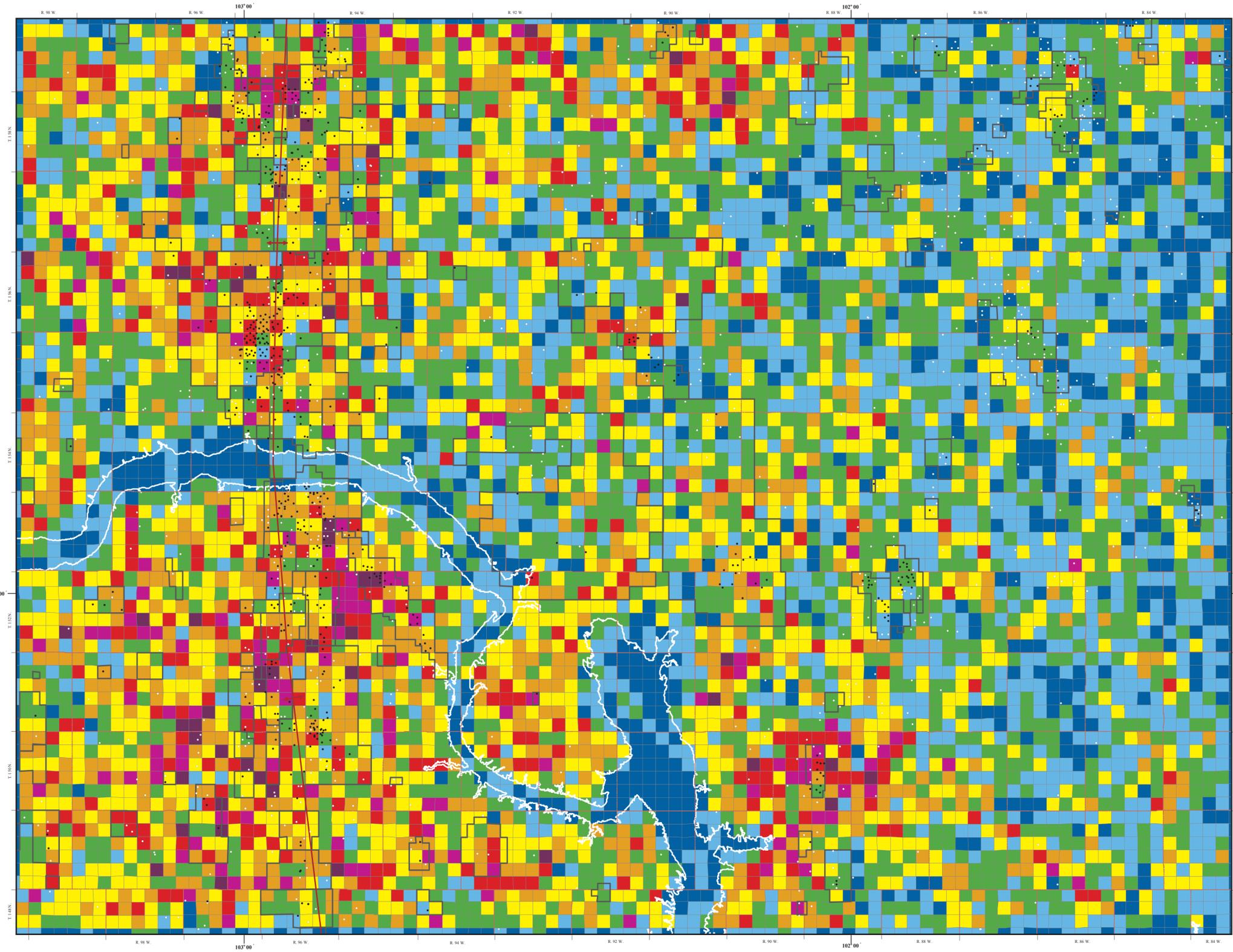


LINEAMENT DENSITY AND GENERALIZED WELL PRODUCTION IN THE PARSHALL AREA, NORTH DAKOTA

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EXPLANATION

This map presents the results of an evaluation of the relationship between lineament density (Anderson, 2008) and overall generalized well production and success. The Parshall area is located in the northeastern portion of the Williston Basin and is centered around Mountrail County in northwestern North Dakota. Lineament density was calculated across the map area by automated analysis of the sum of all mapped lineament lengths found to occur within a 1 mile x 1 mile grid cell coincident with actual Public Land Survey System (PLSS) sections. Cellular lineament density values (i.e., total lineament line length per unit cell) were assigned to each of the grid cells. Lineament density classes are depicted on this map as ranging from areas of lower lineament density, shown as cooler colors, to areas of higher lineament density, shown as warmer colors. This map shows area of higher lineament density in the western portion of the map area, coincident with major subsurface structural development along the Nesson Anticline and lessened geomorphological influence from Pleistocene glaciation. Areas of lower lineament density are found in the eastern and northeastern portions of the map. Overall, lineament density appears greatest in areas where producing oil and gas wells are commonly located, and lower where non-producing wells have been drilled (Figure 1). This suggests a relationship between productive areas and relatively higher lineament density. Lineament density appears artificially lower in the areas covered by Lake Sakakawea as these water covered areas were not included during the original lineament mapping. The distribution of wells found within individual lineament density classes suggests that more dry wells have been drilled in areas of