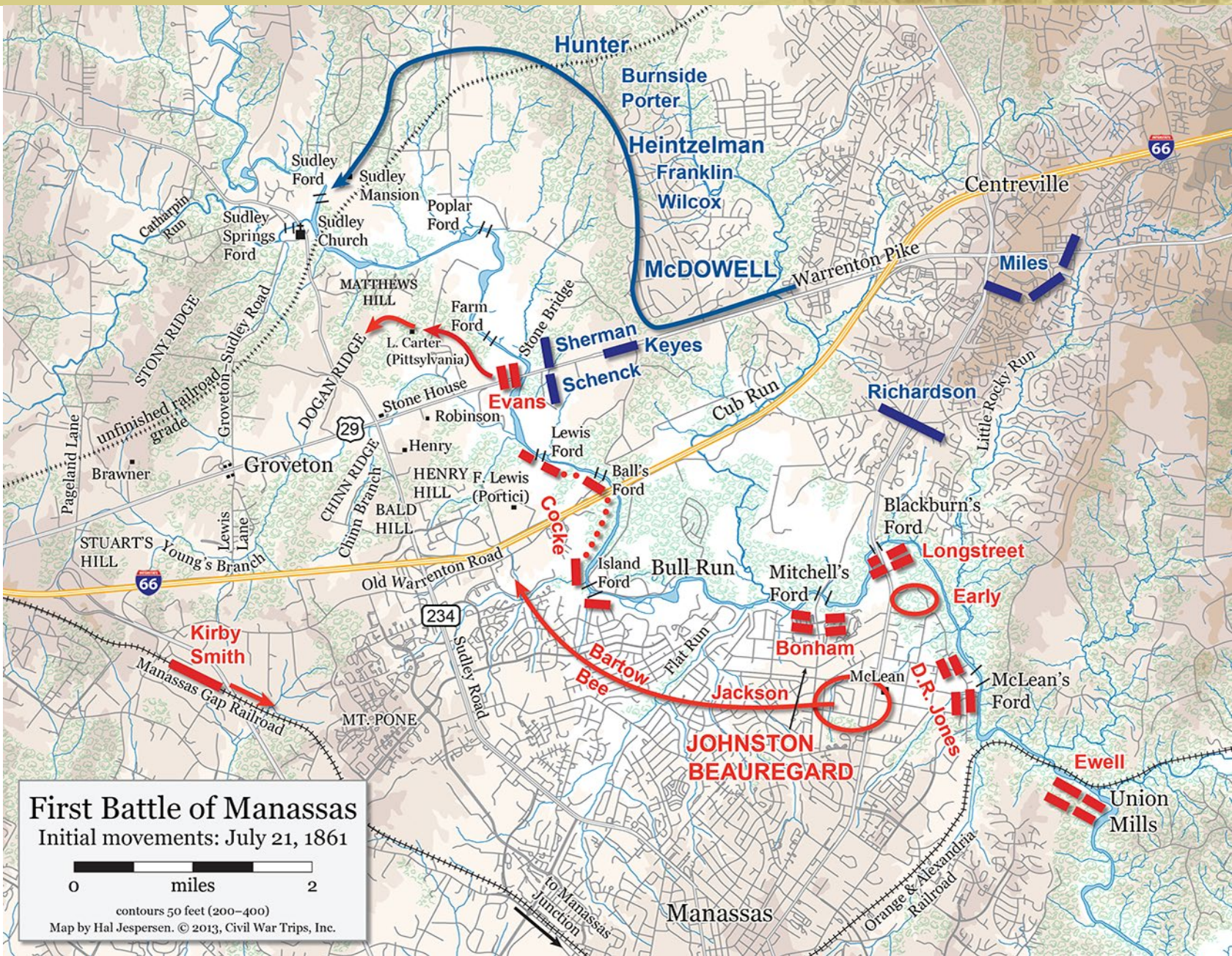
Little Rocky Run
Flat Run
Sudley Road
McLean
McLean's Ford
Manassas Gap Railroad
MT. PONE
Union Mills
to Manassas Junction
Manassas
Orange & Alexandria Railroad

