Fox Hills Sandstone

Reservoir Geometry

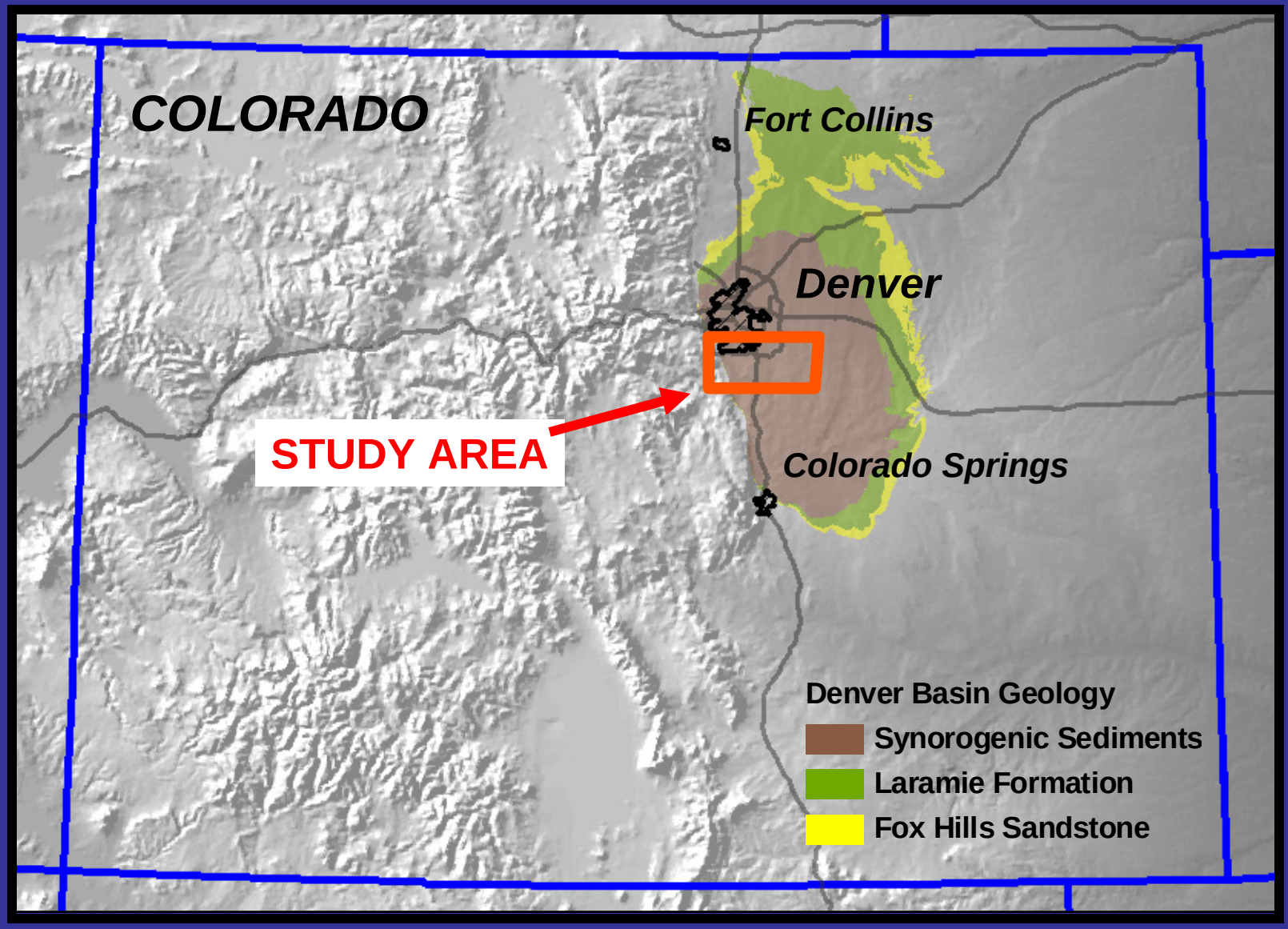
Control on Aquifer Quality

Marieke Dechesne & Bob Raynolds

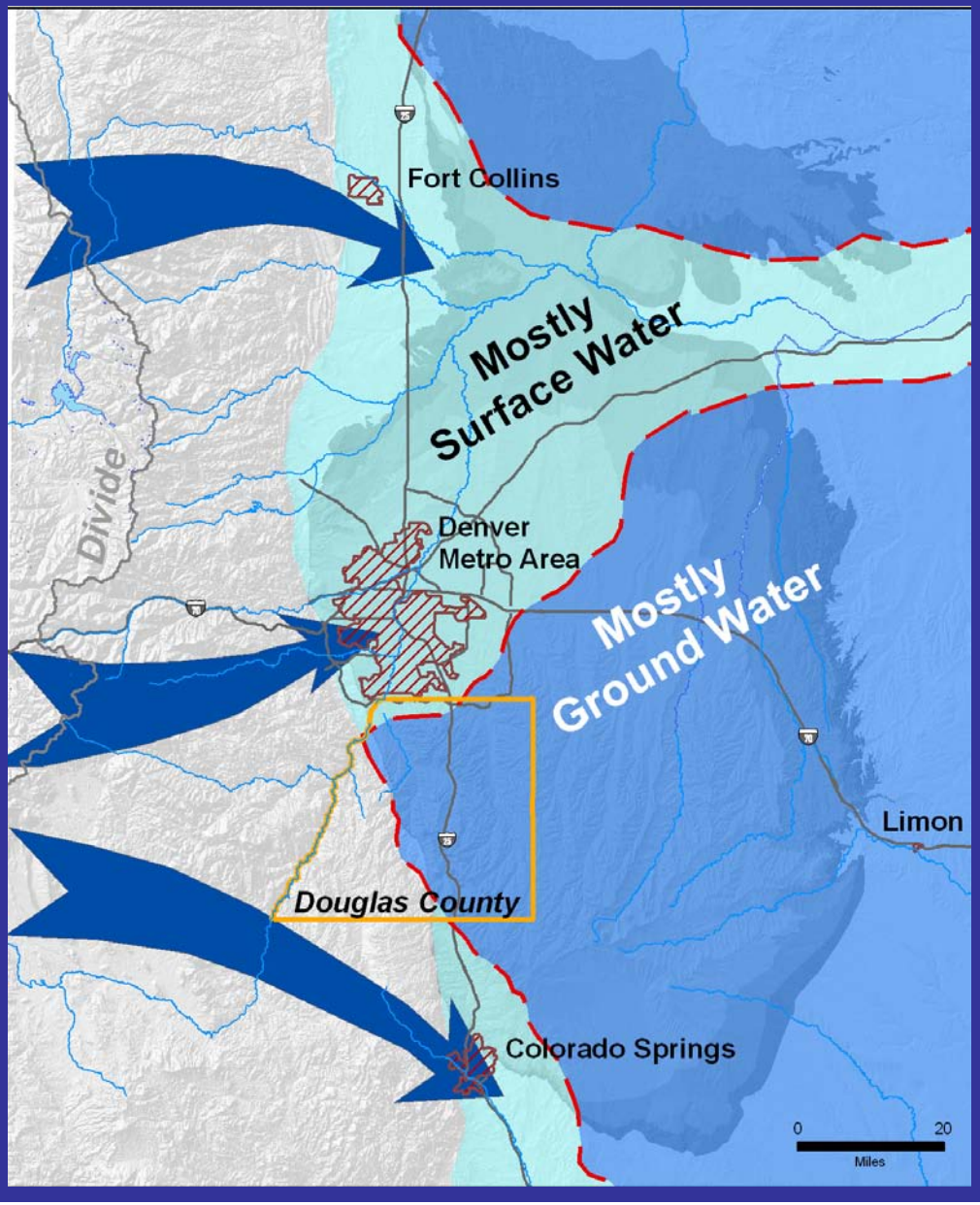
Fox Hills Sandstone

- Where and Why?
- Geometry & Stacking Pattern
- Reservoir Architecture
  - Ground Water Resources:
    - Quantity
    - Quality

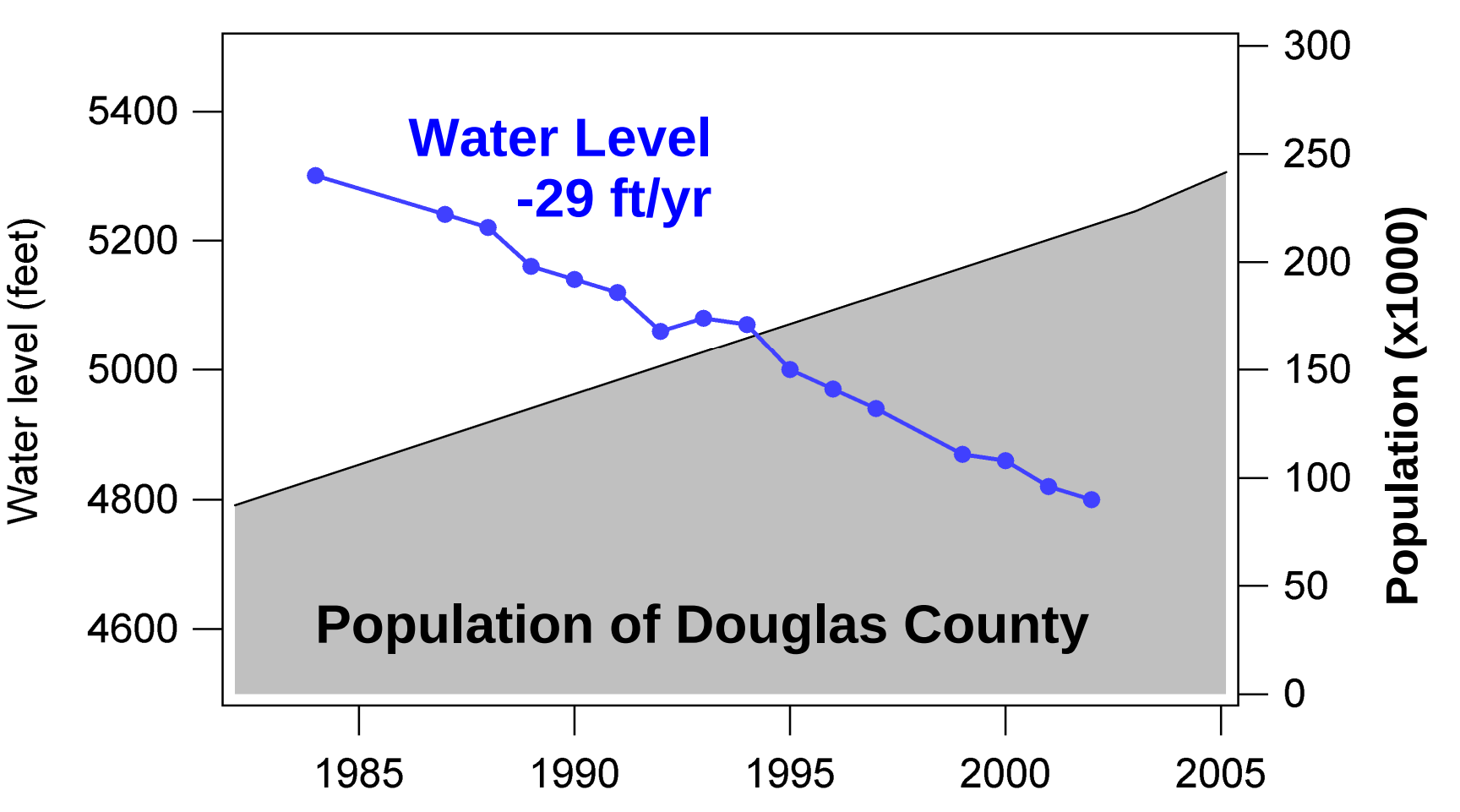
Denver Basin



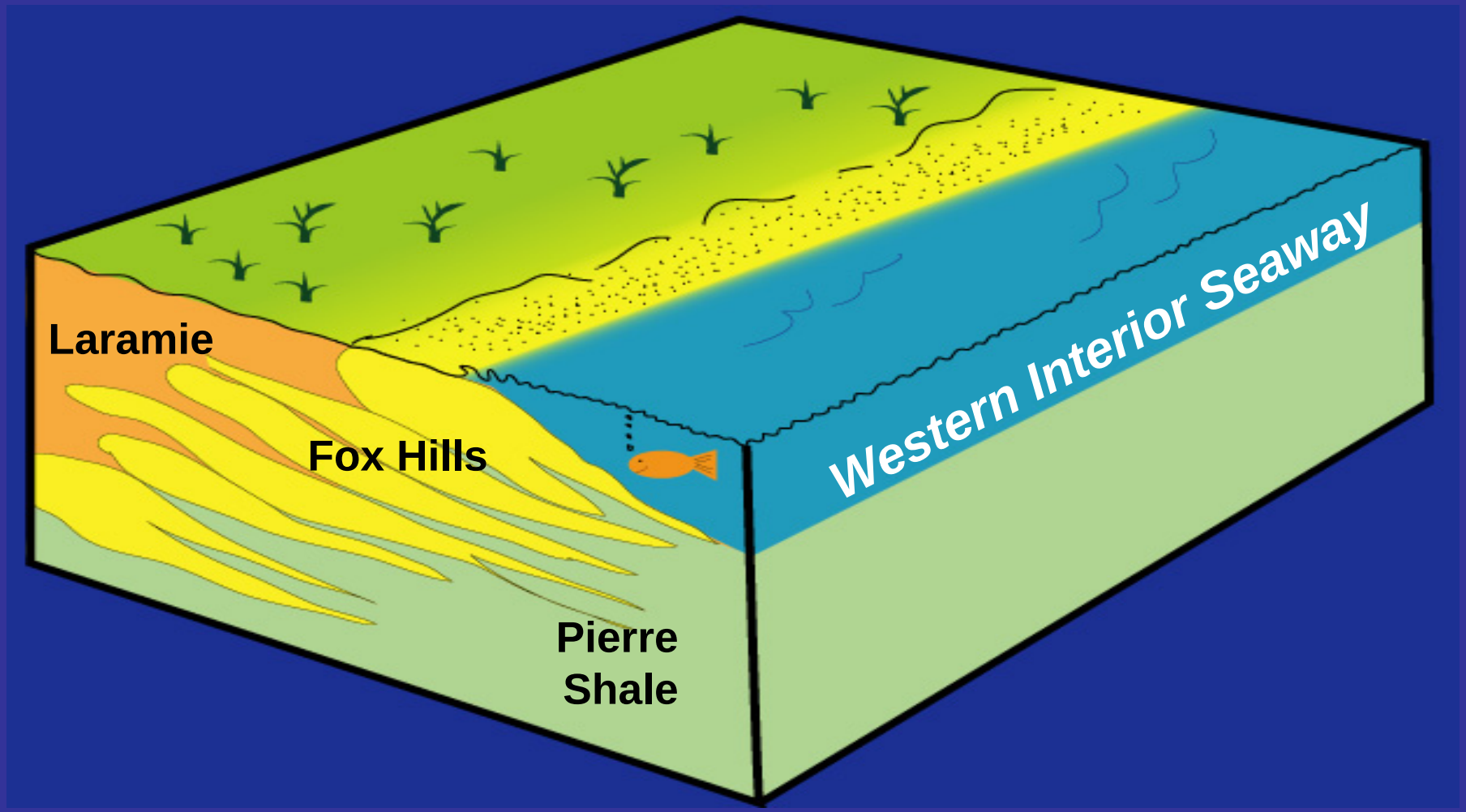
Where Does Your Water Come From?



