GAS PRODUCTION IN JIM HOGG COUNTY, TEXAS

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There are multiple factors that affect gas production in a given location. One of those factors could be the market price for each commodity. Jim Hogg County in South Texas has had active gas production for many years; this analysis focuses on a nine-year period from 2000 through 2008. Is there a correlation between production and market prices for gas during this time period in Jim Hogg County? What patterns can de discerned in other factors connected to production?

I began my search for gas prices on the web and found two helpful resources. The Energy Information Administration, part of the U.S. Department of Energy, provides historical data which I converted into a spreadsheet. Prices fluctuated during the period from 2000 to 2008. Would this be reflected in production? The Texas Railroad Commission maintains data for gas production down to the county level; this resource enabled me to collect data exclusive to Jim Hogg County.

DrillingInfo provides a variety of information to members in the oil and gas industry. I focused my search on new production for the specified time period and gathered data on new production for each year. I found shapefiles for the county boundary at the Texas Tech University Center for Geospatial Technology and for the land survey outlines at the Texas Natural Resources Information System.

Sources:

1. Texas Natural Resources Information System (original Texas land survey shapefile)
2. DrillingInfo (production shapefile)
3. Texas Tech University Center for Geospatial Technology (County boundary shapefile)
4. U.S. Department of Energy, Energy Information Administration (oil and gas price data)
5. Texas Railroad Commission (annual oil and gas production data)

Having obtained information, I then created a geodatabase within ArcCatalog to organize my data.

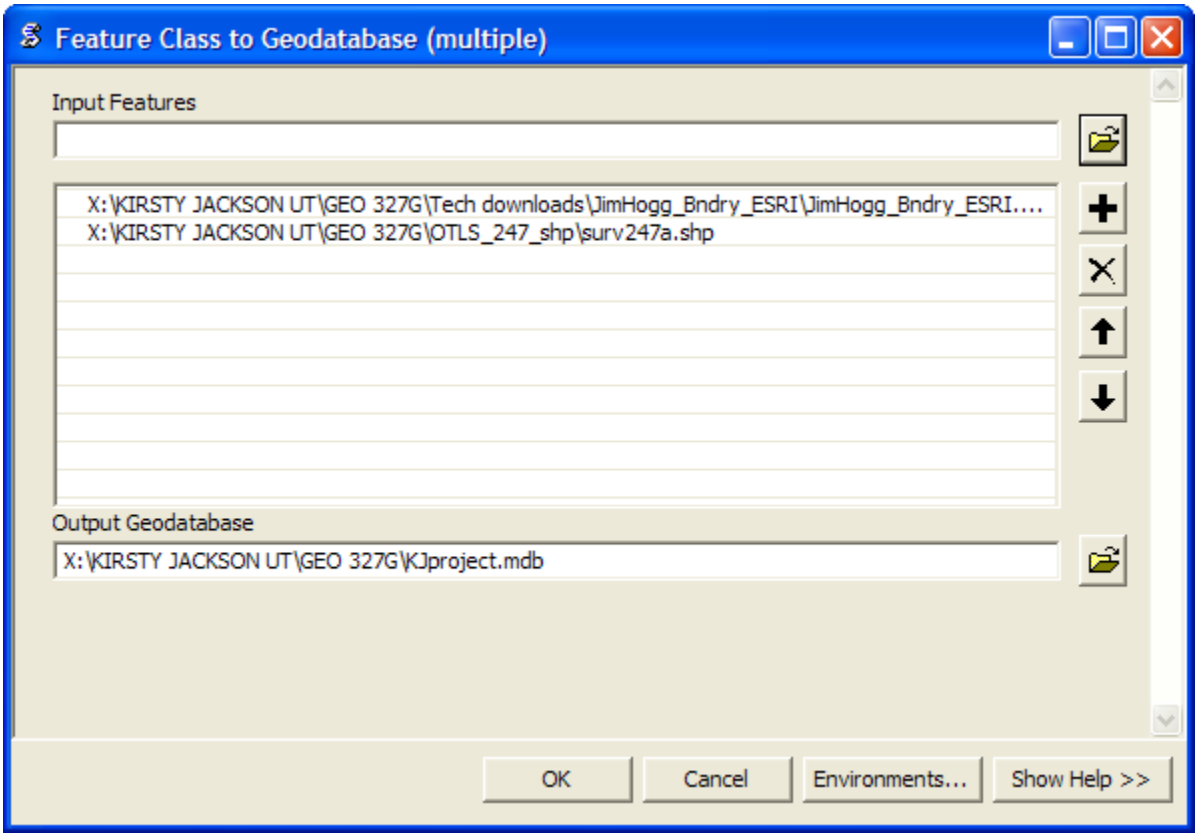

Figure 1: importing files into the geodatabase

Production

According to the DrillingInfo production data, there are 1766 oil and gas wells in Jim Hogg County. I extracted the 254 wells which began producing during the years 2000 through 2008. Of these 235 are gas wells so I further narrowed my selection to them.

