

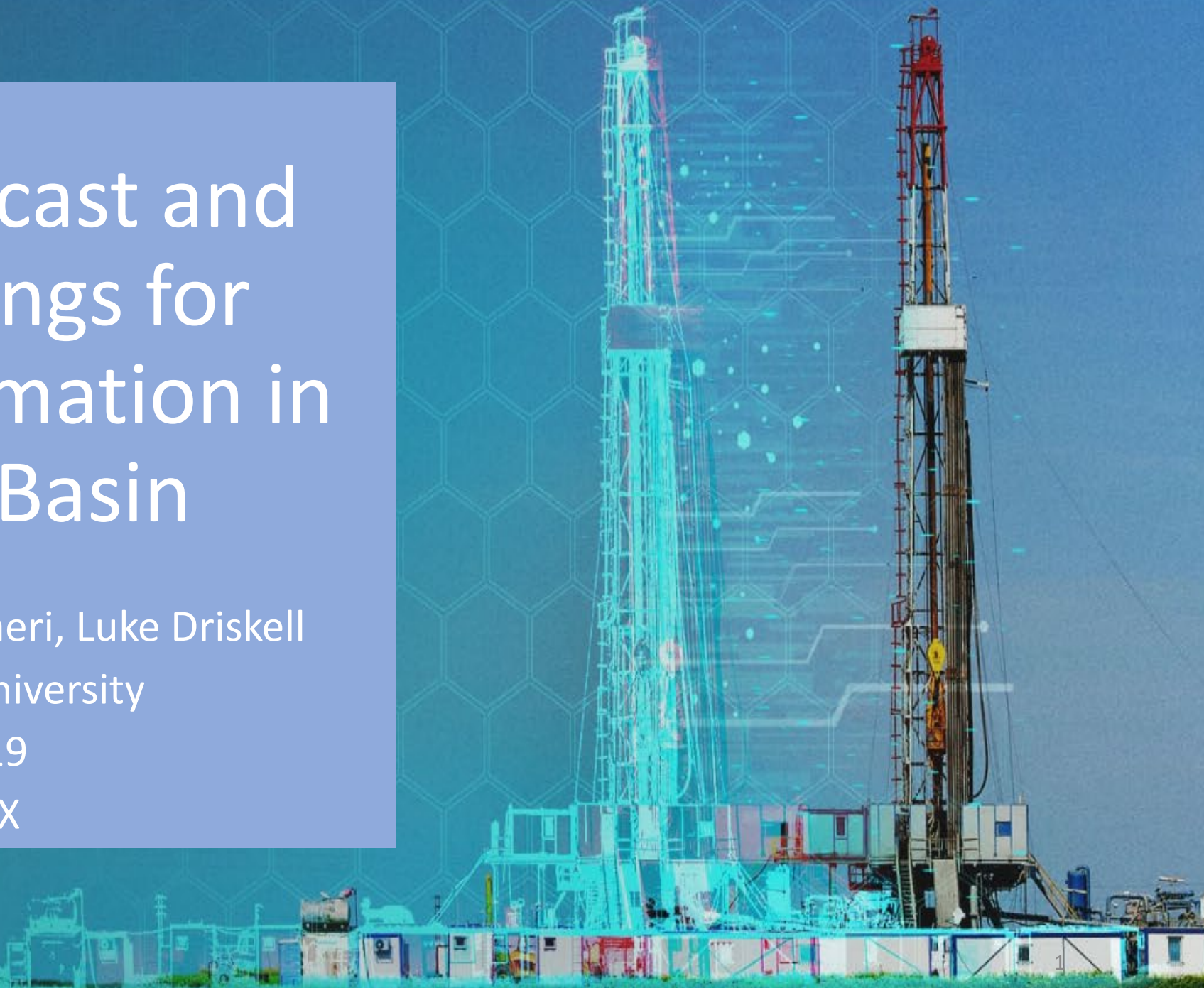
# Reserve Forecast and Lease Rankings for Wolfcamp formation in Delaware Basin