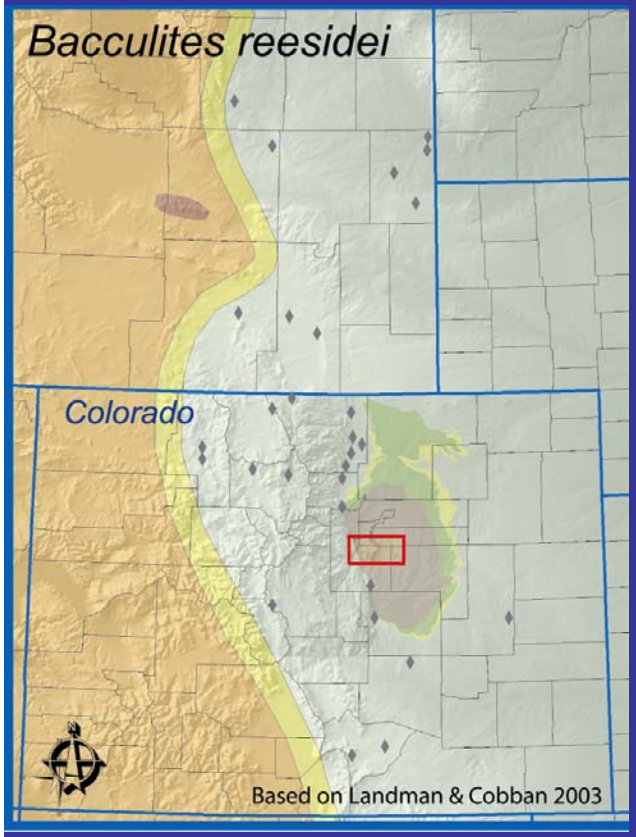
Population vs. Water

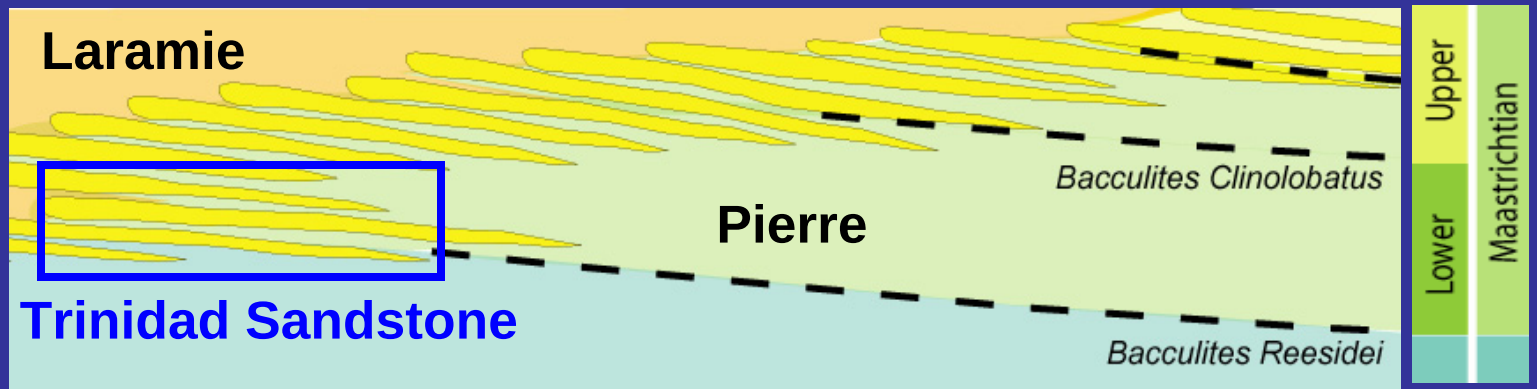


Fox Hills Deposition

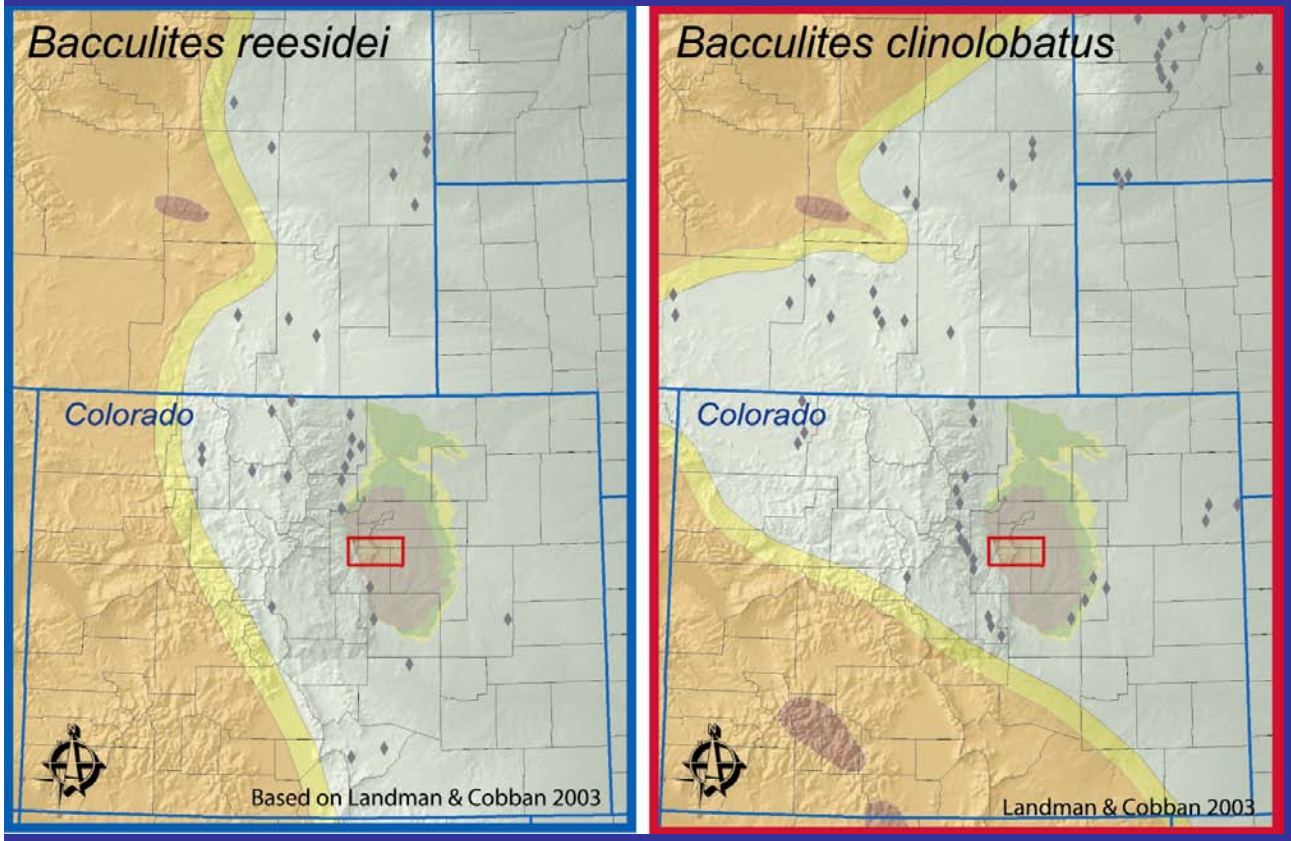


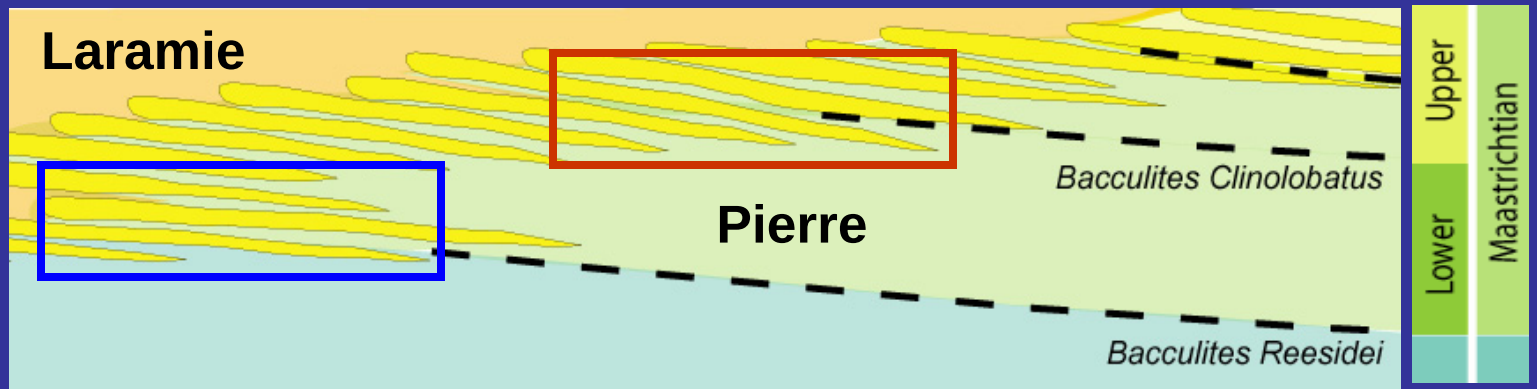
Fox Hills Paleogeography



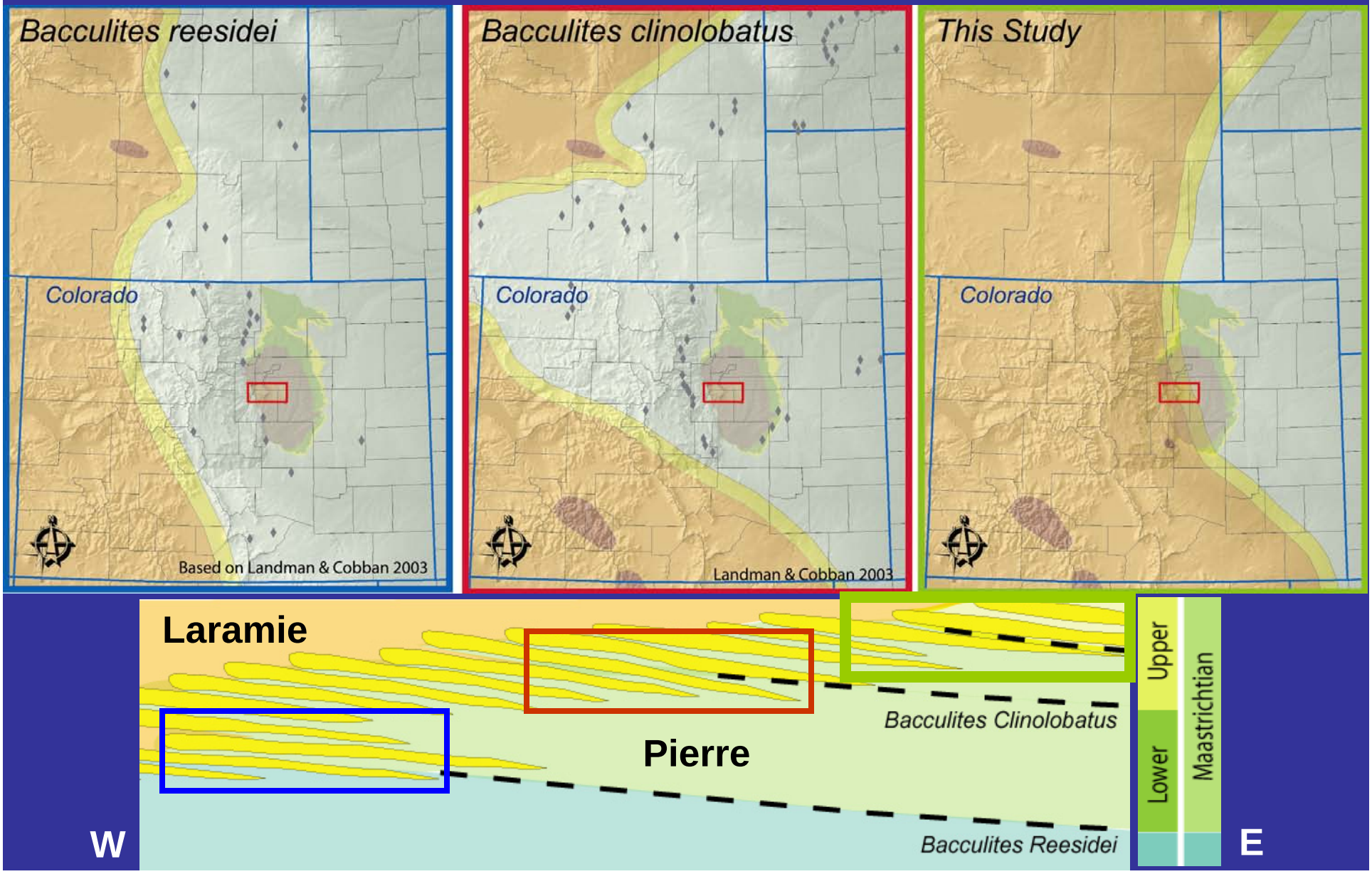