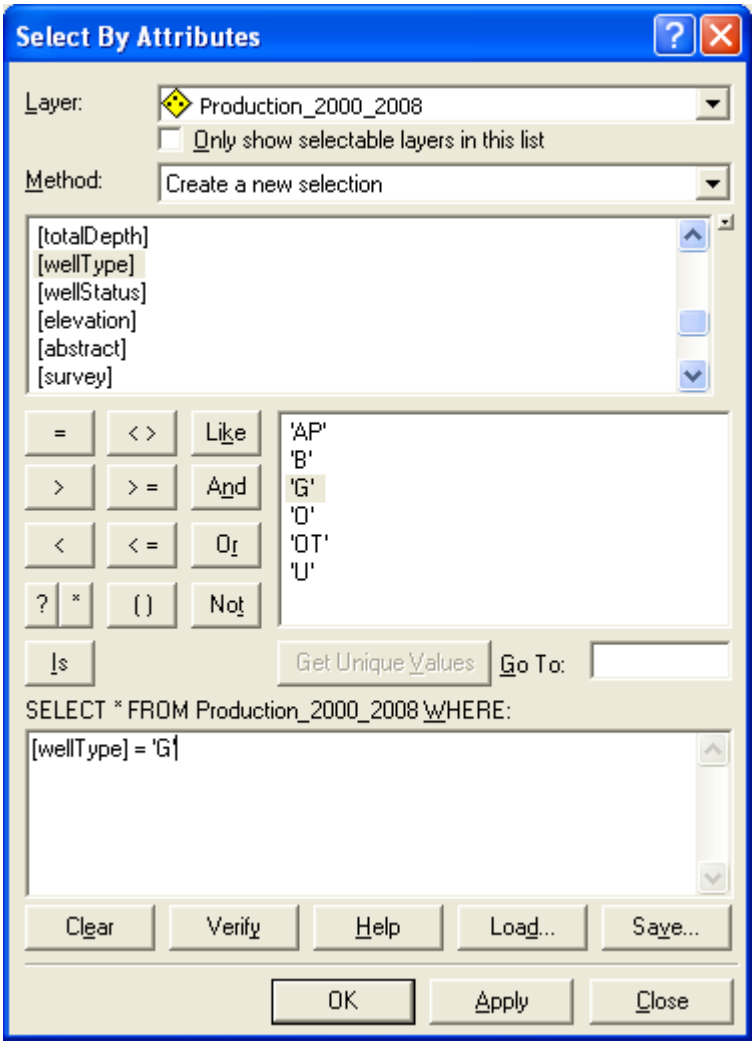

Figure 2: selecting gas wells

The date of first production is in a month/day/year format; my concern is only the year. I created a new field for year and the associated domains for each year.