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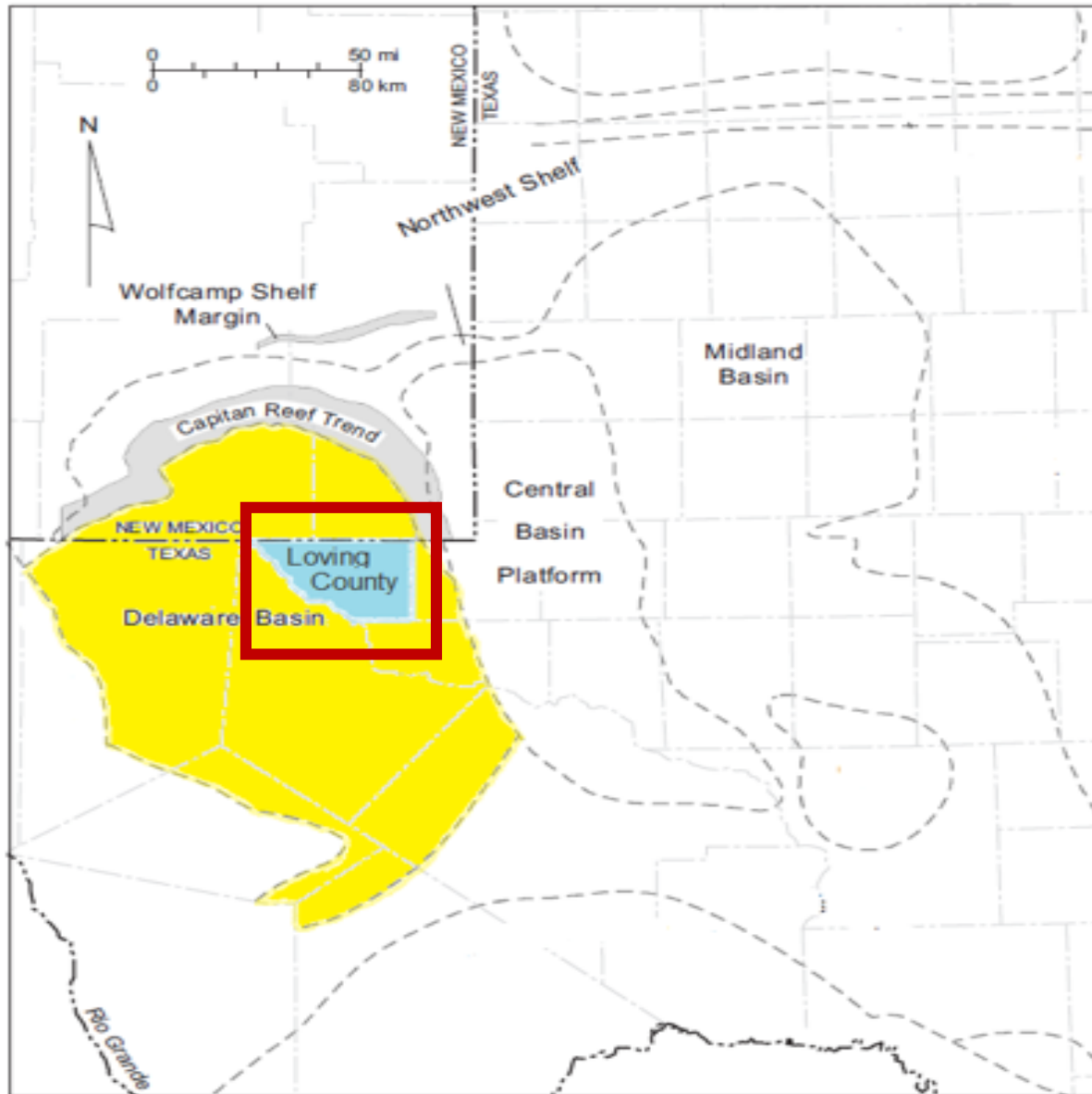
Louisiana State University