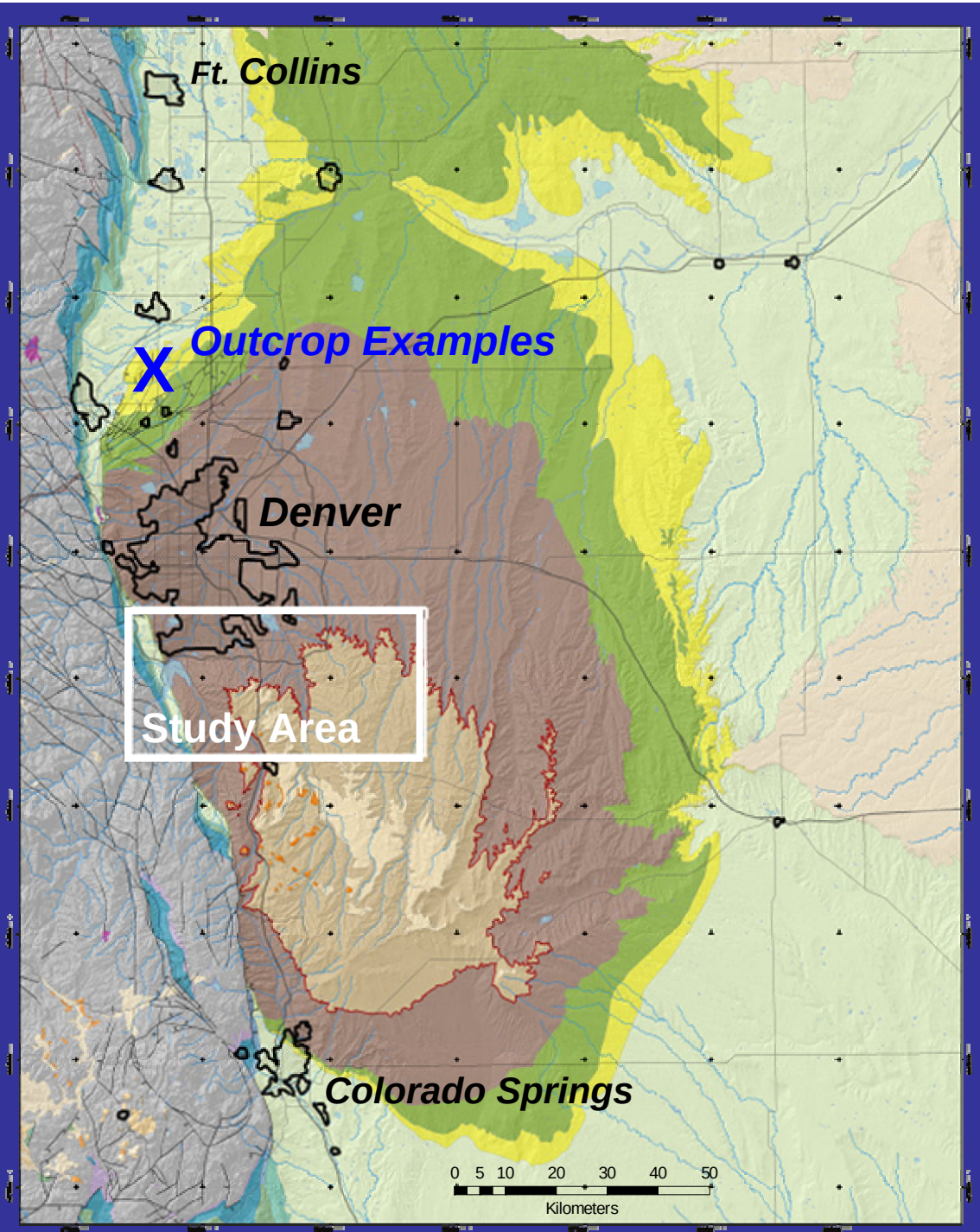
Fox Hills Paleogeography





Fox Hills Paleogeography





Denver Basin Geology

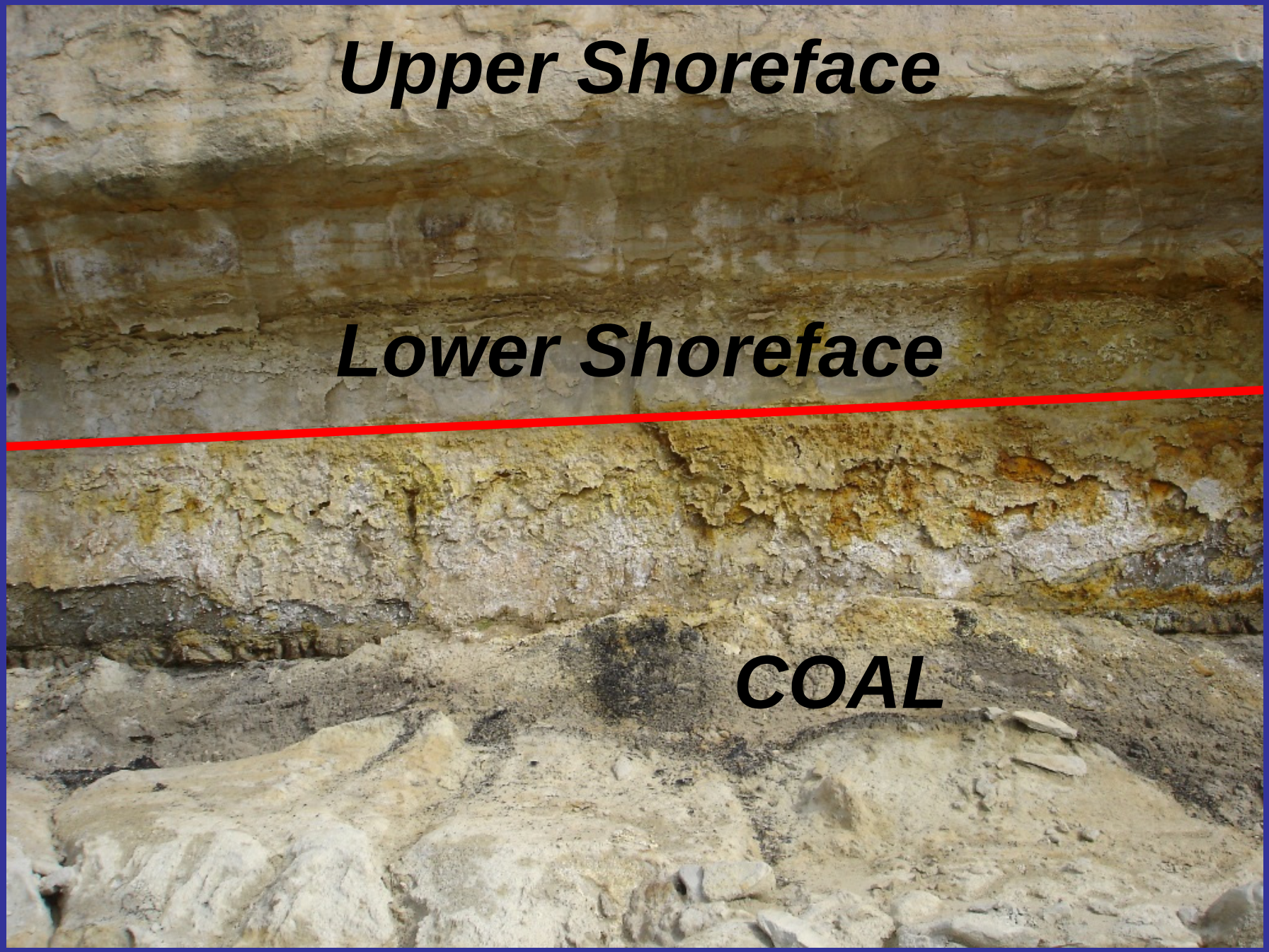
Simplified Legend

- Undivided Tertiary Sediments
- D2 Sequence
- D1 Sequence
- Laramie Formation
- Fox Hills Sandstone
- Undivided Pierre Shale