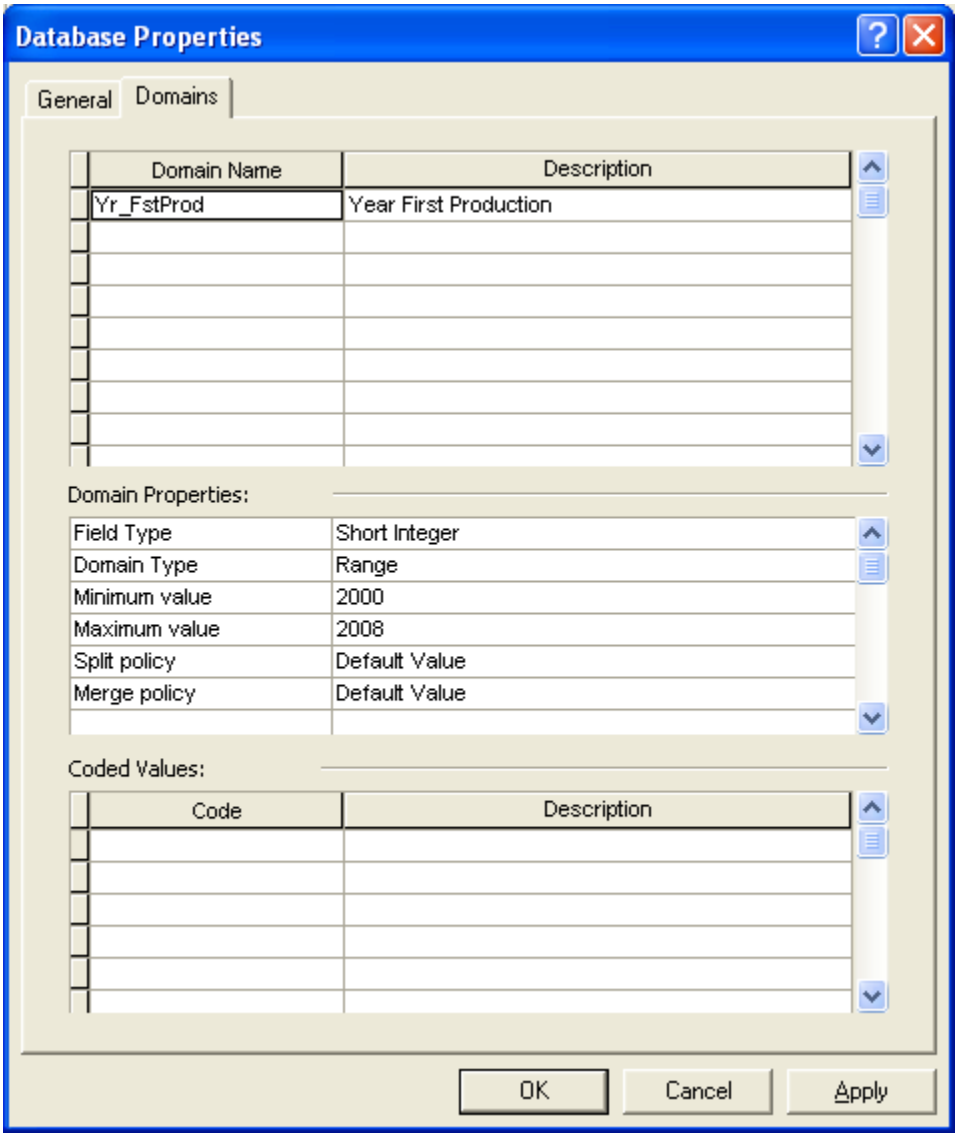

Figure 3: Creating new attribute range domain

As seen in the map “New Production by Year” there does not appear to be a specific pattern associated with the locations of new wells from year to year. The time period may not be long enough – there might be an observable trend over many years. Or there may not be any spatial component to the new well locations.

Well depth

The range of values for the total depth of the wells under production is 276 to 18,208 feet. Analysis of the data shows that there is a spatial component to these values; see the map “Well Depth”. Spatial statistics tools in ArcToolbox provide several methods for this analysis. The Global Moran’s I test measures spatial autocorrelation; it addresses possible clustering of high and low values across the study area.