TIGER, IV


Hunter
Burnside
Porter
Heintzelman
Franklin
Wilcox
McDOWELL
Sherman
Keyes
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Evans
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Bartow
Bee
Jackson
JOHNSTON
BEAUREGARD
Kirby
Smith
Miles
Richardson
Longstreet
Early
Bonham
D.R. Jones
Ewell
Sudley Ford
Sudley Mansion
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STONY RIDGE
DOGAN RIDGE
CHINN RIDGE
Chinn Branch
Pageland Lane
unfinished railroad grade
Groveton–Sudley Road
Lewis Lane
Manassas Gap Railroad
Orange & Alexandria Railroad
Union Mills
66
29
234
First Battle of Manassas
Initial movements: July 21, 1861
0 miles 2
contours 50 feet (200–400)
Map by Hal Jespersen. © 2013, Civil War Trips, Inc.

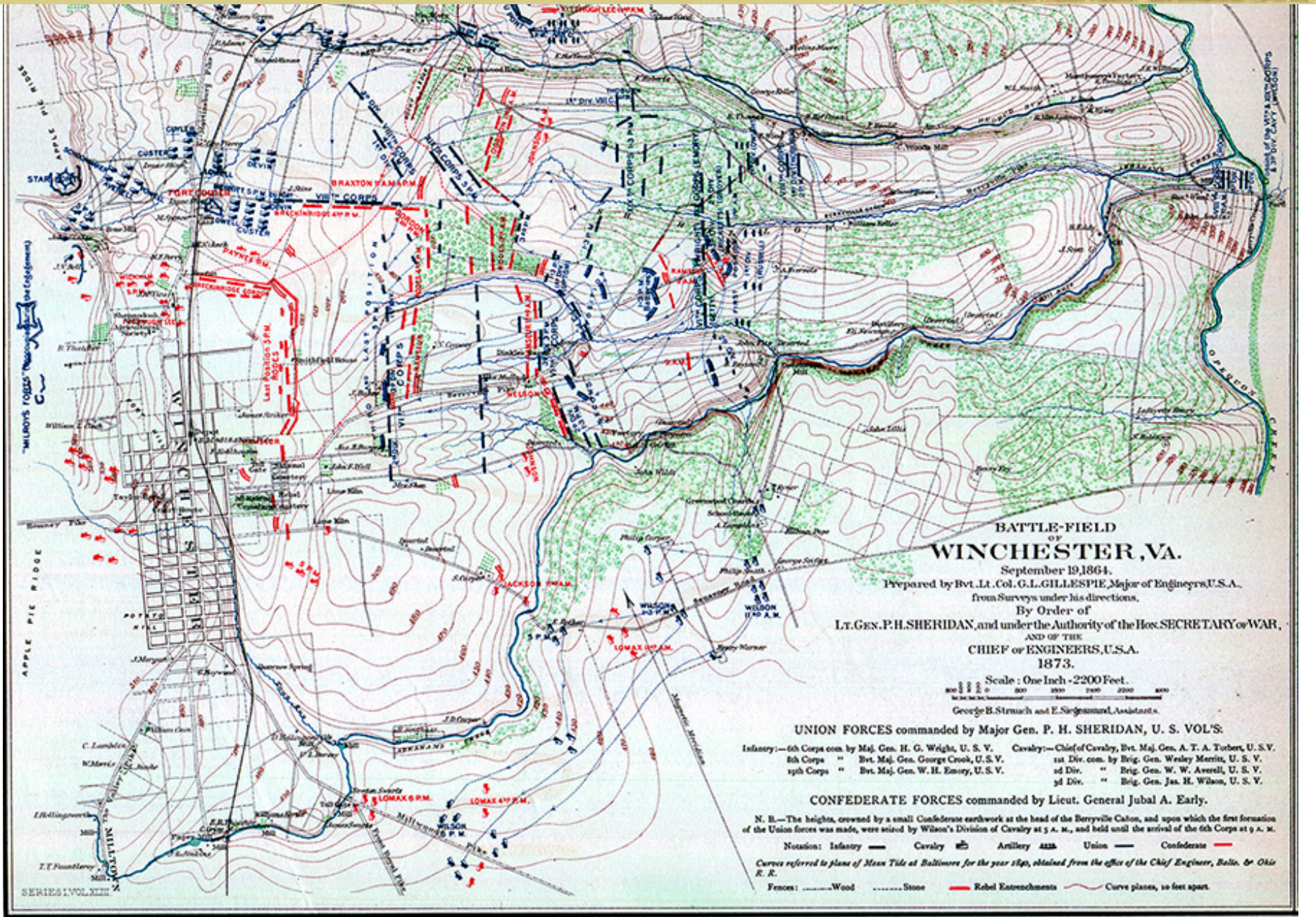
Outline

- My history in mapmaking
- Famous cartographers who influenced me
- How I work with authors
  - Determining content
  - Publication challenges and issues
- Mapmaking tools and workflow
- Technical aspects of cartography: projection, elevation, data sources
- Accuracy of 19c maps

How to Represent 19th Century?

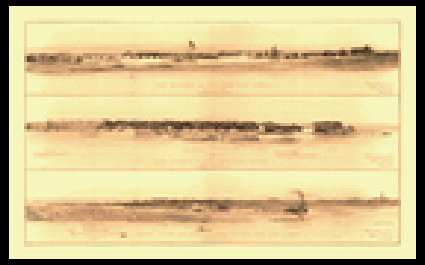
- Lots of things have changed since 1861–65, which makes maps challenging
  - Elevations (freeways and land leveling/filling)
  - River courses (meanders, dams)
  - Tree cover
  - Roads and railroads
  - Town names and boundaries
- Historic maps are usually not accurate enough to translate directly onto the real terrain
- “Geo-Referencing” required