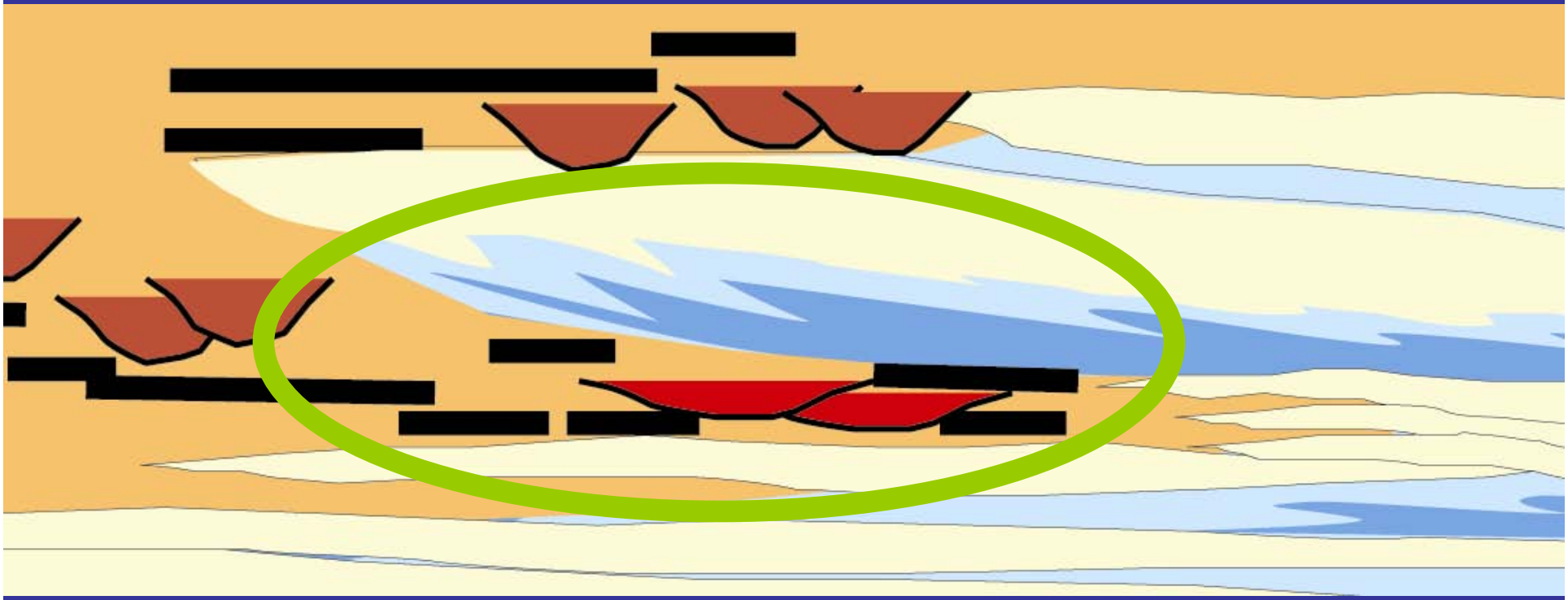
Fox Hills Shingles in Outcrop

White Rocks, City of Boulder Open Space

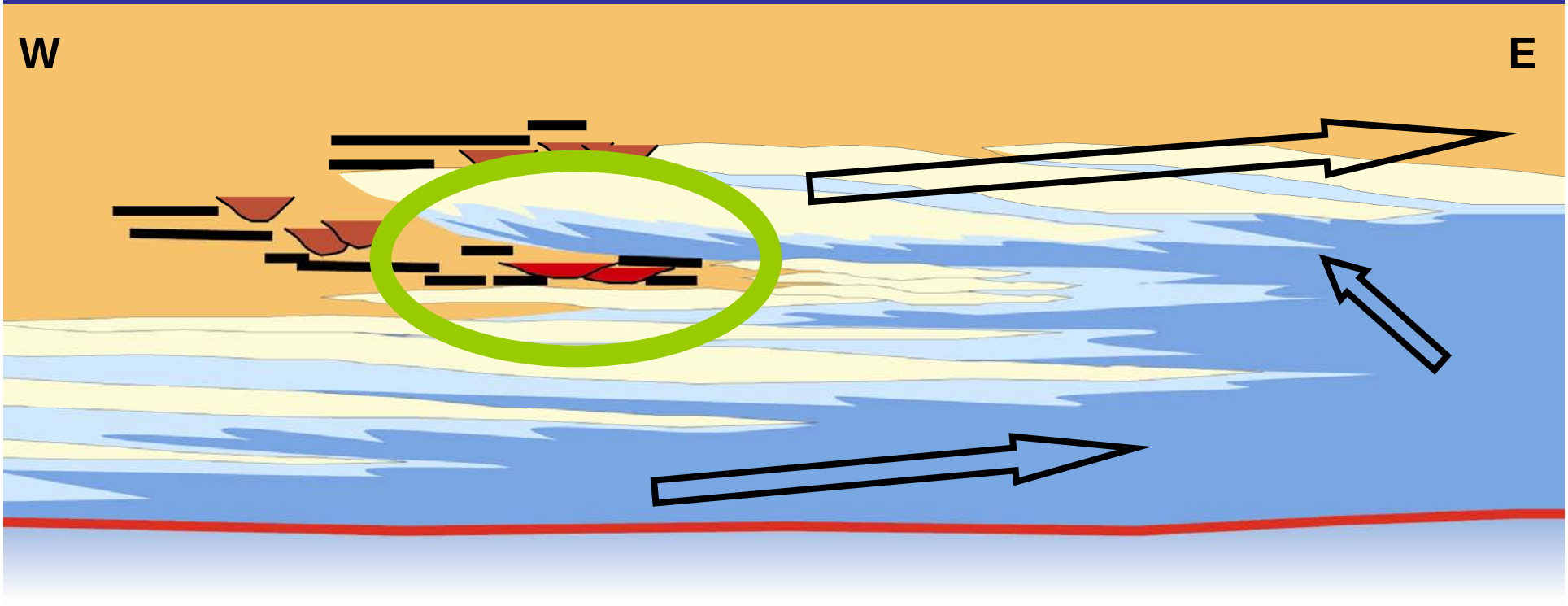
10m


Upper Shoreface
Lower Shoreface
COAL

Lower Shoreface on Coal

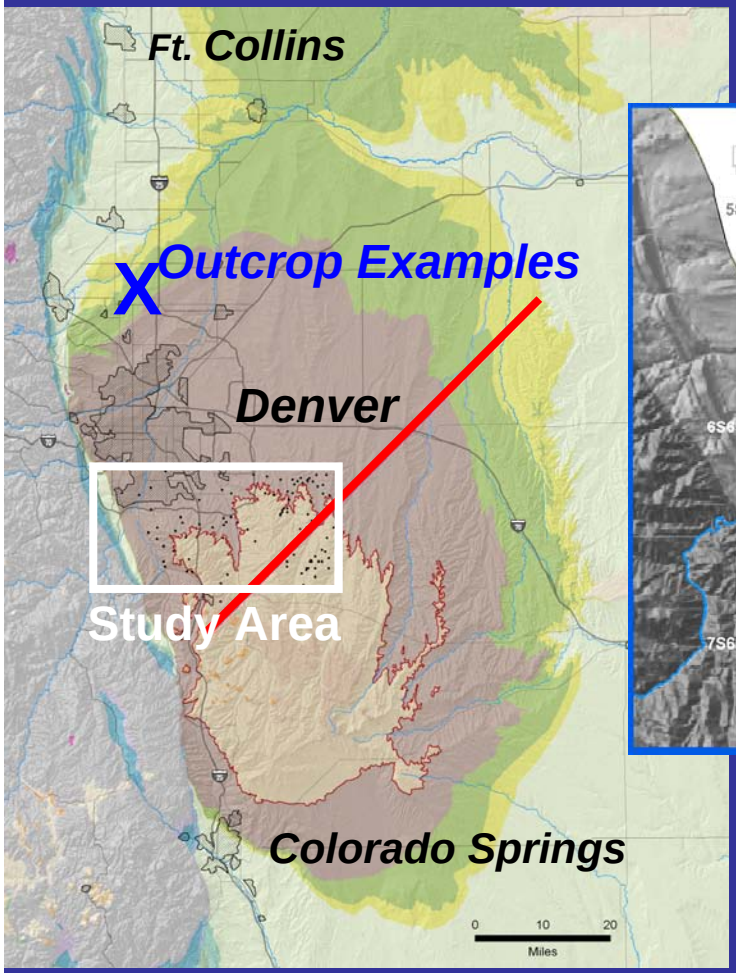


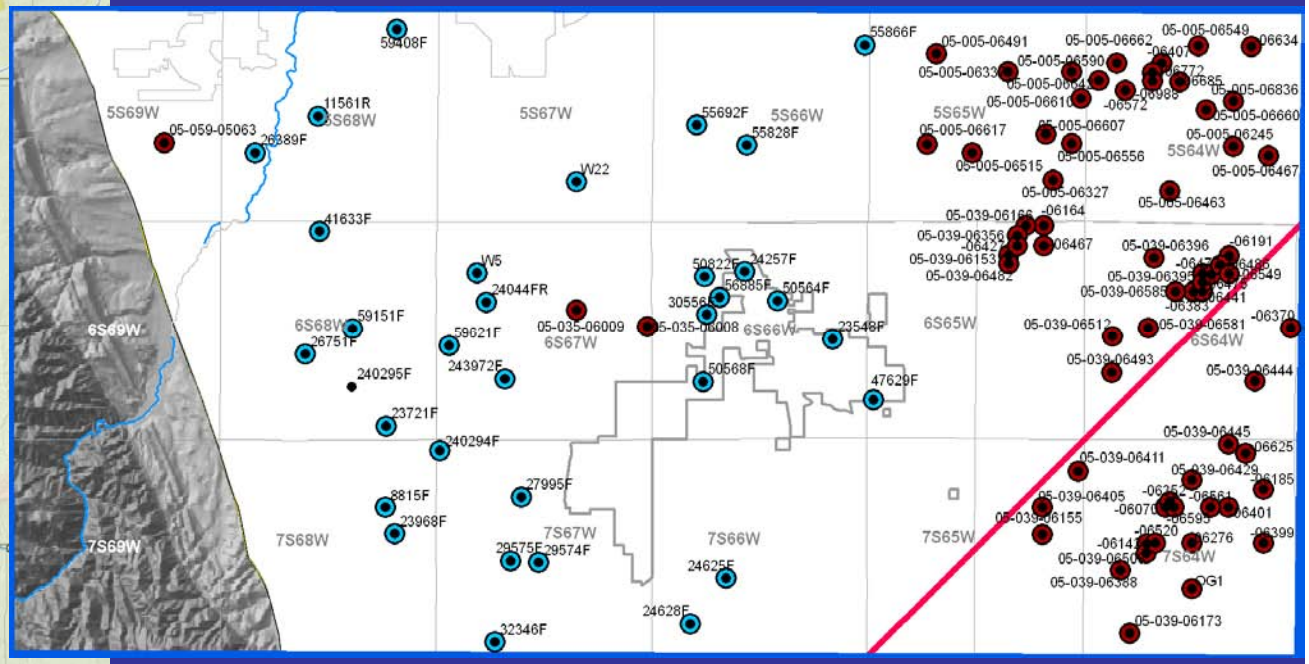
Lower Shoreface on Coal



- Progradation ~ Aggradation ~Progradation

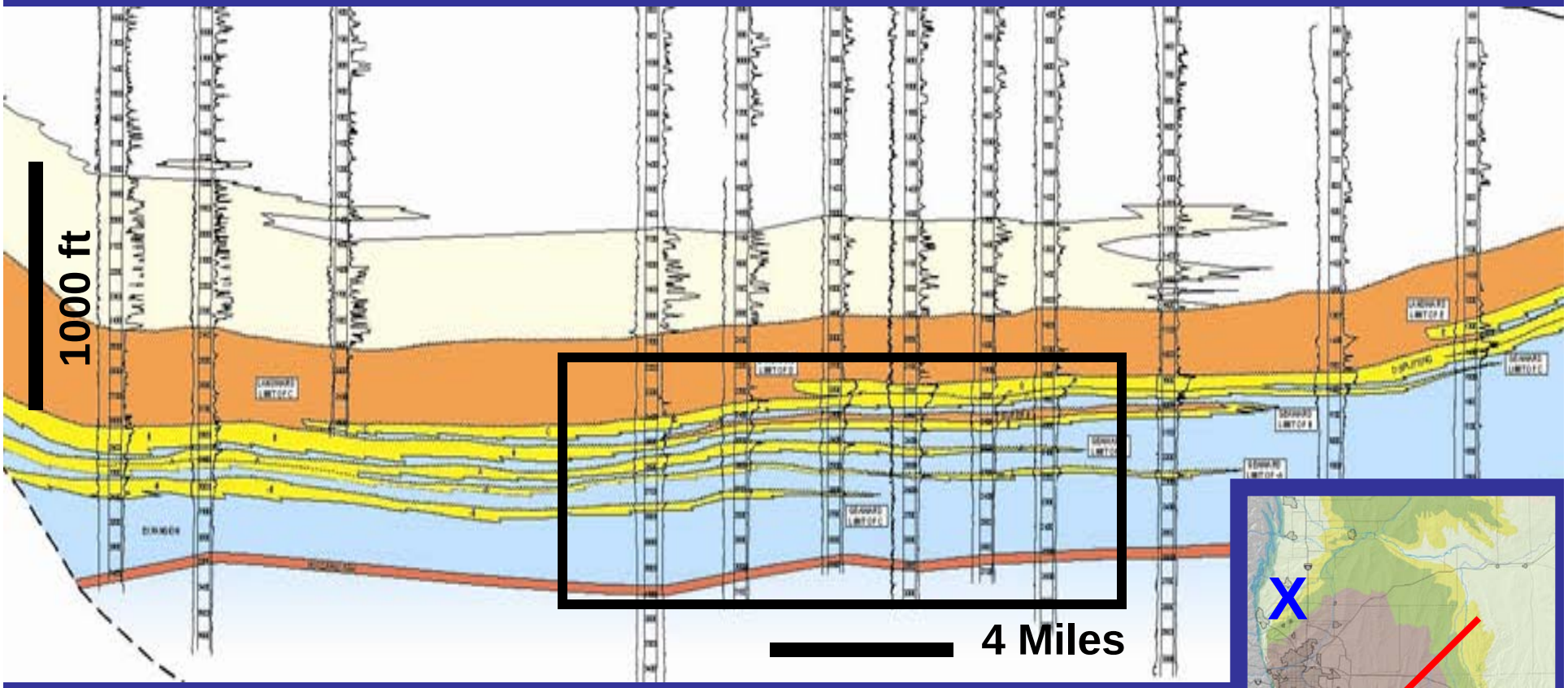
This Study: 102 Wells Used





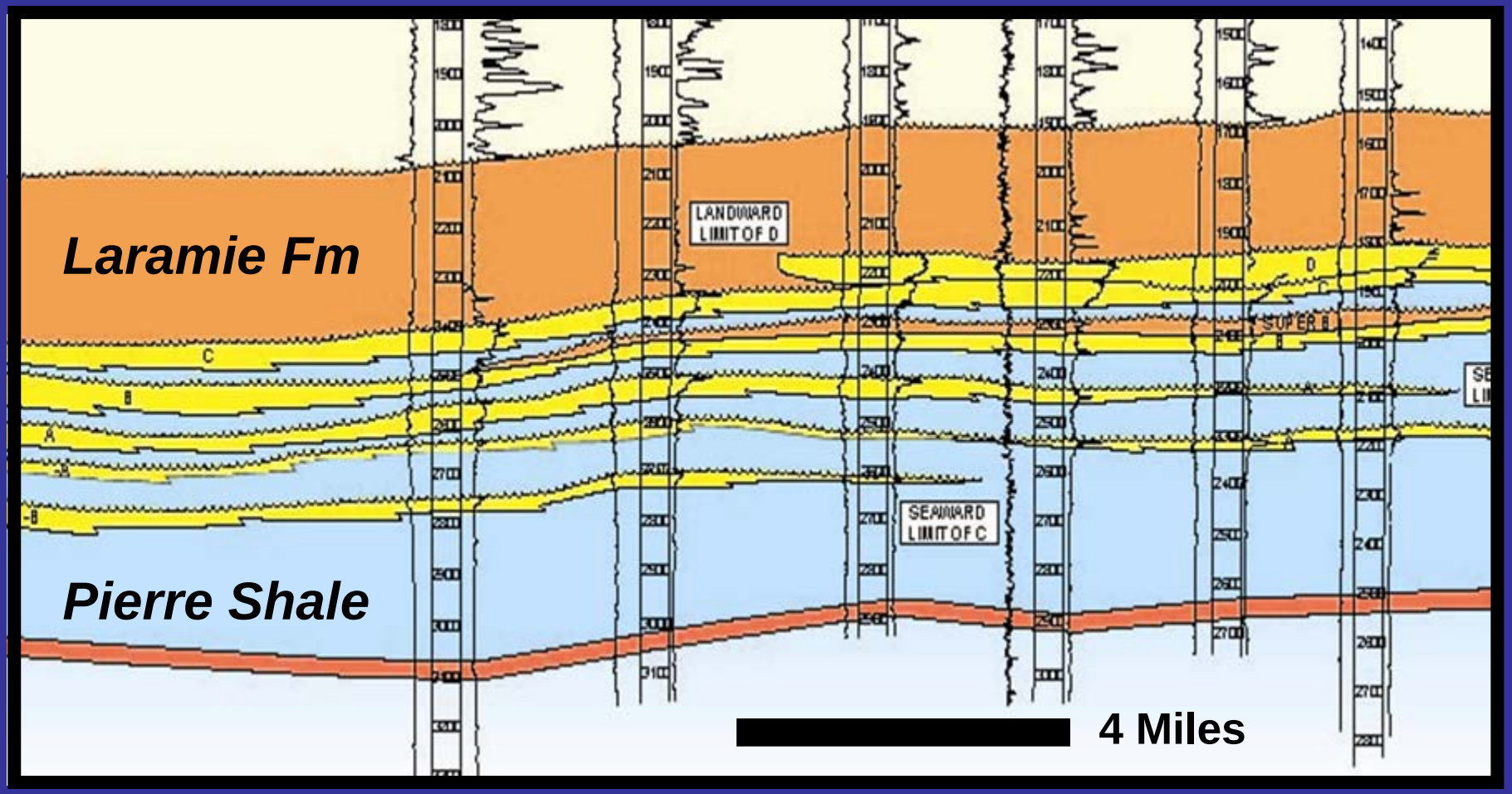
- 68 Oil\Gas wells
- 34 water wells

Fox Hills Cross Section