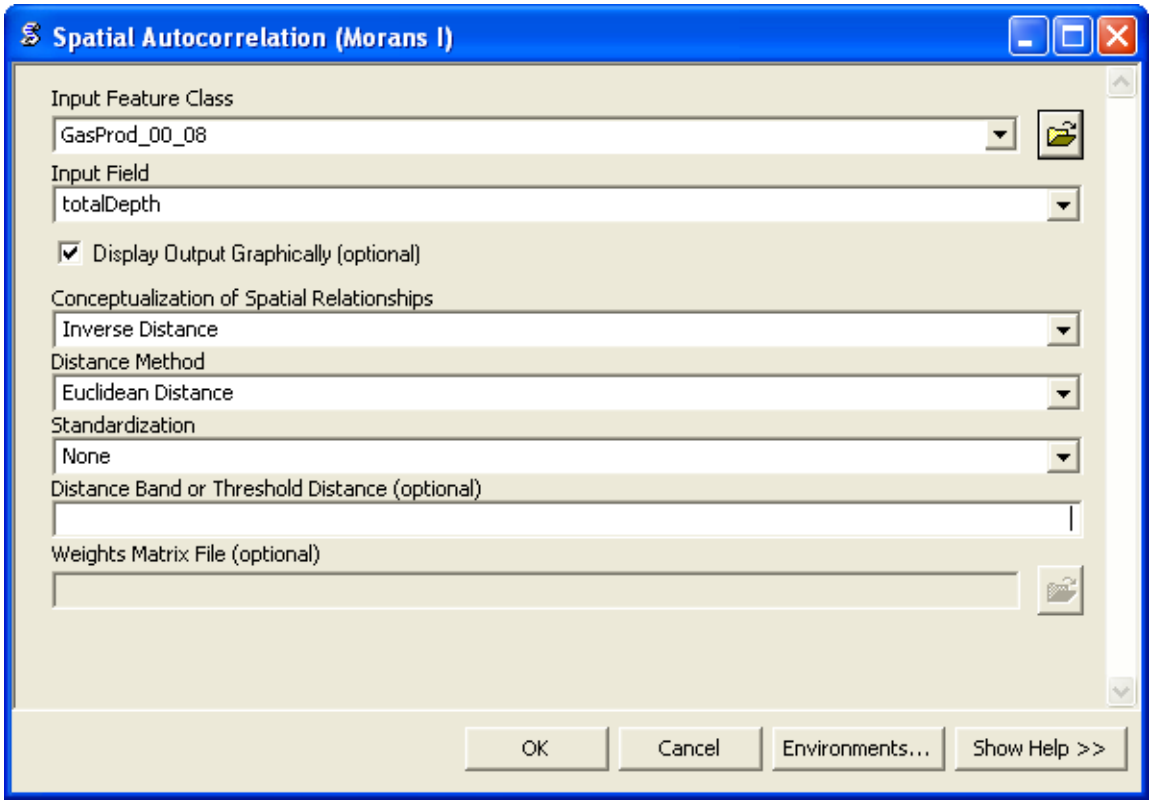

Figure 4: Moran's I input

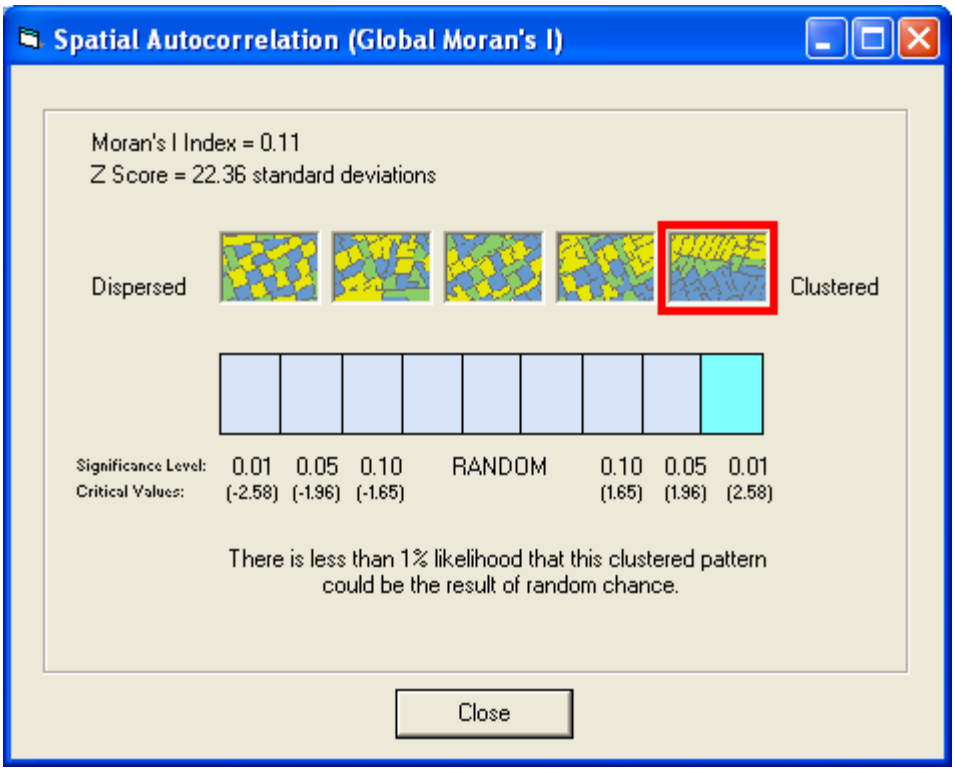

Figure 5: Moran's I results

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Global Moran's I Summary
Moran's Index:   0.107386
Expected Index:  -0.004274
Variance:        0.000025
Z Score:         22.360932
p-value:         0.000000
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Applying this tool to the well depth reveals a high degree of clustering. Geology plays a major role in production – this could be the reason behind the observed spatial autocorrelation.