16 May 2019

Houston, TX



Permian Basin covers area of approximately 75,000 sq. miles



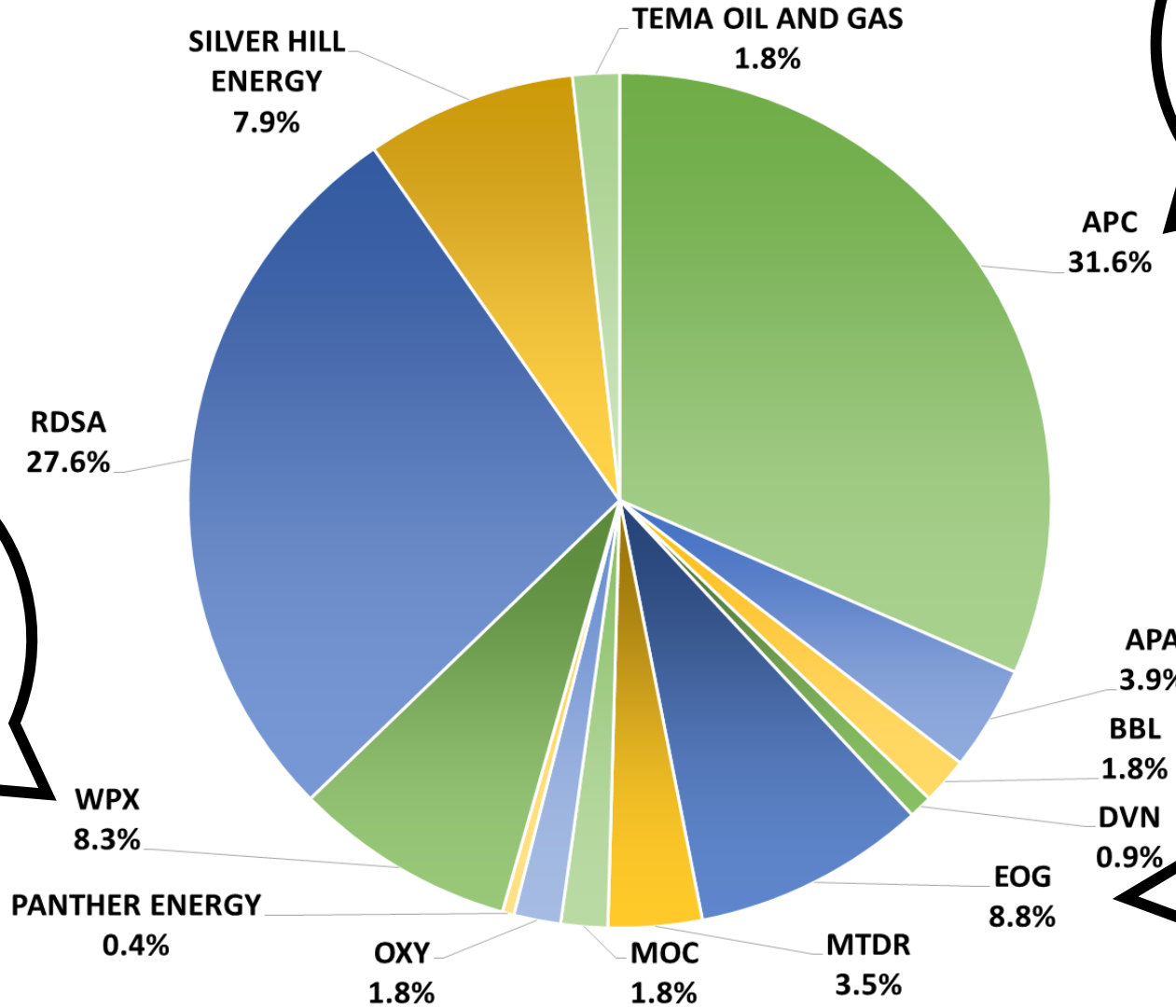
| Delaware Basin |                    |                             |
|----------------|--------------------|-----------------------------|
| <b>Permian</b> | <b>Bone Spring</b> | Brushy Canyon               |
|                |                    | Avalon Shale                |
|                |                    | 1 <sup>st</sup> Bone Spring |
|                |                    |                             |
|                |                    | 2 <sup>nd</sup> Bone Spring |
|                |                    |                             |
|                | <b>Wolfcamp</b>    | 3 <sup>rd</sup> Bone Spring |
|                |                    | Wolfcamp A                  |
|                |                    | Wolfcamp B                  |
|                |                    | Wolfcamp C                  |
|                | Wolfcamp D         |                             |

# Texas RRC Public GIS Viewer

The screenshot displays the Texas RRC Public GIS Viewer interface, which is split into two main panels. The left panel shows a regional map of Texas with its 10 Regulatory Districts (RDs) outlined in green and labeled: 1, 2, 3, 4, 5, 6, 7A, 7B, 7C, 8, 8A, 9, and 10. Major cities like Houston, San Antonio, Austin, Dallas, Fort Worth, Midland, El Paso, Albuquerque, and Santa Fe are marked. The right panel provides a detailed view of a specific area, showing a grid of well locations. A legend on the right side of the right panel lists various well types and their corresponding symbols: Permitted Location (blue circle), Dry Hole (blue diamond), Oil (green circle), Gas (red star), Oil / Gas (red star with dot), Plugged Oil (green circle with dot), Plugged Gas (red star with dot), Canceled / Abandoned Location (blue circle with slash), Plugged Oil / Gas (red star with dot and slash), Injection / Disposal (red star with dot and slash), Core Test (blue circle with dot), Sulfur Test (red star with dot), Storage from Oil (green circle with dot), Storage from Gas (red star with dot), Shut-In Oil (green circle with slash), Shut-In Gas (red star with slash), Injection / Disposal from Oil (green circle with dot and slash), Injection / Disposal from Gas (red star with dot and slash), Injection / Disposal from Oil / Gas (red star with dot and slash), Geothermal (blue circle with dot), Brine Mining (blue circle with dot), Water Supply (blue circle with dot), Water Supply from Oil (green circle with dot), Water Supply from Gas (red star with dot), Water Supply from Oil / Gas (red star with dot), Observation (blue circle with dot), Observation from Oil (green circle with dot), and Observation from Gas (red star with dot). The top of the interface features navigation tools like 'Go To: SELECT COUNTY', 'Print', and 'Identify Wells'. A search bar on the right of the top panel allows users to 'Find well api or address'. The bottom right corner of the right panel shows the map's coordinates: 'Lat: 31.771311, Long: -103.512875 (WGS 84)'.