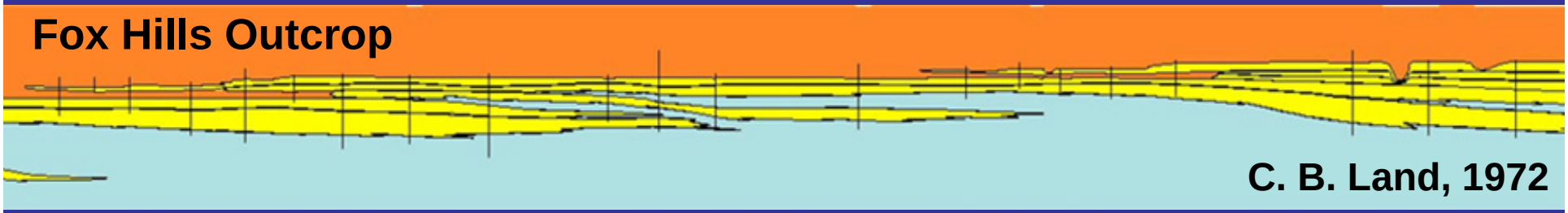


- Overall regressive stacking pattern
- 8 Individual shingles mapped

Cross Section in of Study Area



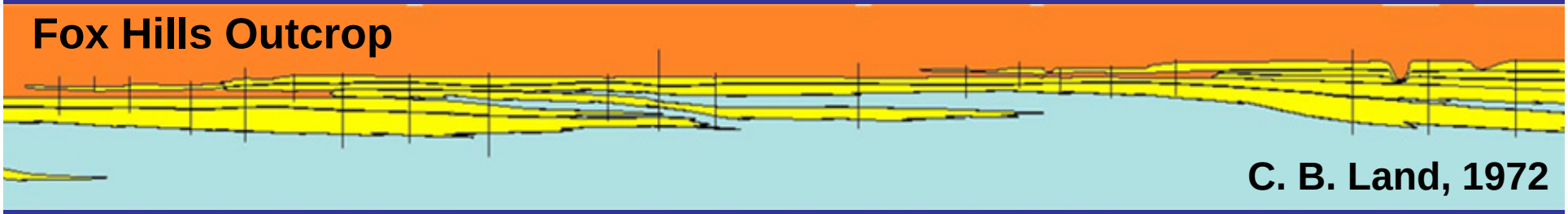
Fox Hills in Outcrop



Greater Green River Basin, Wyoming

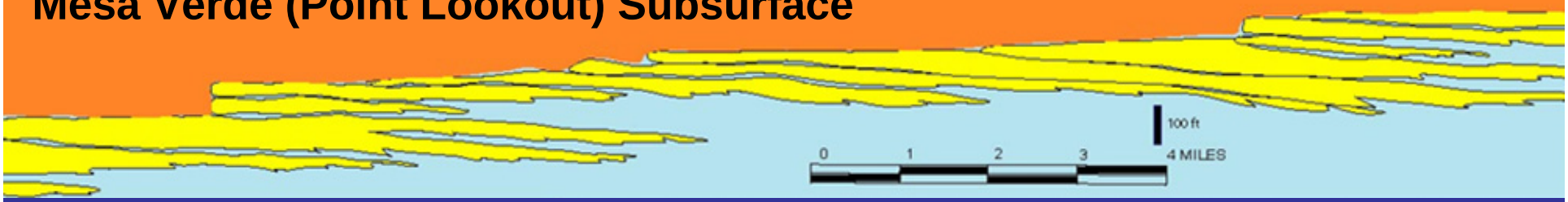
Shingles at Same Scale

Fox Hills Outcrop



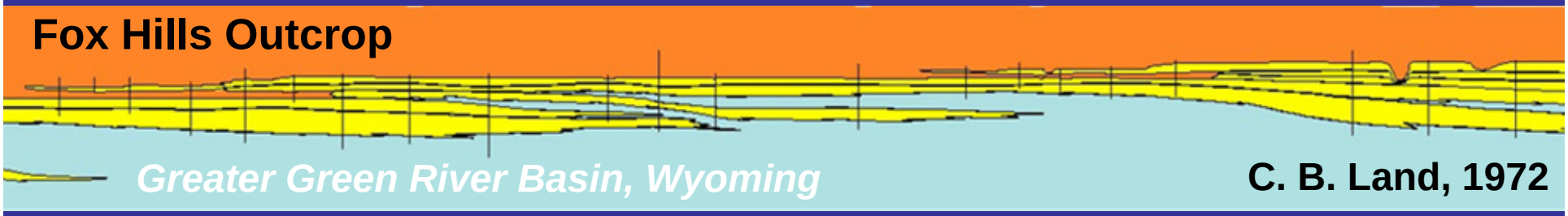
C. B. Land, 1972

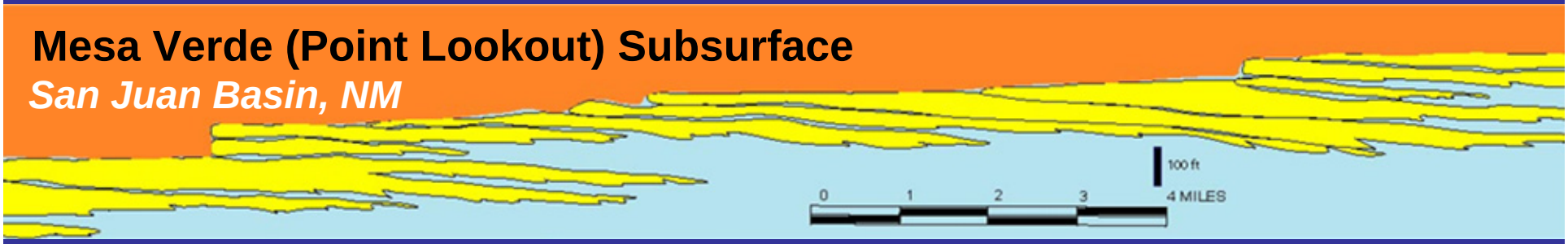
Mesa Verde (Point Lookout) Subsurface

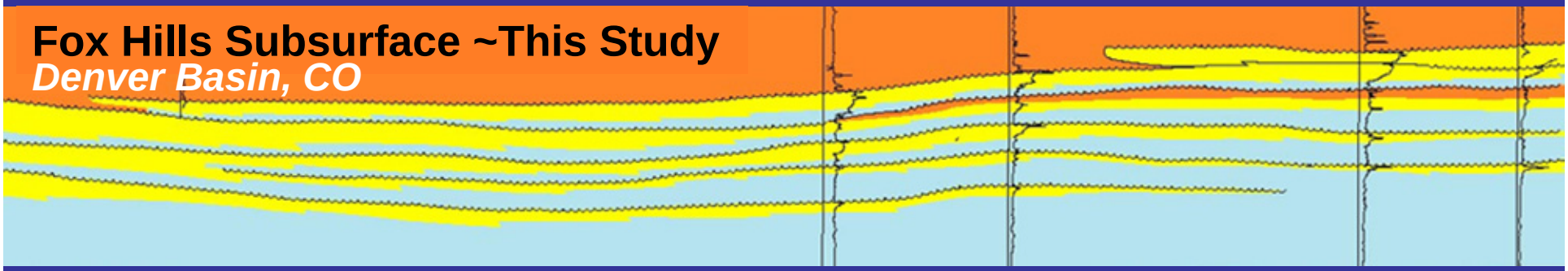


San Juan Basin, New Mexico