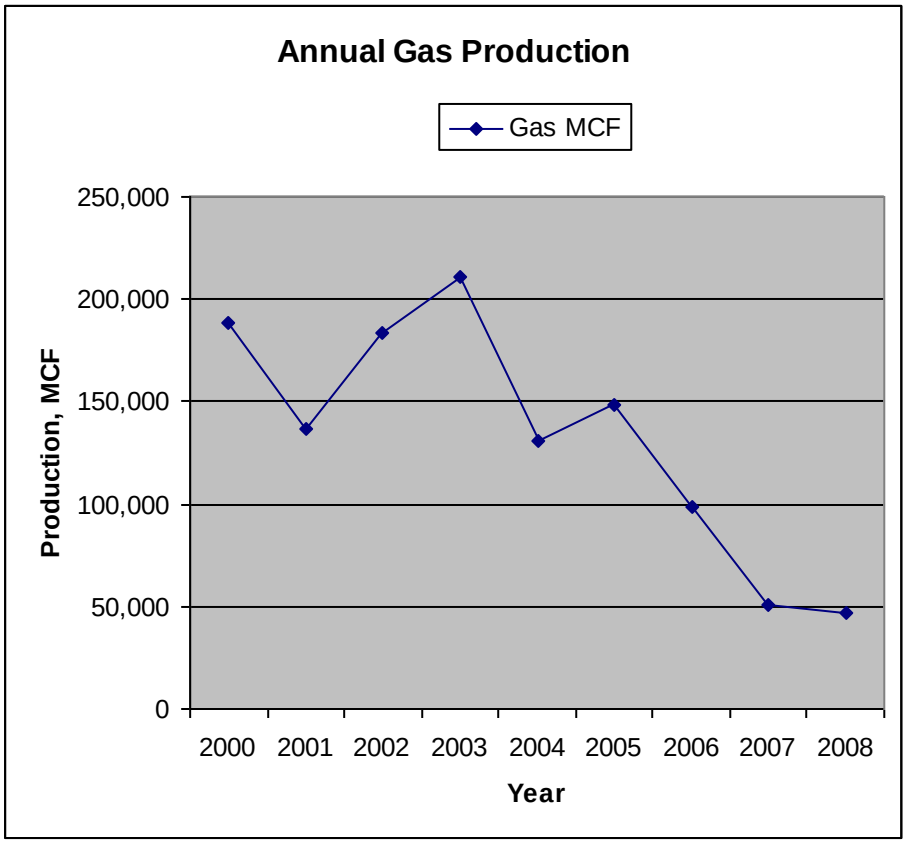
Operators

A number of companies are involved in production in the county. During the study time period thirty-six companies commenced production in the area. Was the activity of some more numerous and were they operating in close proximity? Some companies operated only one well while one company dominated with nearly half the total new wells in operation. As seen in the map “Operators” company wells did tend to be near each other. Mestena Operating, L.L.C. has a focus in the northeast portion of the county (seen in green) while BP America Production Company (seen in brown) is active entirely within a survey in the northwestern part of Jim Hogg.

Production and Pricing

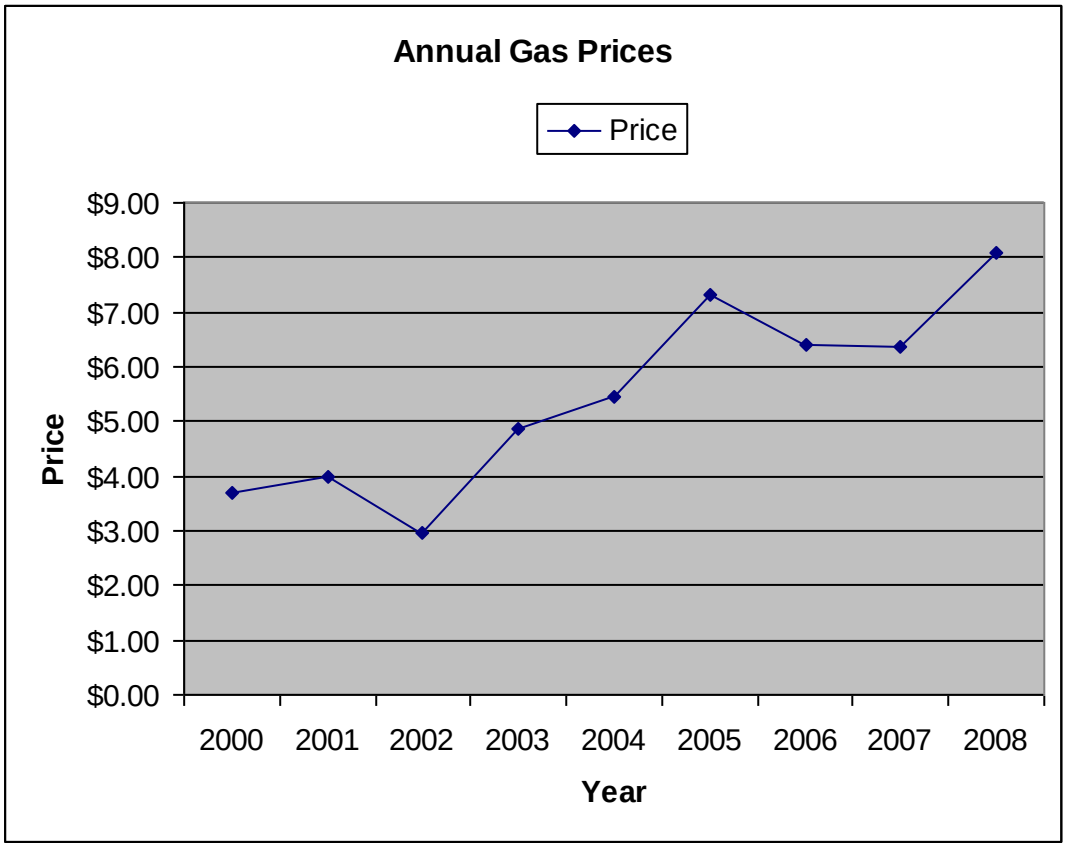
Annual production data from the Texas Railroad Commission shows that total production from both new wells and those in operation before 2000 experienced a decrease over the nine year study period. The highest amount was 210, 913 MCF in 2003 and the lowest was 46,964 MCF in 2008.