Lt. Col. G. L. Gillespie, USA

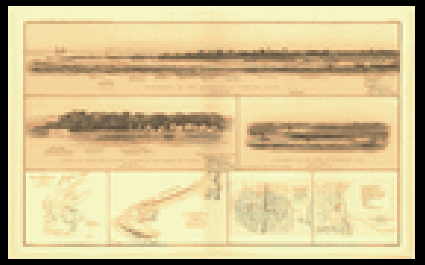


Official Records Atlas

- Now online in high resolution from the Library of Congress



Pl. I: Fort Moultrie, Fort Johnson and Morris Island and Cummings Point



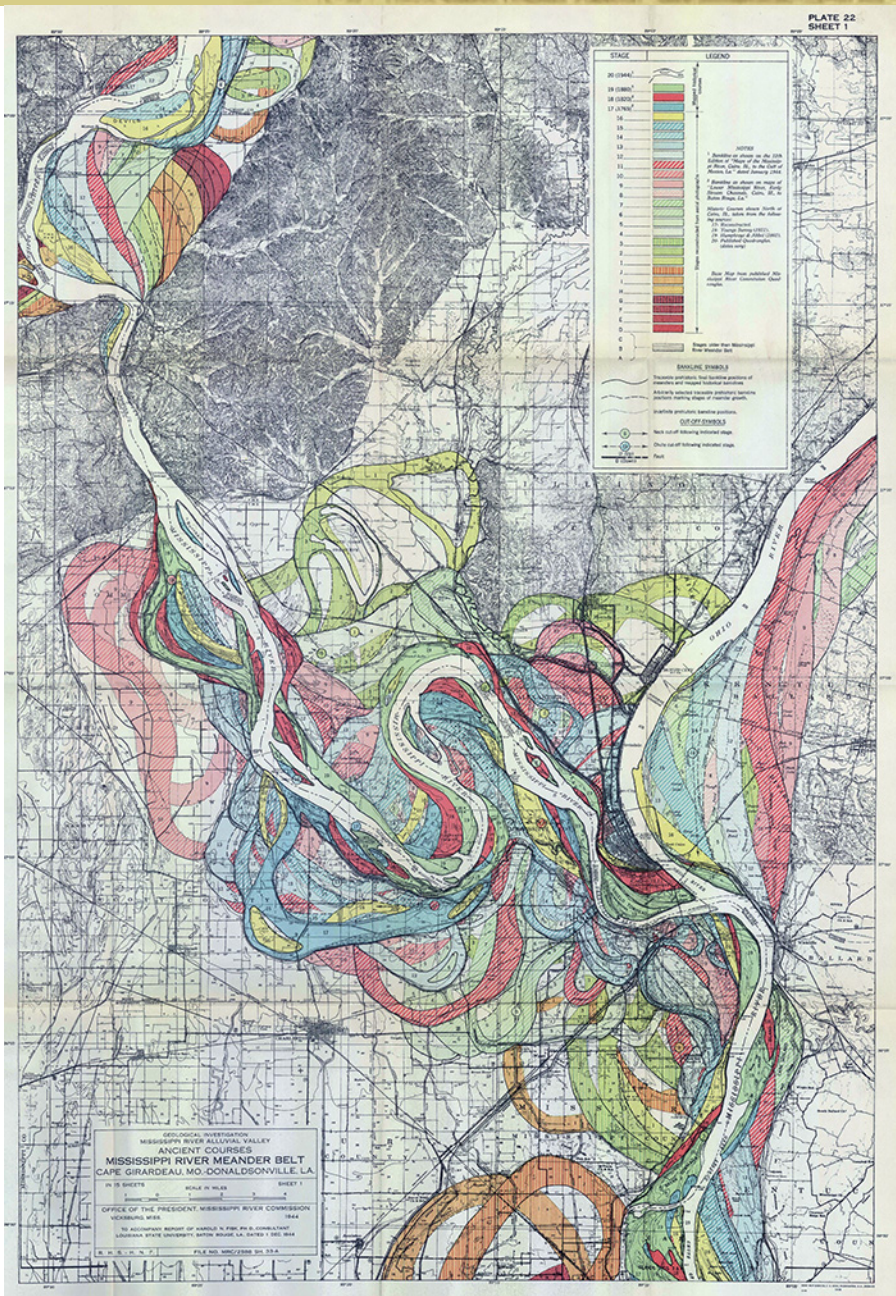
Pl. II: Cummings Point, Fort Johnson, West Virginia, Rich Mountain, Camp Garrett, and Rich Mt. Battlefield

Pl. VI: Washington (DC), Paducah (KY), Mill Springs (KY), Logan's Cross Roads (KY)