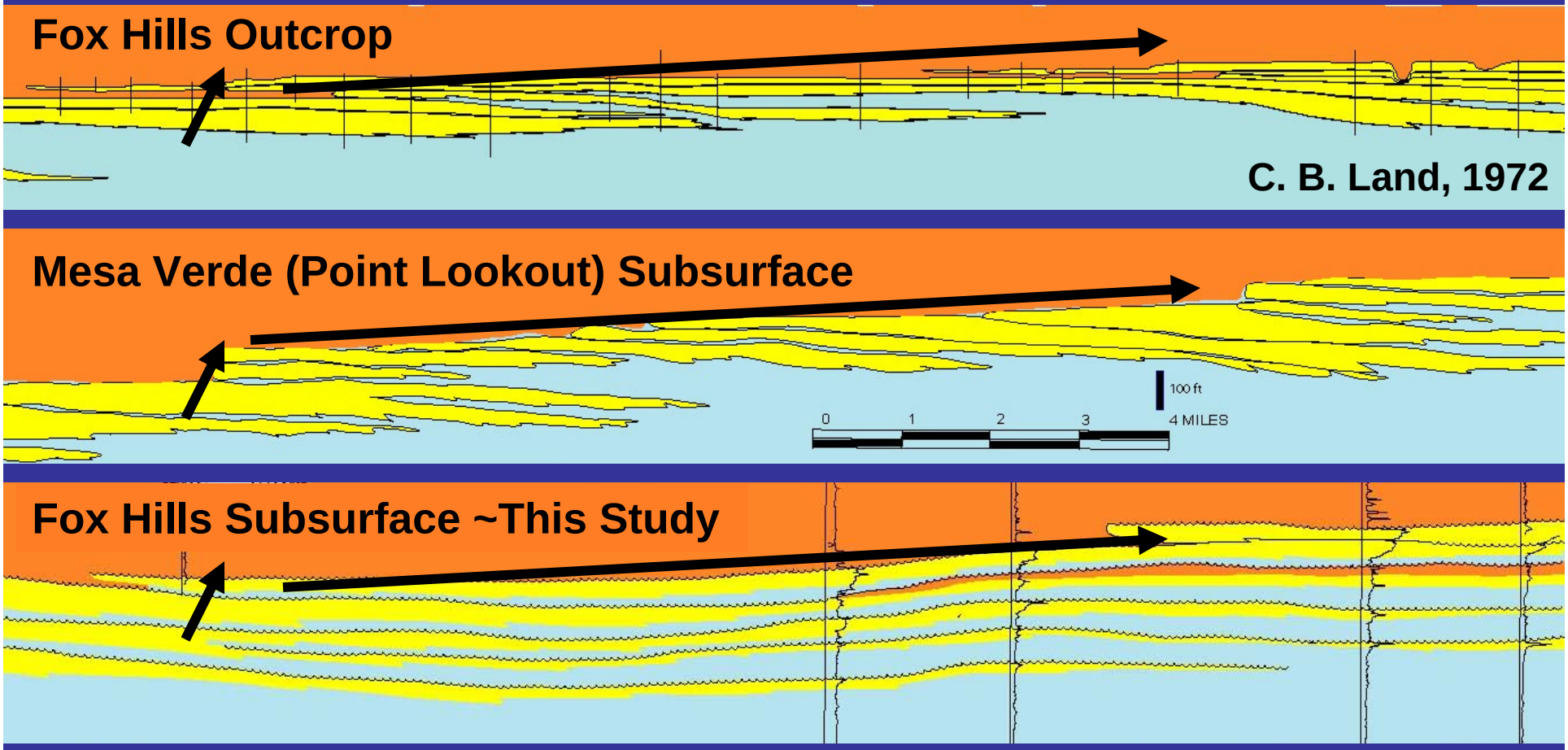
Shingles at Same Scale





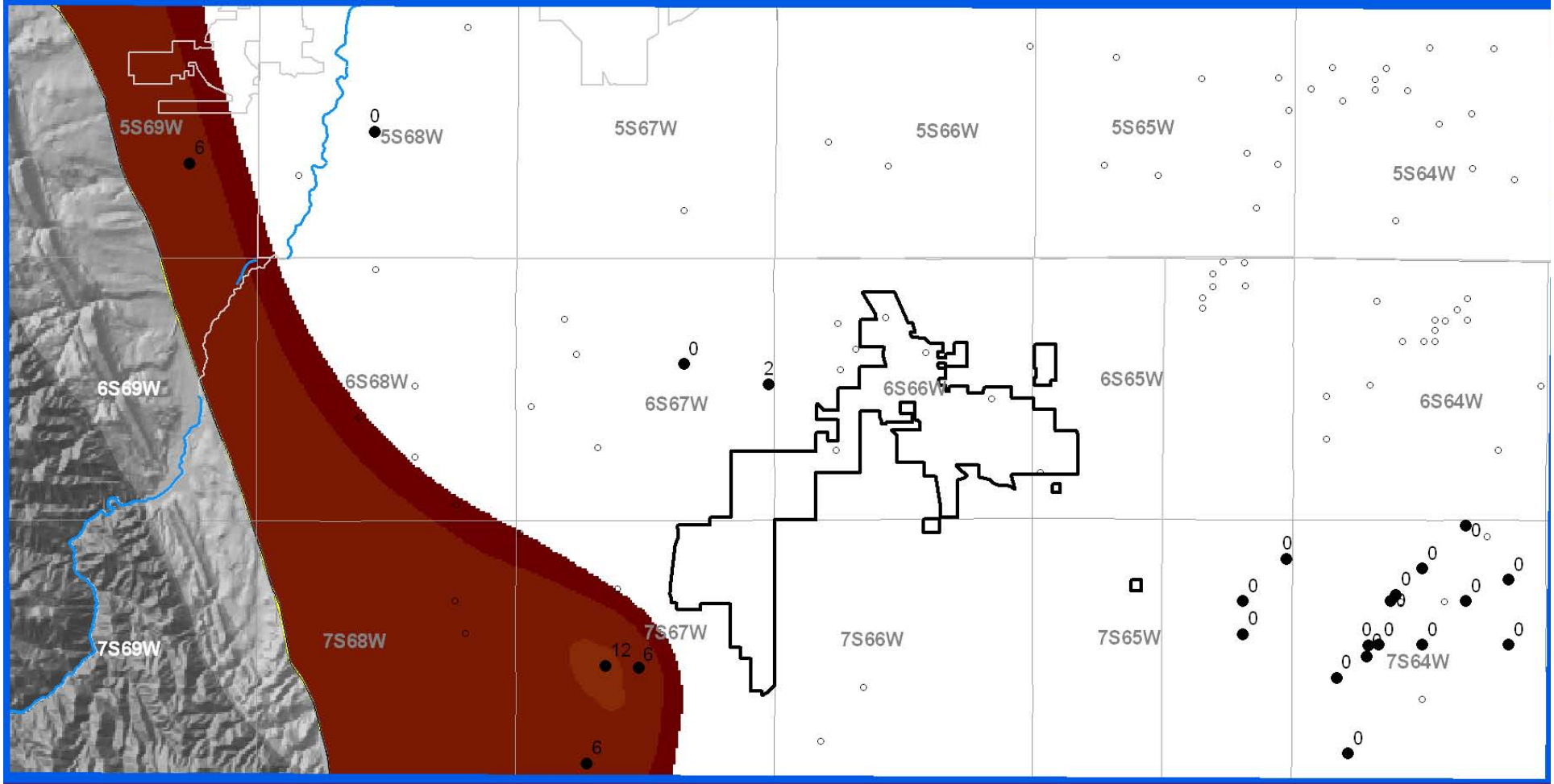


Shingles at Same Scale



- Stacking pattern comparable
- Shingle lengths similar

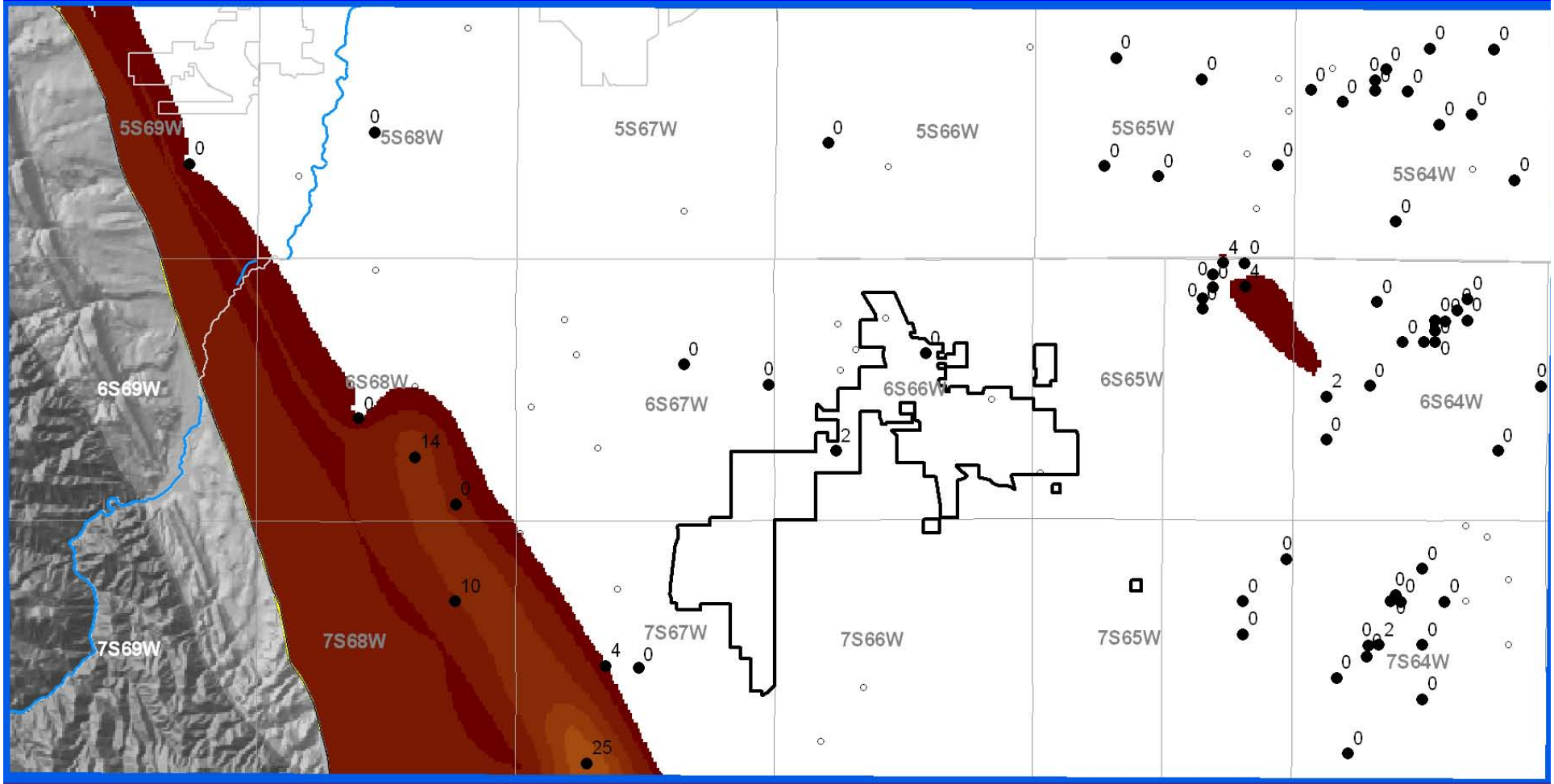
Net Sand Maps By Shingle



- Thickness 0 - 12 ft…

Shingle -C

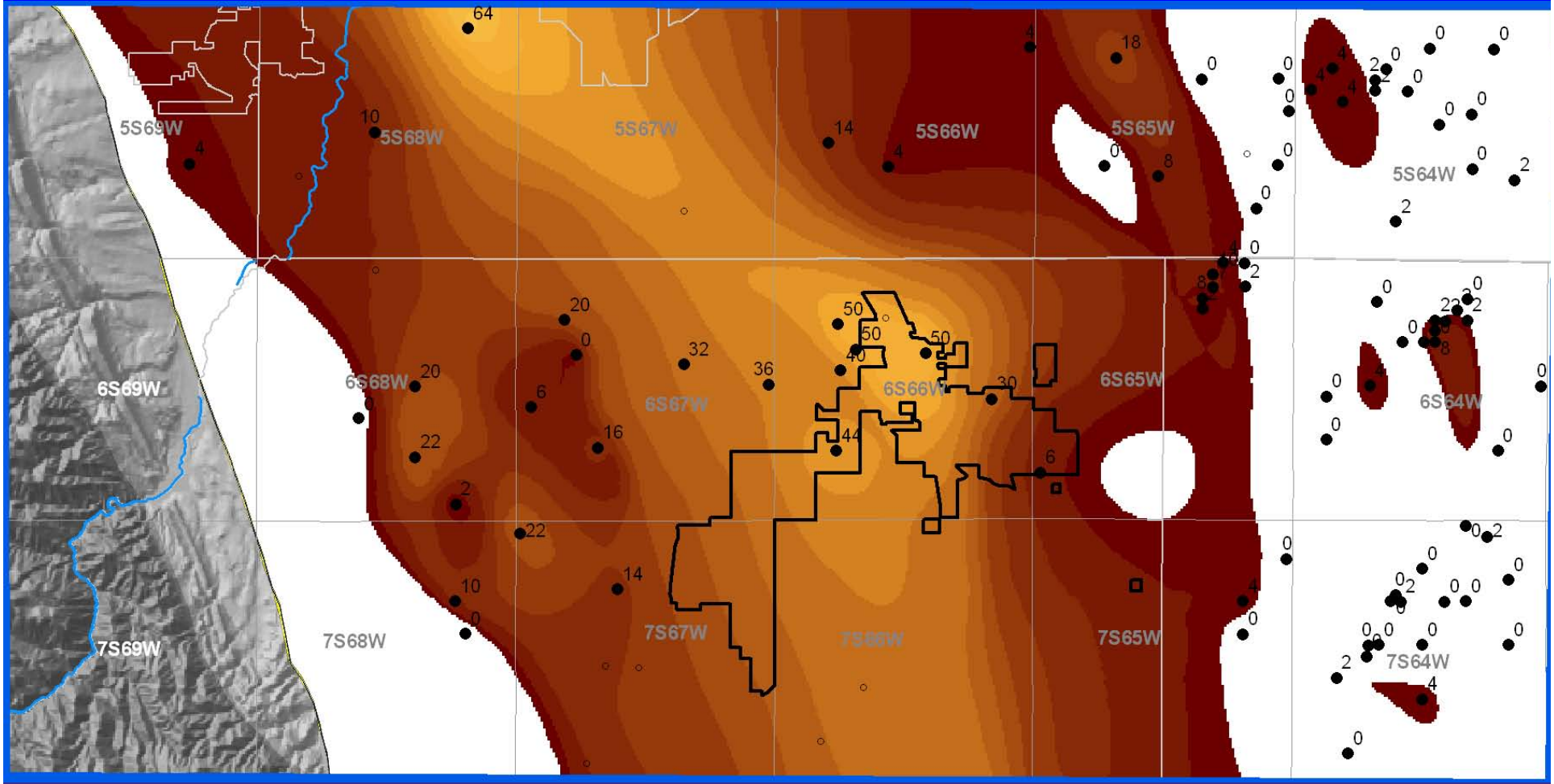
Net Sand Maps By Shingle



- Thickness 0 - 25 ft…

Shingle -B

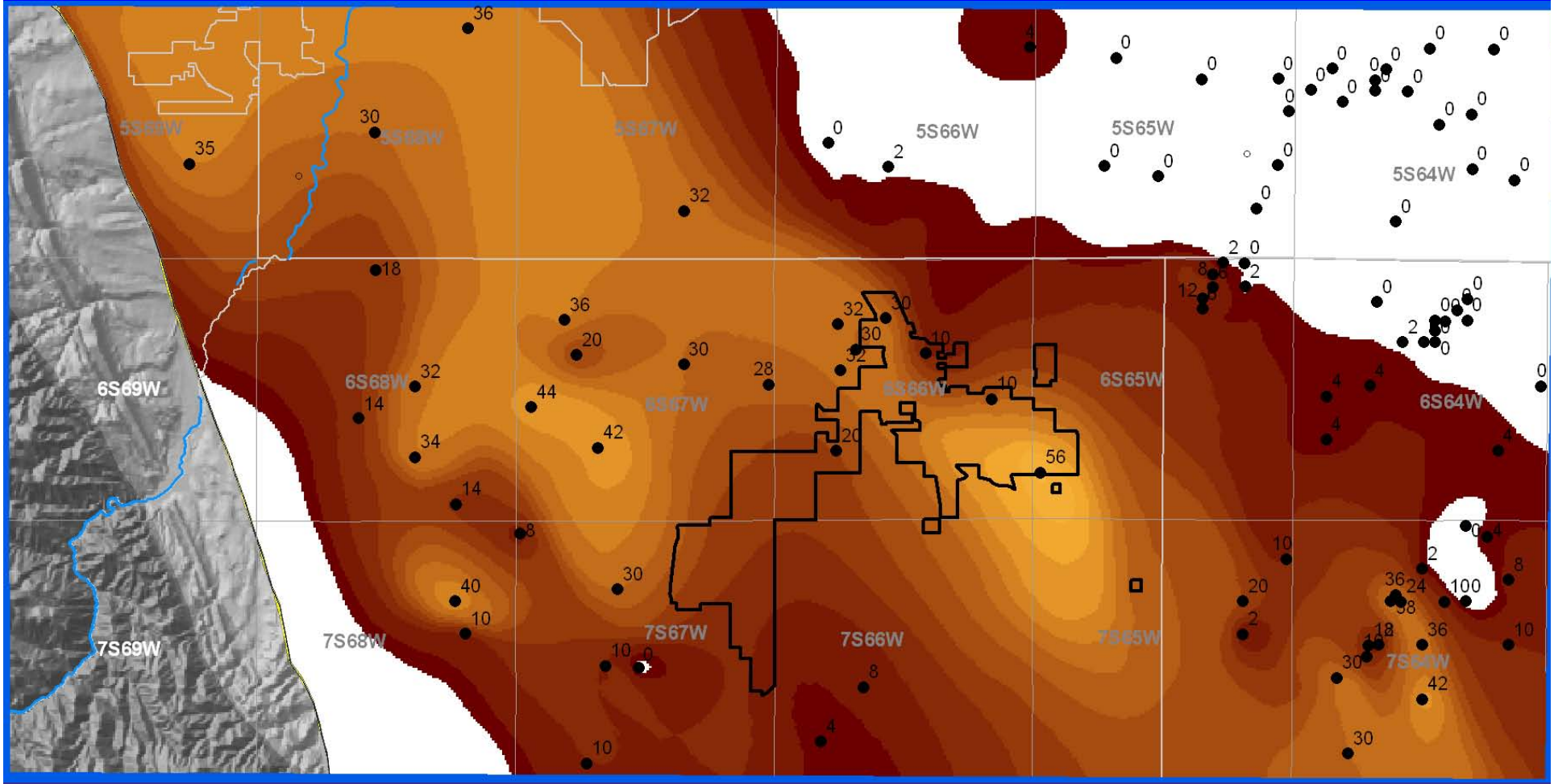
Net Sand Maps By Shingle



- Thickness 0 - 64 ft…

Shingle -A