Year	**Production (MCF)**
2000	188,544
2001	136,231
2002	183,954
2003	210,913
2004	130,542
2005	148,099
2006	98,181
2007	50,708
2008	46,964

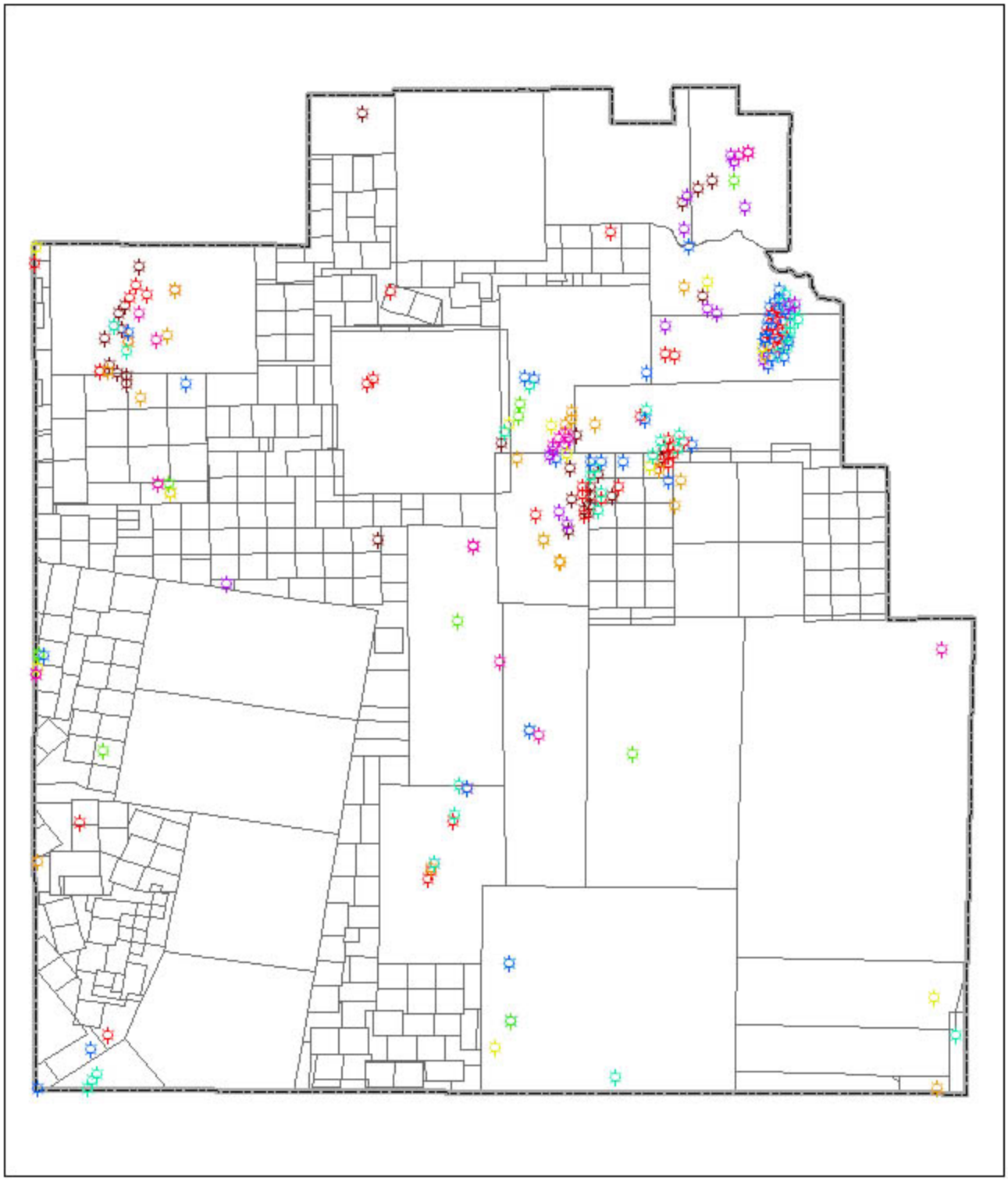


How do the production levels compare with gas prices during the 2000 – 2008 period? The Energy Information Administration of the U.S. Department of Energy tabulates pricing data. According to their records the overall trend was towards prices increasing during the nine years under examination.

Year	**Price**
2000	$3.68
2001	$4.00
2002	$2.95
2003	$4.88
2004	$5.46
2005	$7.33
2006	$6.39
2007	$6.37
2008	$8.07



Much of economics can be distilled down to the market forces of supply and demand. One could reasonable expect that a rise in prices would be associated with a rise in production. But in this analysis we find the opposite to be true for gas production in Jim Hogg County. While gas prices followed an upward trend from 2000 through 2008, overall gas production fell. The energy market is a complicated one, subject to a myriad of factors including geology, weather, war, and politics. This glimpse at a small corner of the industry raises some interesting questions worthy of closer examination.