# Loving County Operators Review (Q1 2017)

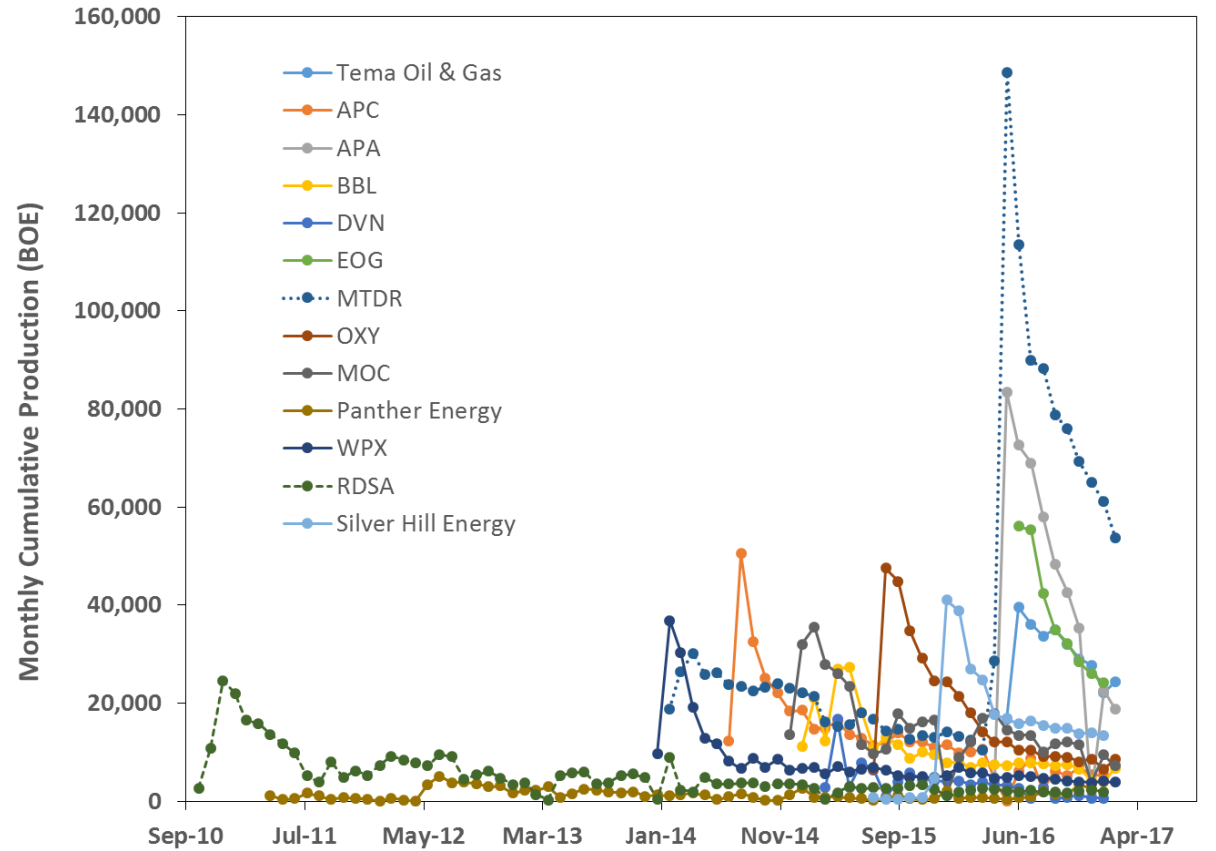
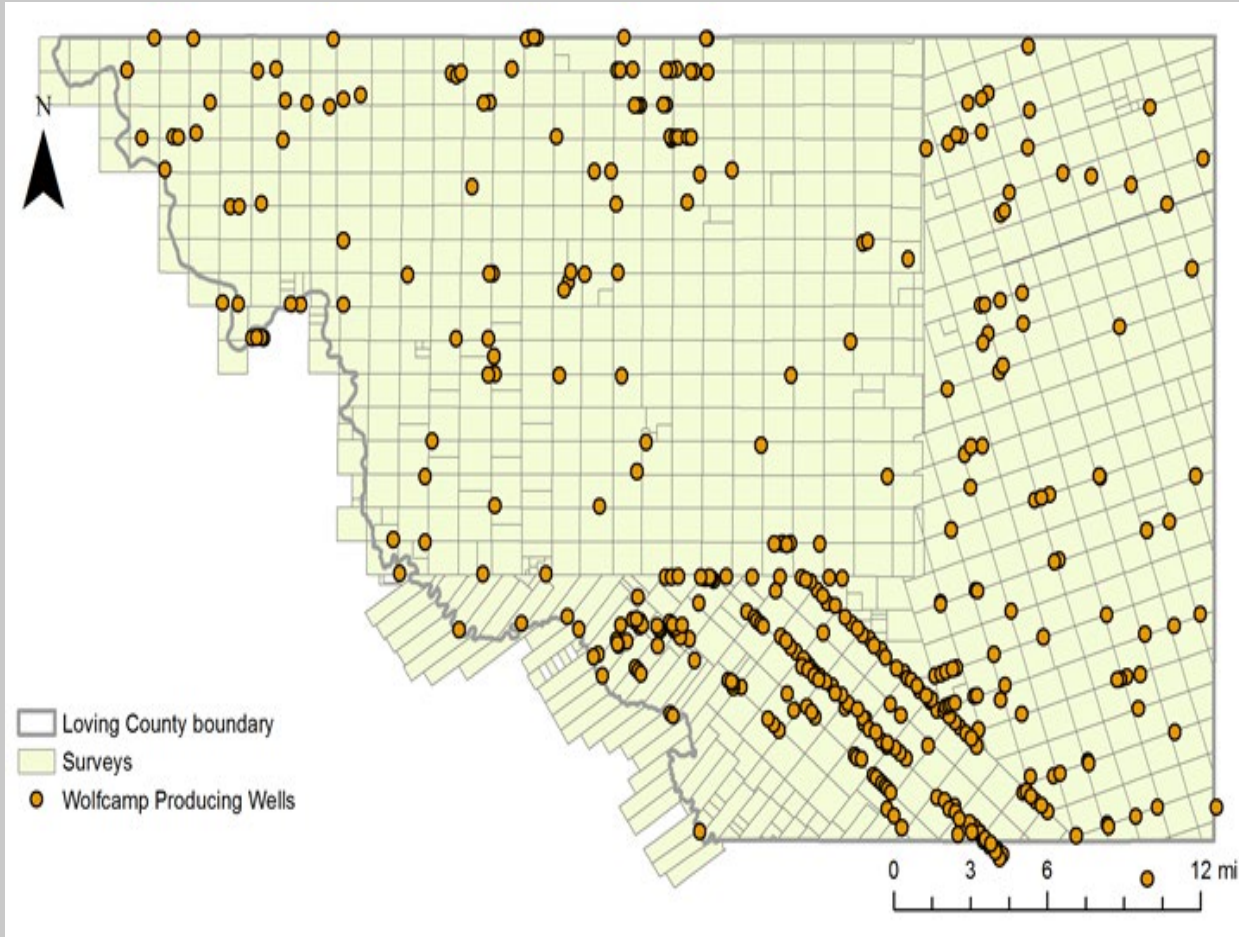