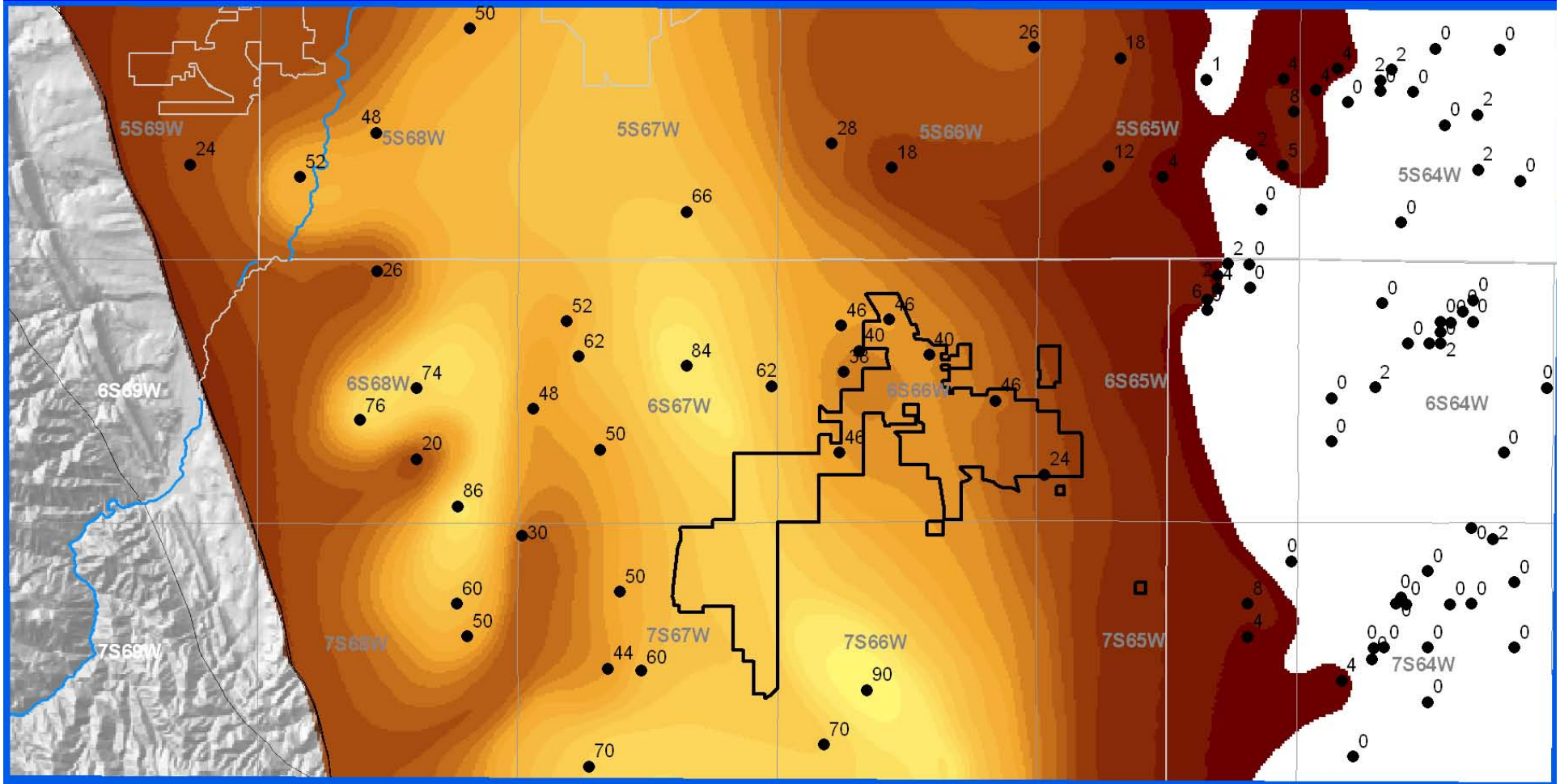
Net Sand Maps By Shingle



- Thickness 0 - 56 ft…

Shingle A

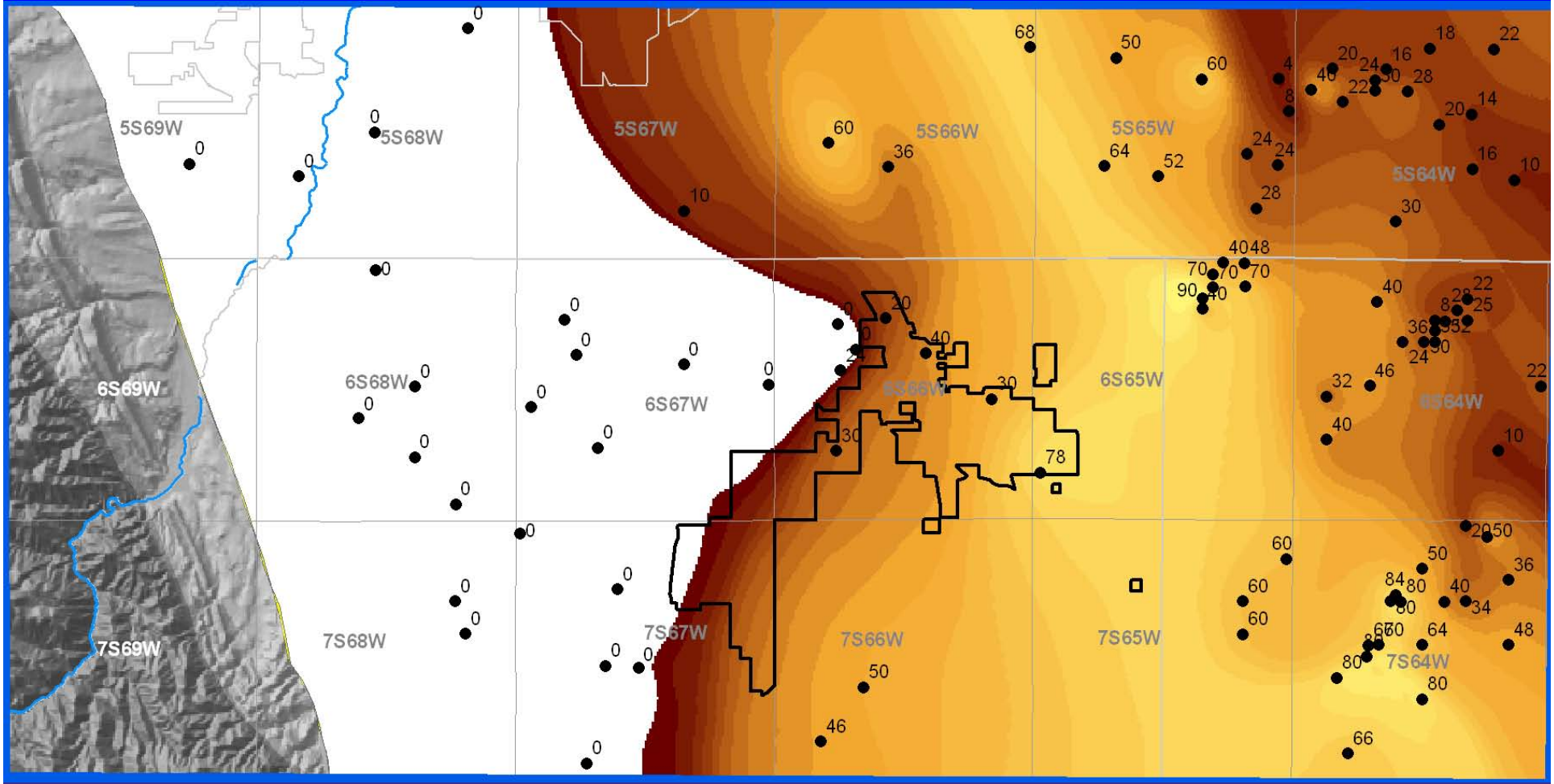
Net Sand Maps By Shingle



- Thickness 0 - 90 ft…

Shingle B

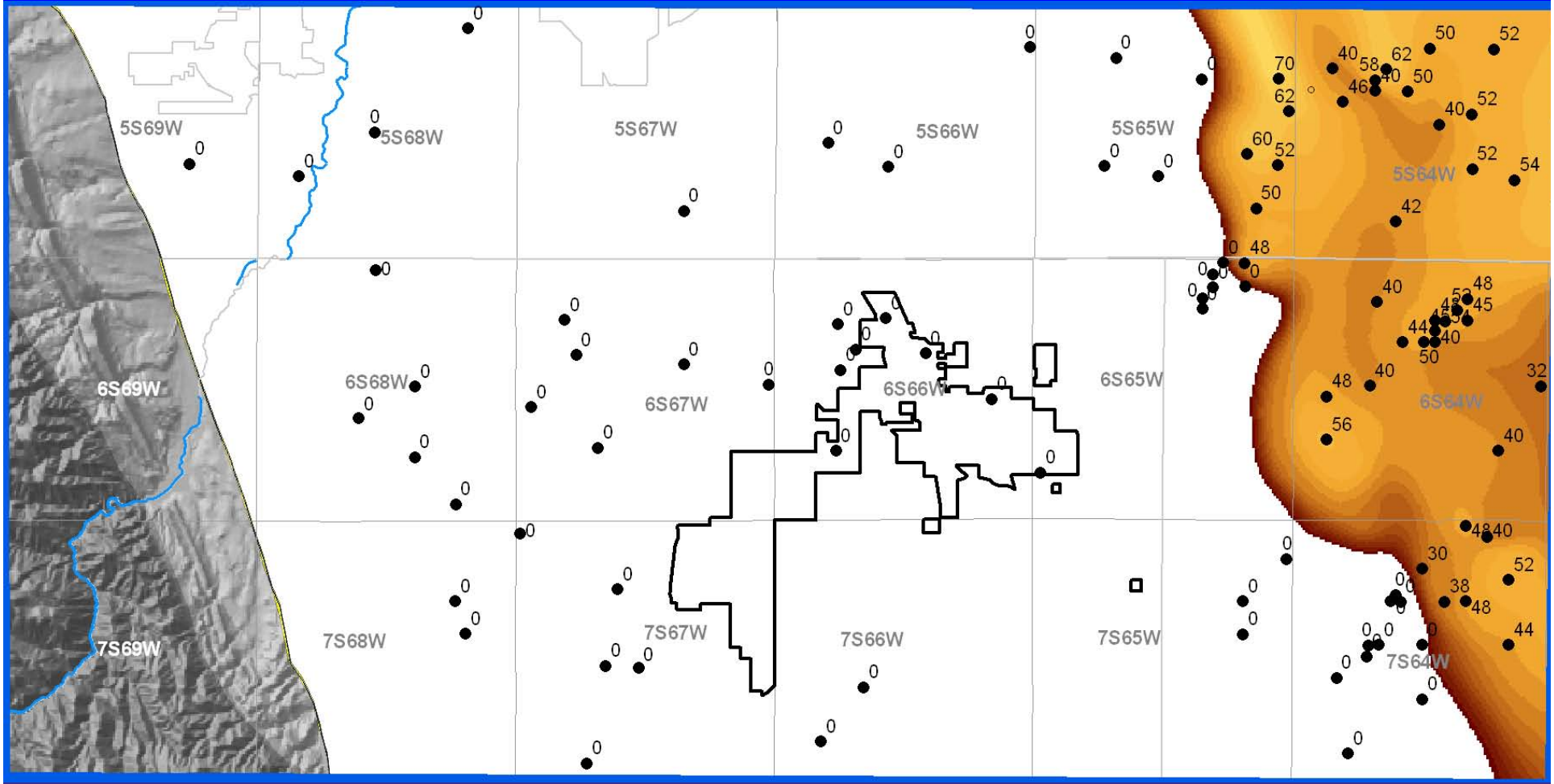
Net Sand Maps By Shingle



- Thickness 0 - 90 ft…

Shingle C

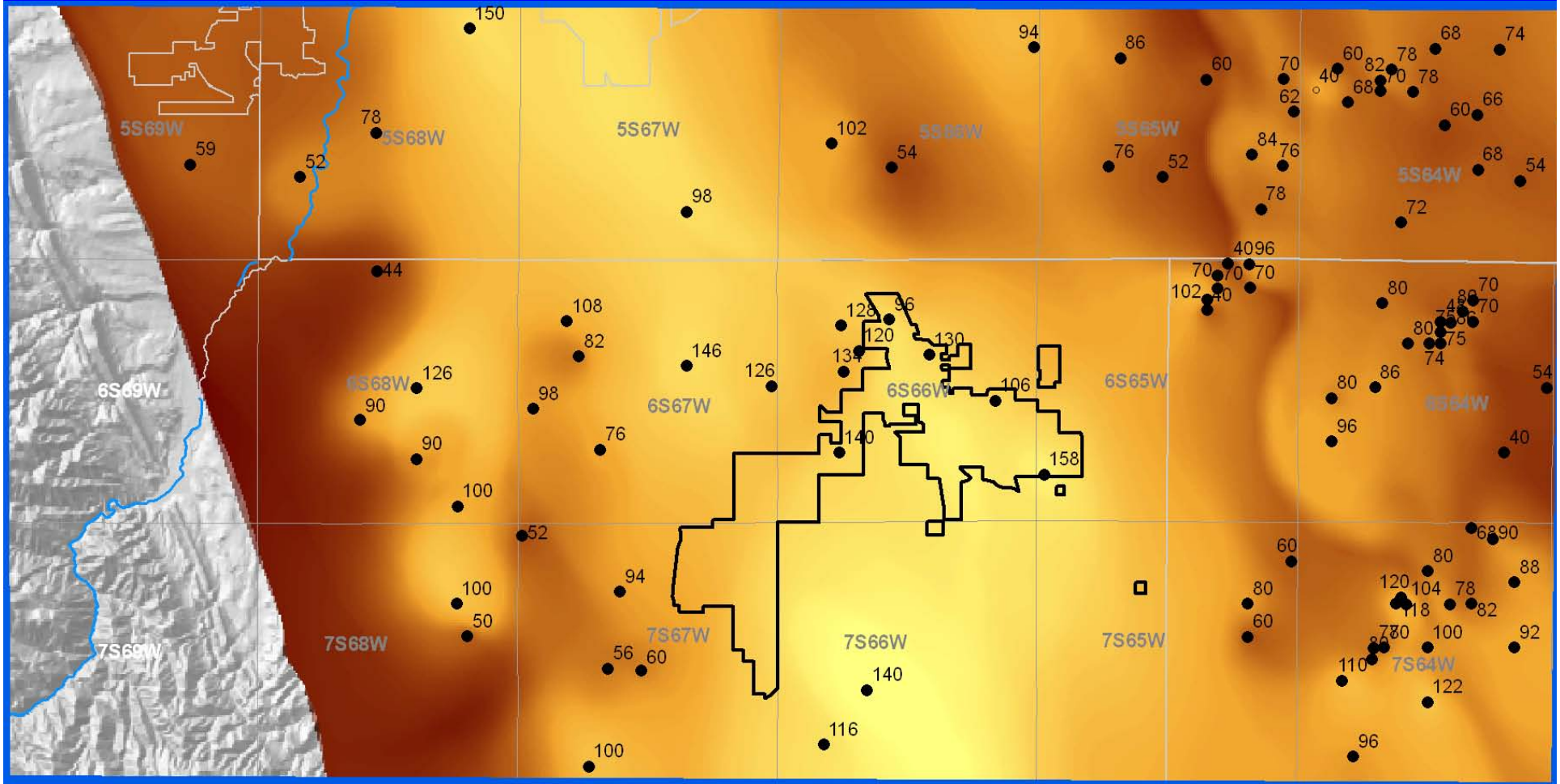
Net Sand Maps By Shingle



- Thickness 0 - 70 ft…

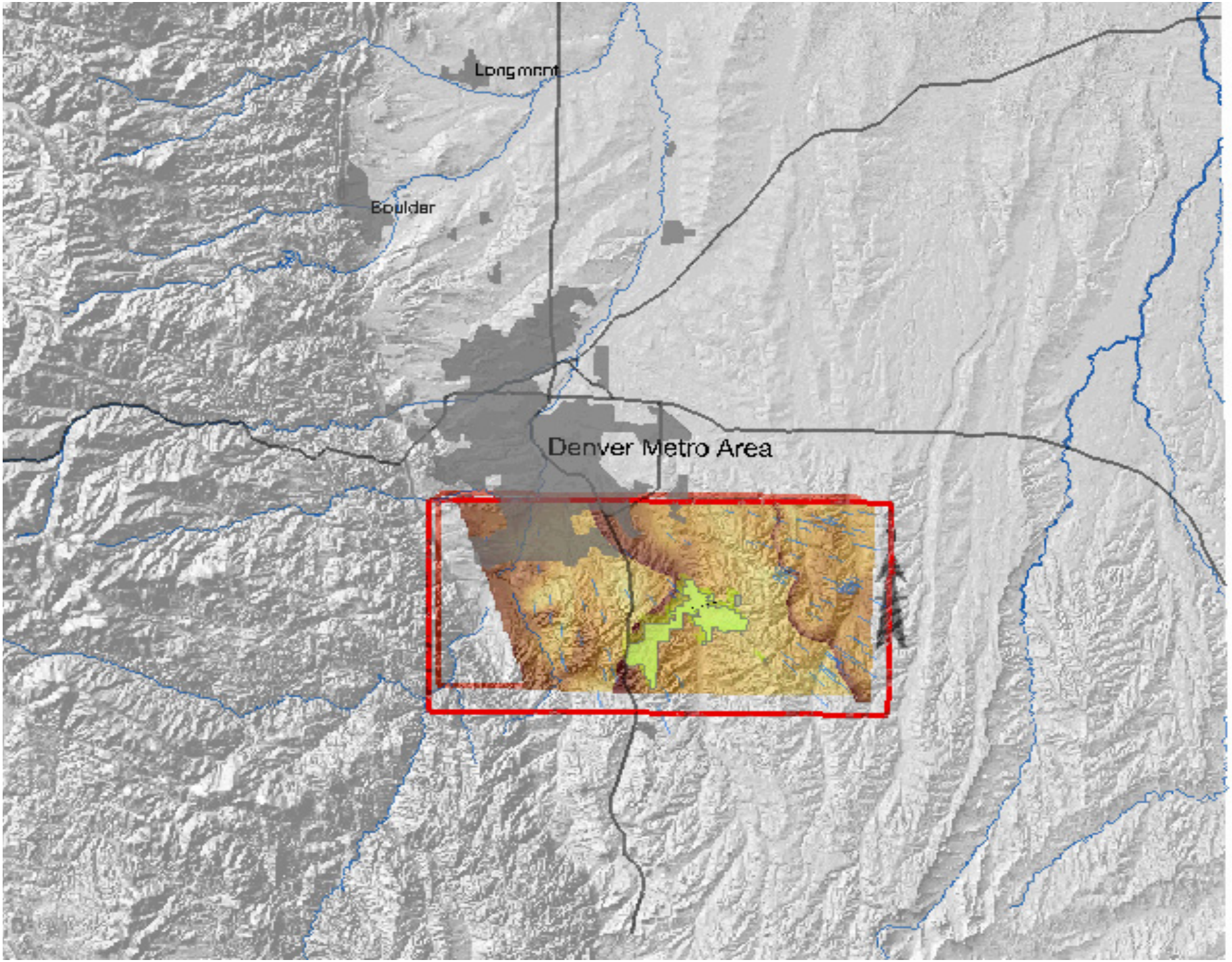
Shingle D

Total Fox Hills Net Sand

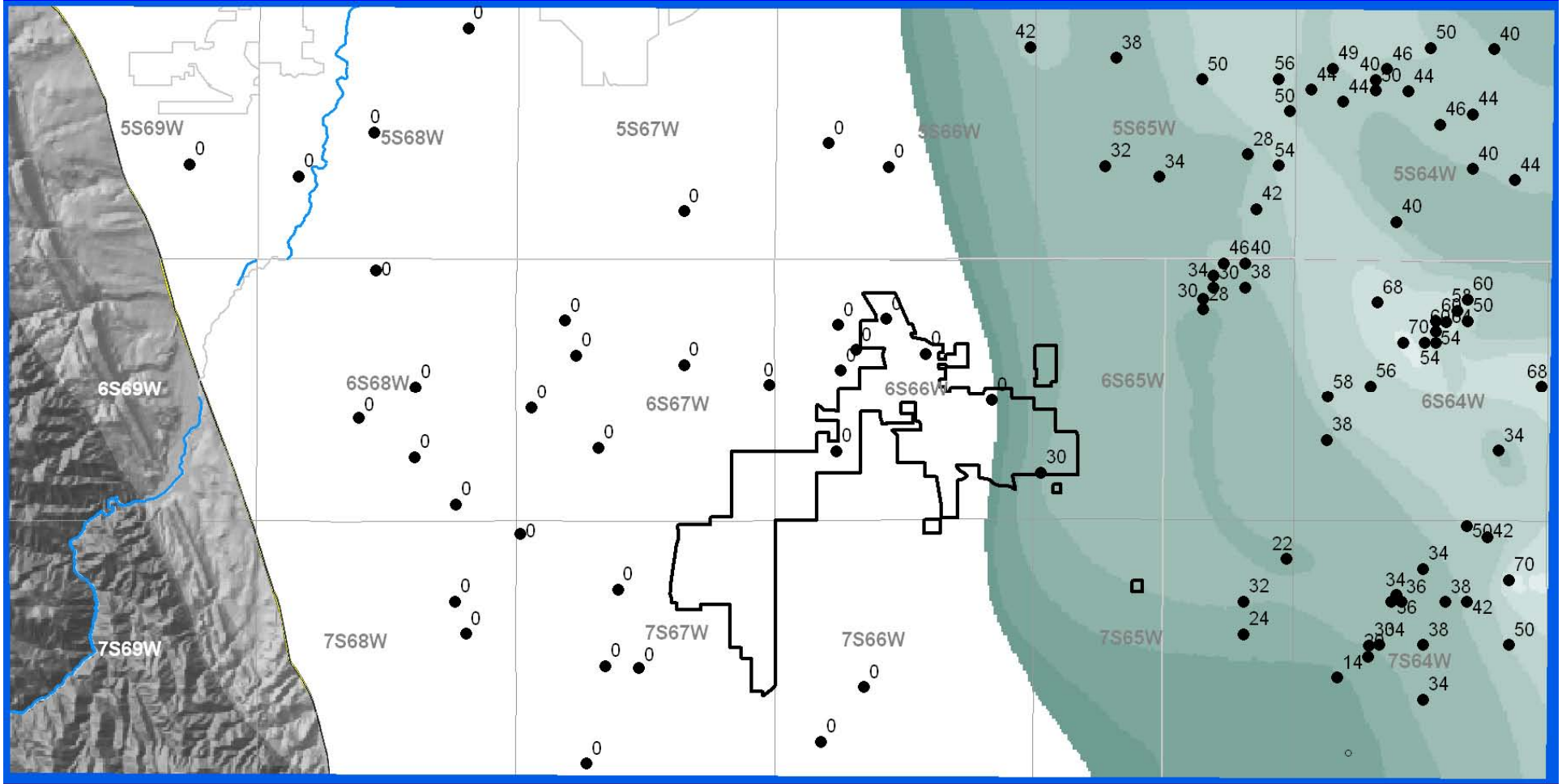


- Thickness 0 - 158 ft…