Pl. VII: Northeastern Virginia and the Vicinity of Washington - 1

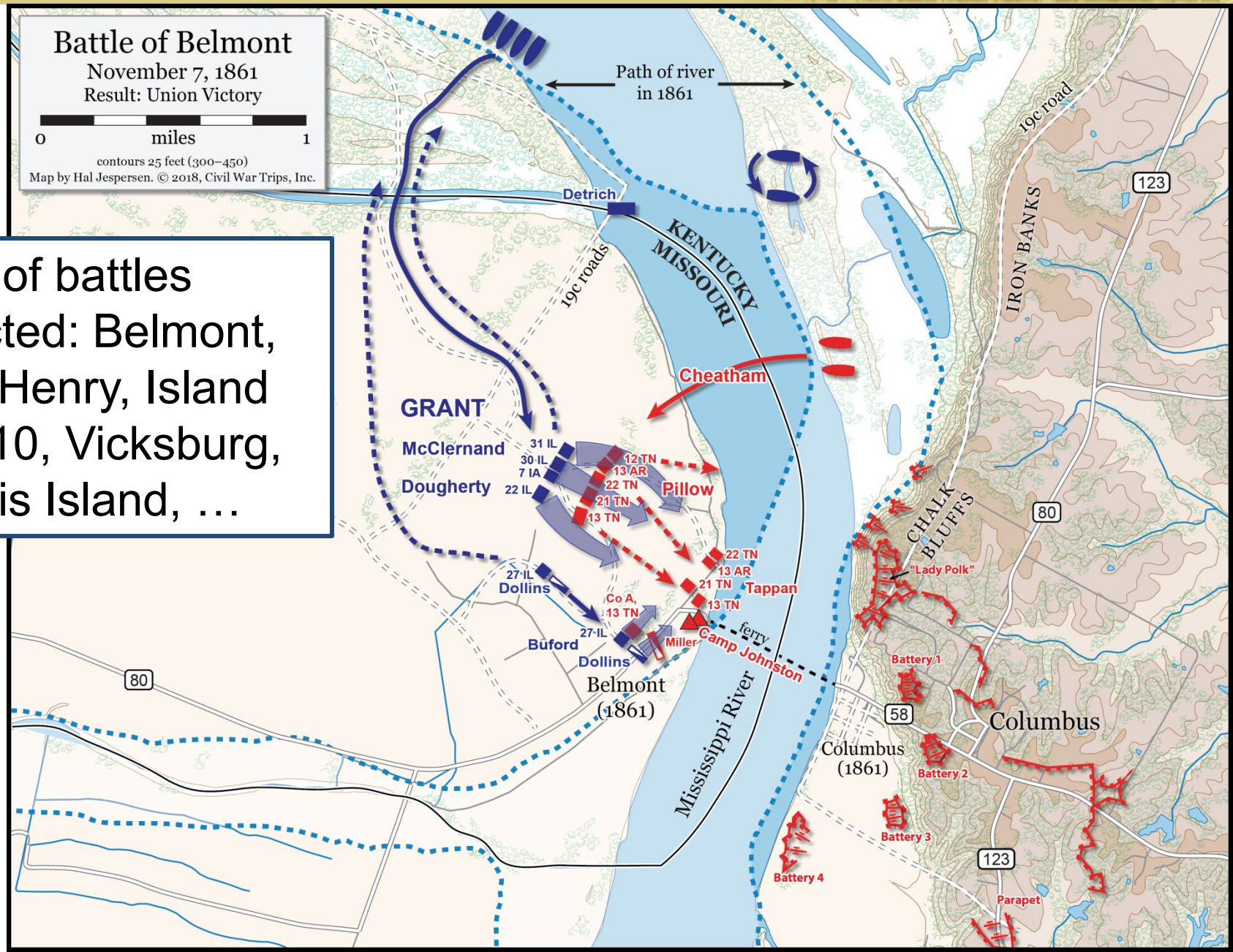
Rivers

- Most small rivers stick to their valley courses
- Mississippi River the most dramatic example of course changes
- Unfortunately, state boundaries were established at one point in time, and the river has moved on