- ❖ > 235,000 net acres (3 bBOE)
- ❖ 54,000 BOED
- ❖ 7,100 ft avg. lateral length

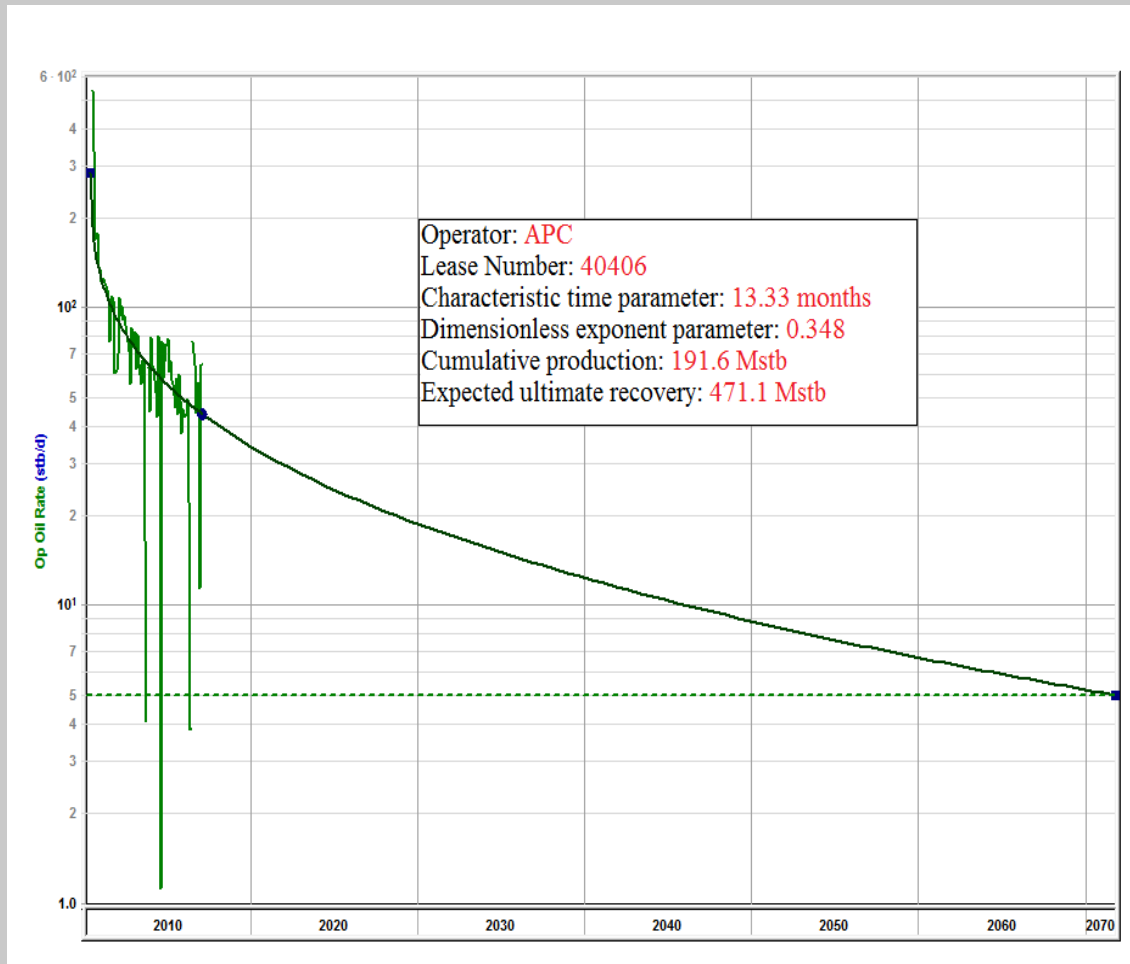
- ❖ > 135,000 net acres
- ❖ One well with 30 days of 1,538 BOED
- ❖ 6,400 drilling locations