lower lineament density. Averaged production data suggest that wells located in areas of greater lineament density have generally higher overall average production. In terms of exploration success (i.e. near or greater than 50%), wells drilled in areas of higher lineament density have generally been more successful. Well data within this area of investigation and presented here, includes production information only from wells drilled before 09/20/08.

Averaged Overall Well Production Per Lineament Density Class

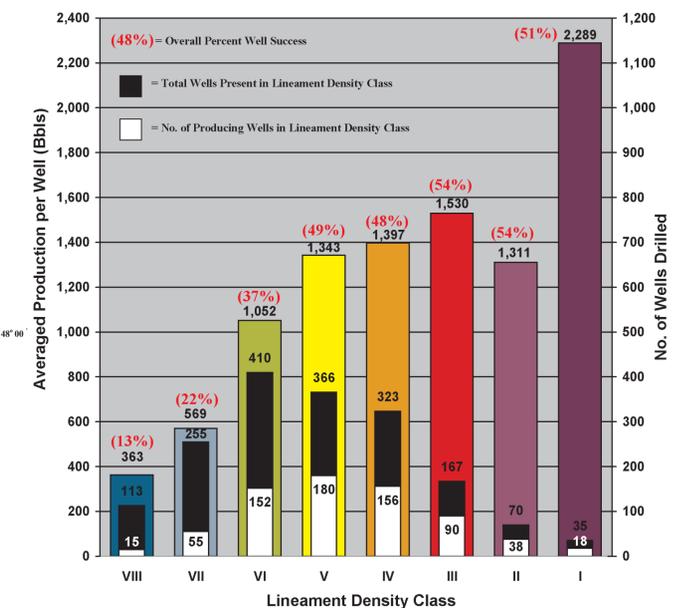
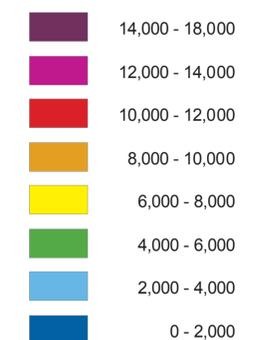


Figure 1. Averaged overall well production per lineament density class (colored bars) on the primary y-axis shown with the total number of wells occurring within each lineament density class (i.e., producing and non-producing wells) shown on the secondary y-axis. Average production is calculated as the average (Bbls) produced, over the first 12 months of production, divided by total number of wells drilled per lineament density class. The overall percent success rate is highlighted in red above each respective lineament class and is defined as the number of producing wells divided by the total number of wells drilled within each lineament density class.

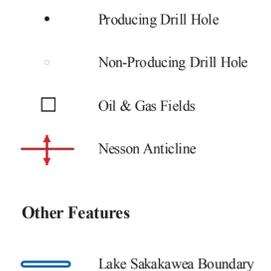
REFERENCES

Anderson, F.J., 2008, Lineament Mapping and Analysis in the Northeastern Williston Basin of North Dakota, North Dakota Geological Survey: Geologic Investigations No. 70, 26 p.
ND Oil & Gas Division, 2008, Risk-Based Data Management System (RBDMS), <https://www.dmr.nd.gov/oilgas/subscription-service.asp>

Lineament Density (ft/mi²)



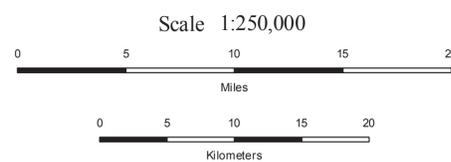
Geologic Features



Other Features



The map area is a constructed 250k sheet. Belden, Belden SE, Belden SW, and Sikes Dam are the four center 24k quadrangles.



Mercator Projection
Standard parallel 47° 22' 30"
1927 North American Datum
Central meridian 102° 07' 30"