Harold Fisk's 1944 map

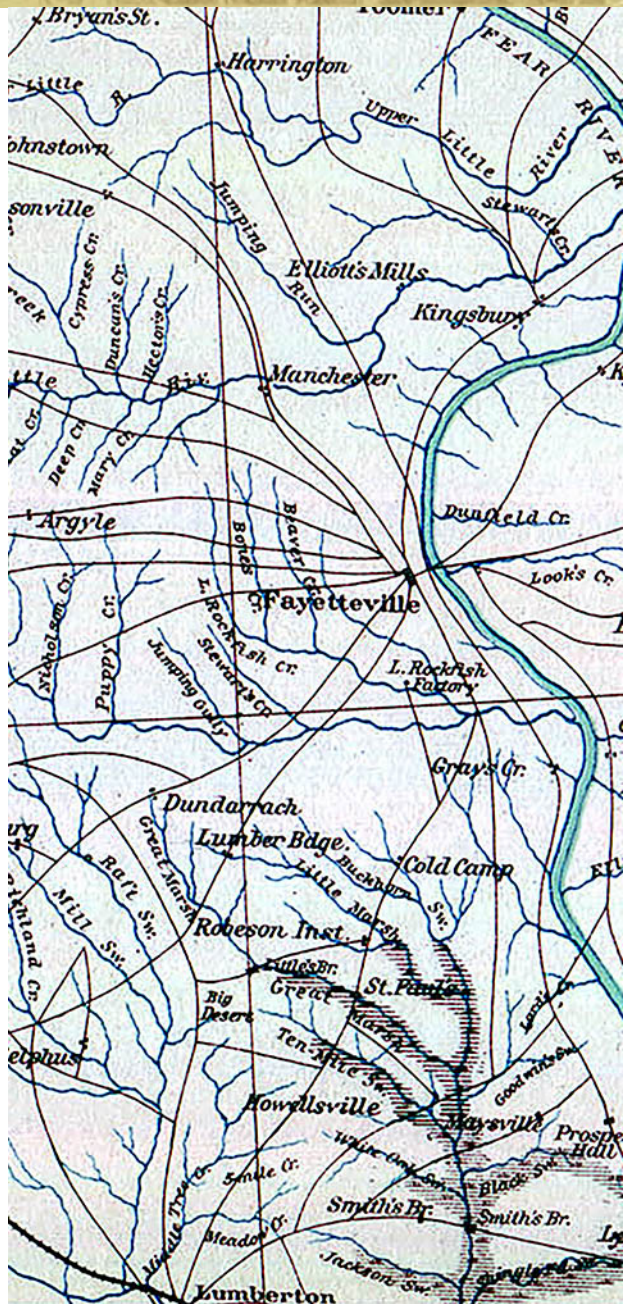
Rivers, II



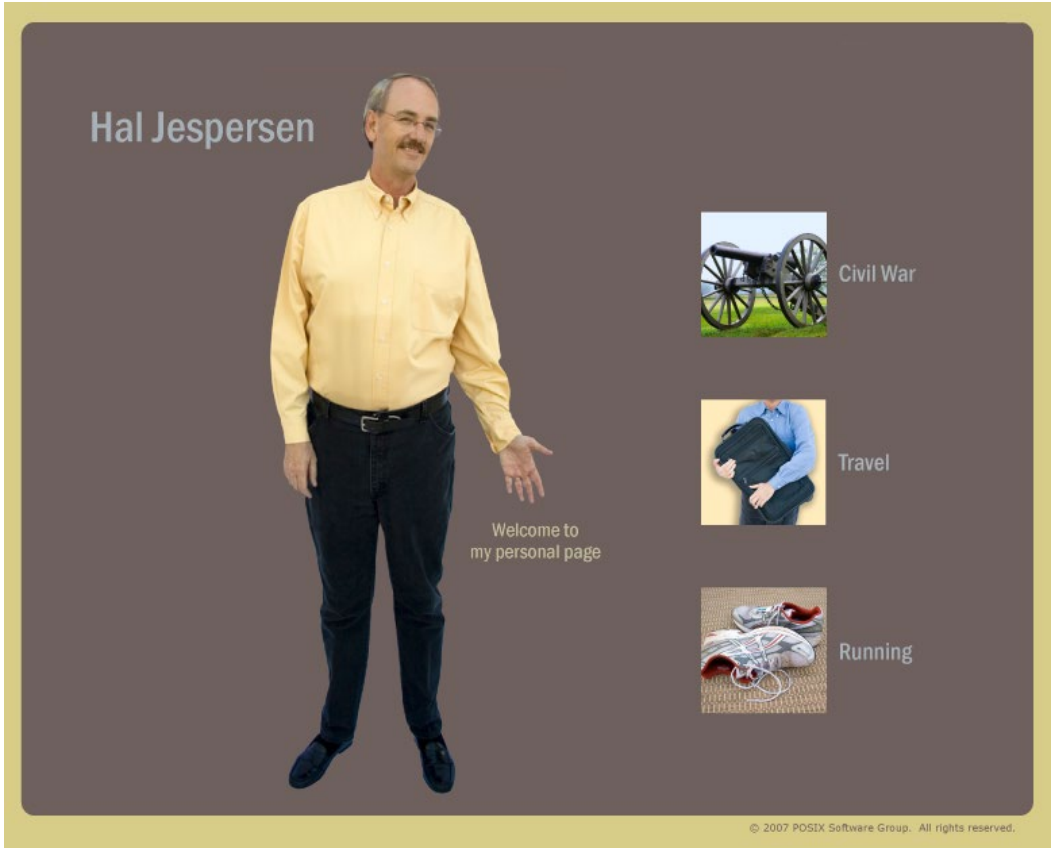
Lots of battles affected: Belmont, Fort Henry, Island No. 10, Vicksburg, Morris Island, …

Roads and Railroads

- Historic maps are often not accurate concerning roads
  - Stylistic, ignore terrain
- Depending on scale of the map, modern state highways may be useful surrogates
- Railroad tracks are often in the same place



OR Atlas, plate 138

Thank you

- See my maps at http://www.CWMaps.com
- CW travelogues at http://www.posix.com
  - Friend me on Facebook to hear about updates
- These cartography slides are on the Old Baldy website