- ❖ > 346,000 net acres (2.9 bBOE)
- ❖ 2,660 drilling locations
- ❖ 7,200 ft avg. lateral length
- ❖ 660 ft spacing

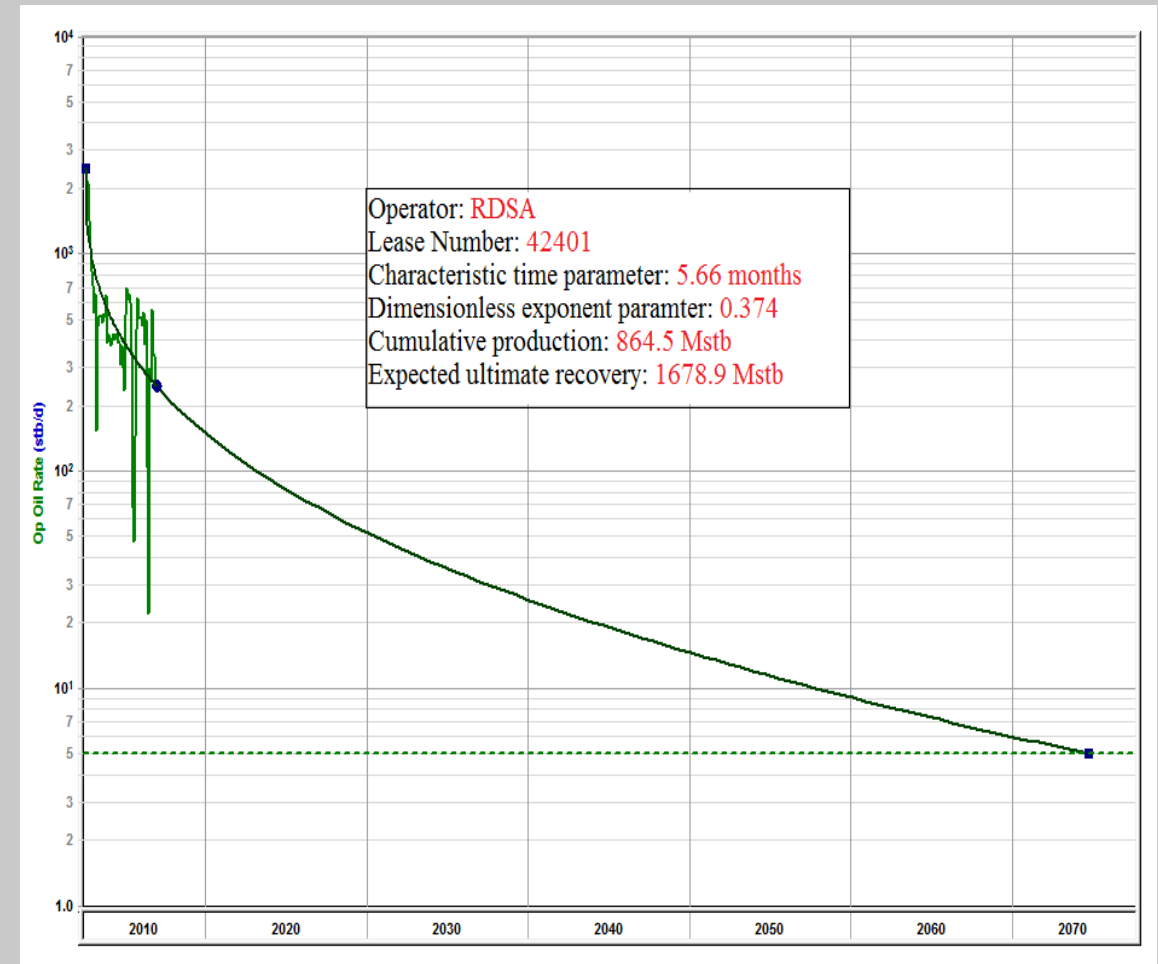
# Loving County Wolfcamp wells distribution (Q1 2017)