Volume in Study Area =
44,434 million cubic meters
~ 36 million acre/feet


Longmont
Boulder
Denver Metro Area

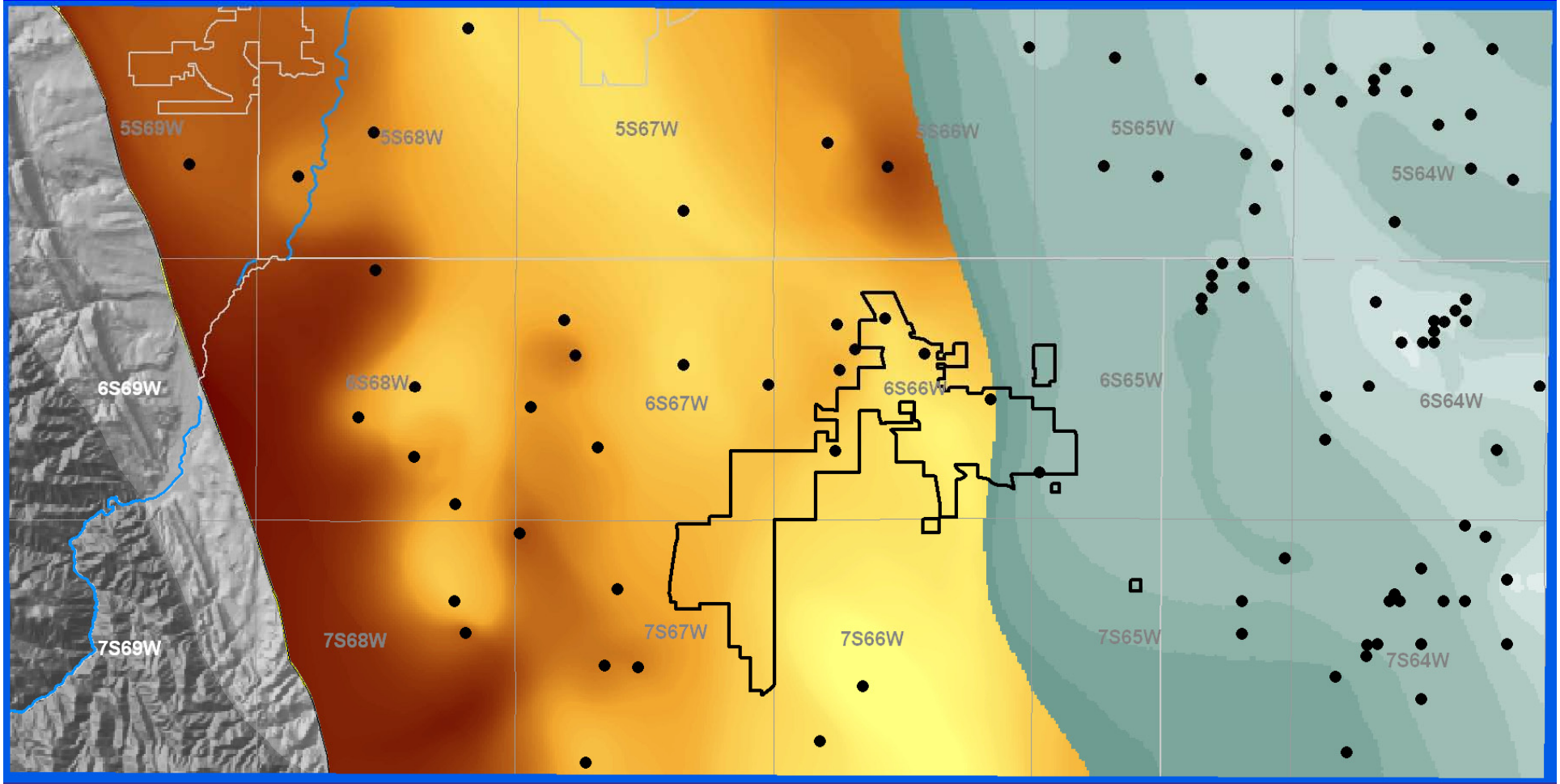
Total Thickness of Coal Layer



- H_2S in Water…

Shingle Super B

In Summary:

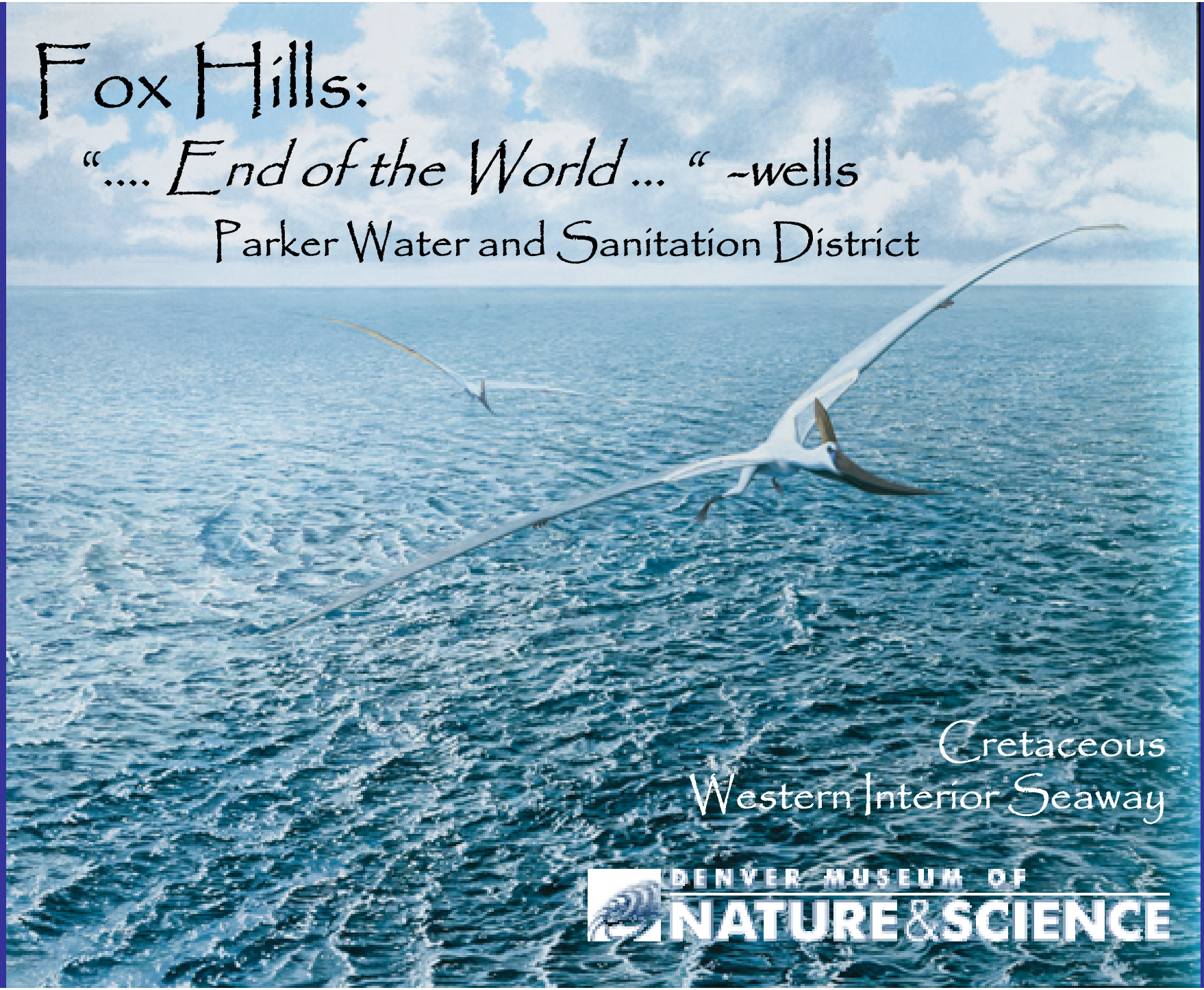


- Total Net Sand with Coal Layer

Fox Hills Sandstone

- 3D Geometry of Individual Shingles
- Reservoir Controls Ground water:
  - Quantity: **Volume = ok**
  - Quality: **Coal layers = poor**

Fox Hills:

"…. *End of the World* … " ~wells

Parker Water and Sanitation District