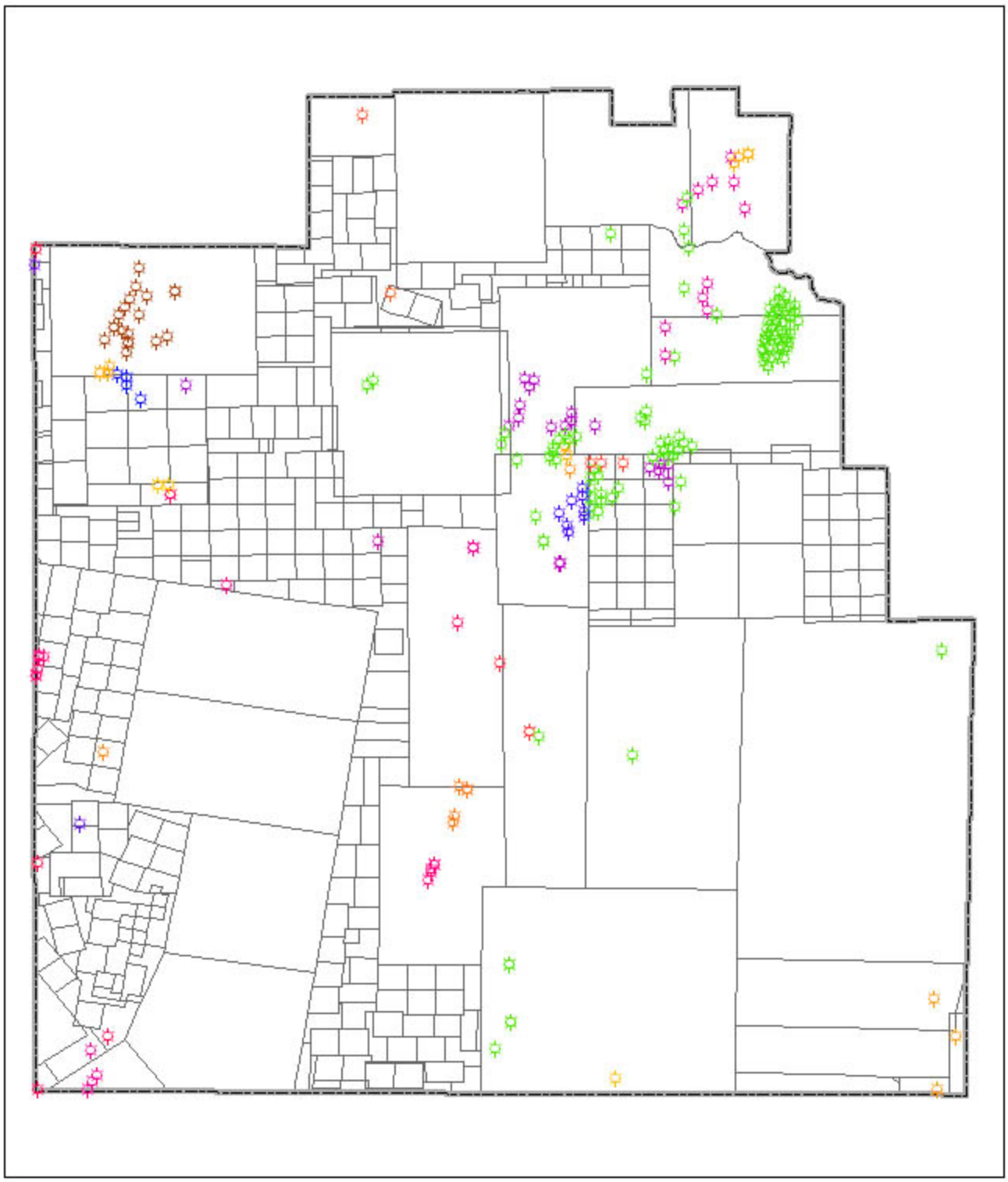
New Production by Year

2000
2001
2002
2003
2004
2005
2006
2007
2008
County Boundary
Land Surveys

N

1:375,000
NAD 1927

0 2 4 8 12 16
Kilometers



ACOCK OPERATING LTD
ASPEN EXPLORATION, INC.
BP AMERICA PRODUCTION CO.
BURNS PRODUCTION CORP.
CENTURY RESOURCES INC.
CHESAPEAKE OPERATING INC.
CHEVRON U.S.A. INC.
CODY ENERGY LLC
COX, MARTIN REGAN
EDDE PETROLEUM OPER. CO.
EOG RESOURCES INC.
EXXON MOBIL CORP.
FOREST OIL CORP.
FUTURE PETROLEUM CO.
HANNAH OIL & REFINING CO.
HEADINGTON OIL CO.
HUGHES, DAN A. CO.
LIGHTHOUSE EXPLORATION INC.
MESTENA OPERATING L.L.C.
NEWFIELD EXPLORATION CO.
PFEIFFER OIL, L.L.C.
POGO PRODUCING CO.
PRIME OPERATING CO.
REPUBLIC RESOURCES, LLC.
RLU OPERATING, LLC
SAFARI PRODUCTION CO.
SAMSON LONE STAR, LLC
SOUTHWINER DRILLING CORP.
STEPHENS & JOHNSON OPERATING CO.
TEPEE PETROLEUM CO., INC.
TEXAS SOUTHERN PETROLEUM CORP.
TORVICAL OPERATIONS, INC.
WADI PETROLEUM, INC.
WAGNER OIL CO.
WAGNER OIL COMPANY
XTO ENERGY INC.
ZACHRY EXPLORATION, INC.
County Boundary
Land Survey