# Stretched exponential production decline (SEPD) technique



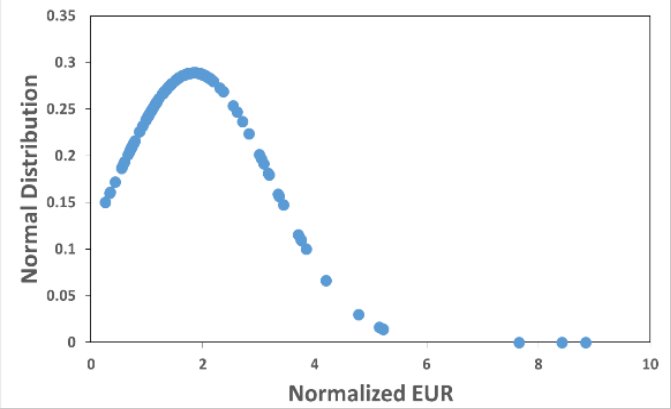
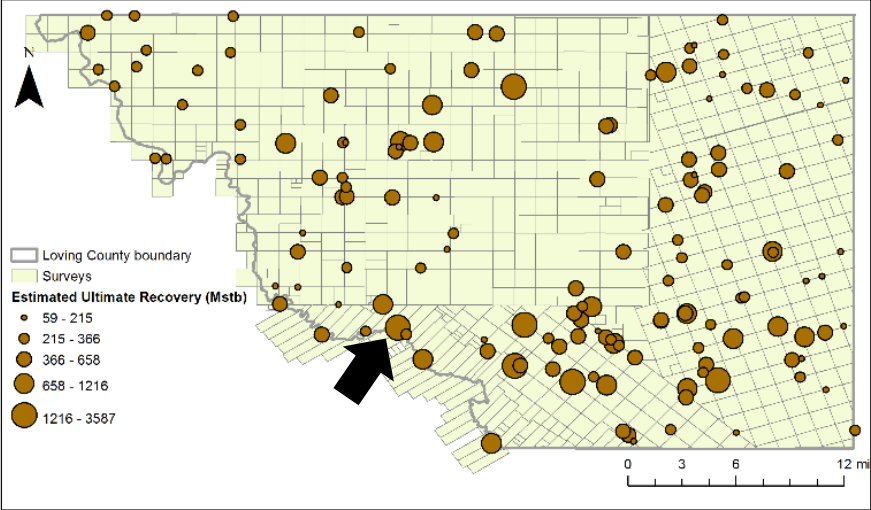
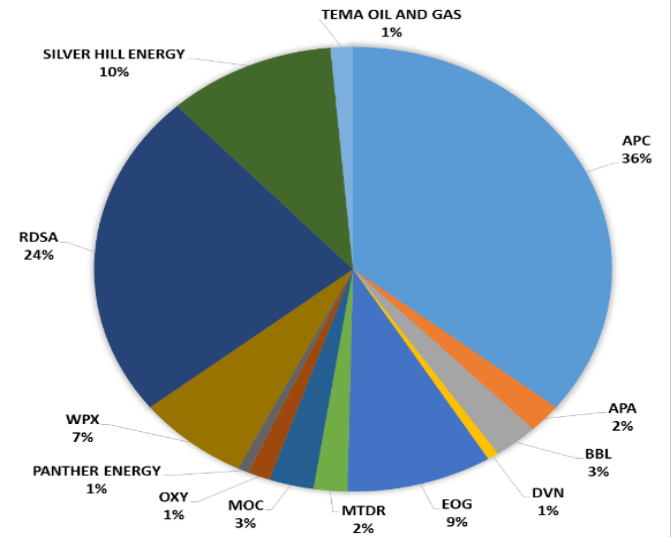
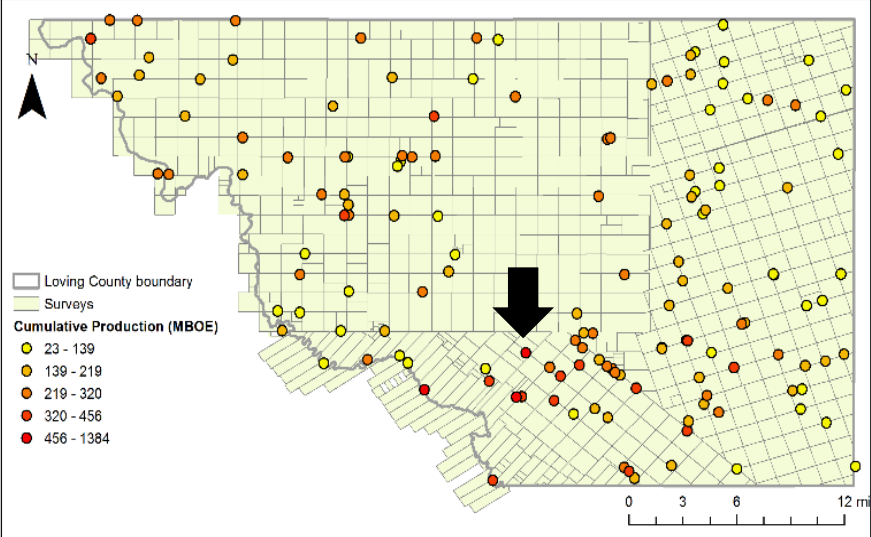
EUR for a single-well lease