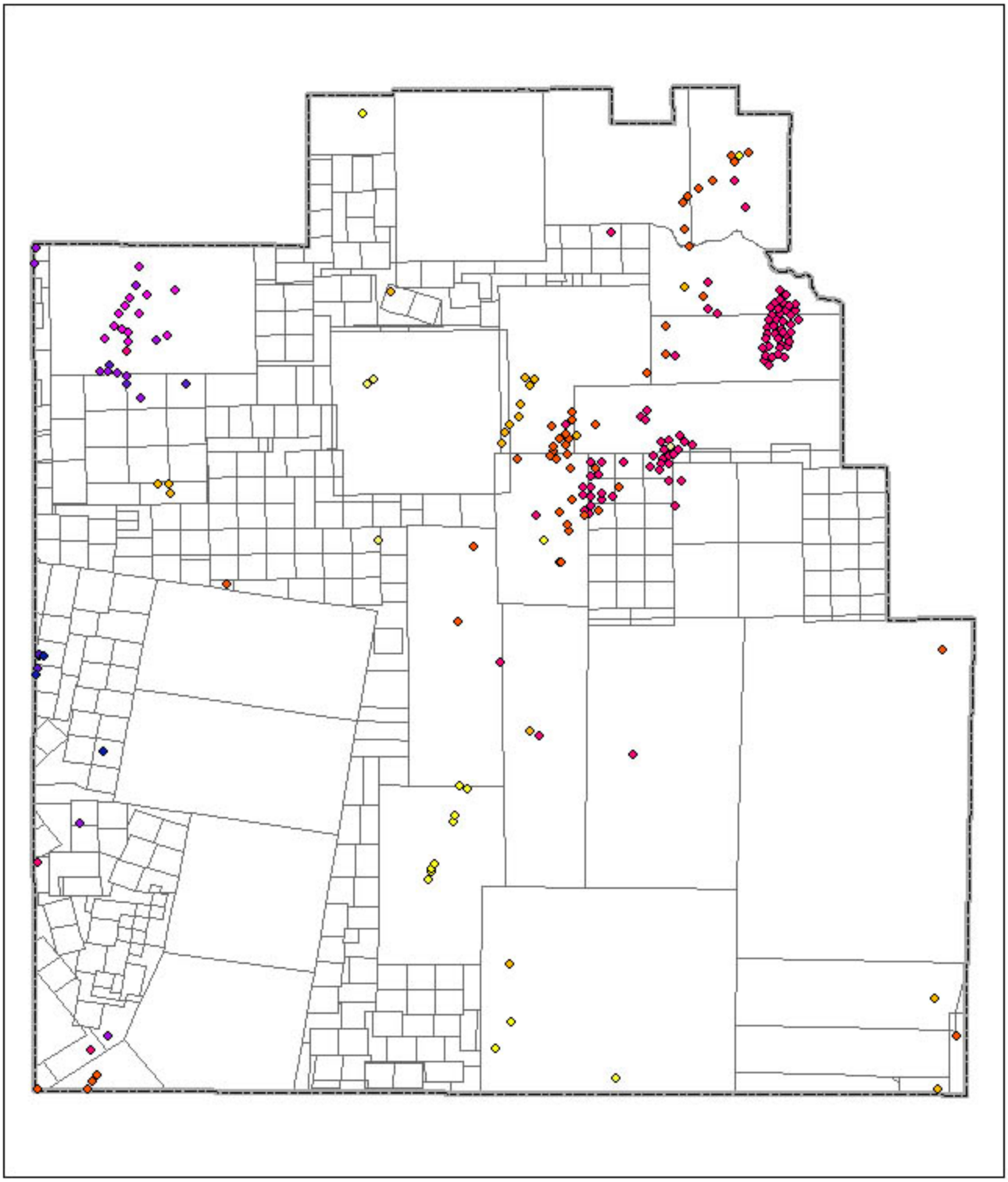
N

1:375,000

NAD 1927

0 2 4 8 12 16 Kilometers

Well Operators



Well Depth

- 276 - 2000
- 2001 - 4000
- 4001 - 6000
- 6001 - 8000
- 8001 - 10000
- 10001 - 12000
- 12001 - 14000
- 14001 - 16000
- 16001 - 18000
- 18001 - 20000
- County Boundary
- Land Surveys

N

1:375,000

NAD 1927

0 2 4 8 12 16 Kilometers