EUR for five-plus-well lease

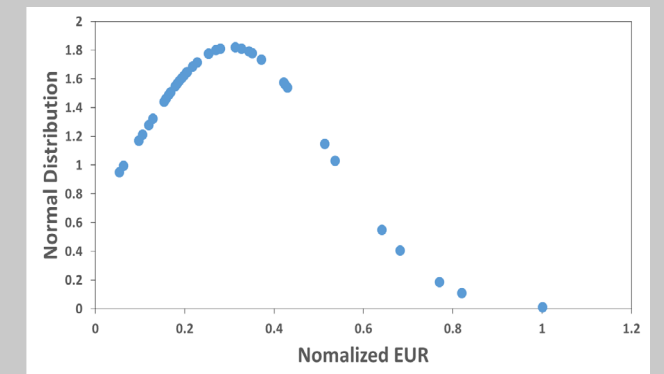
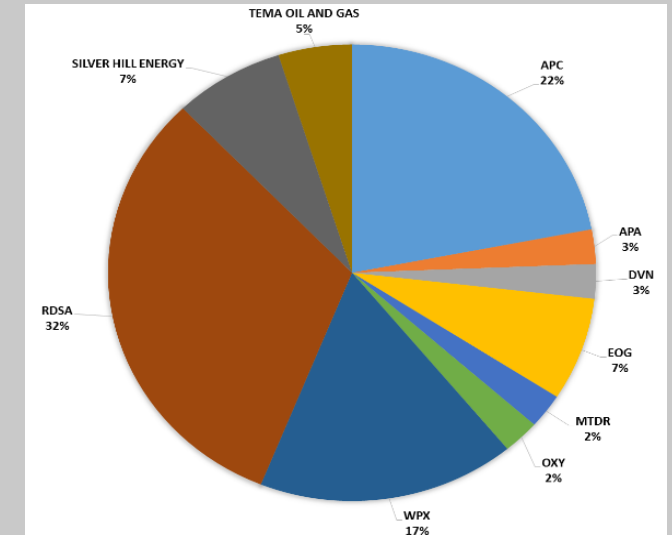
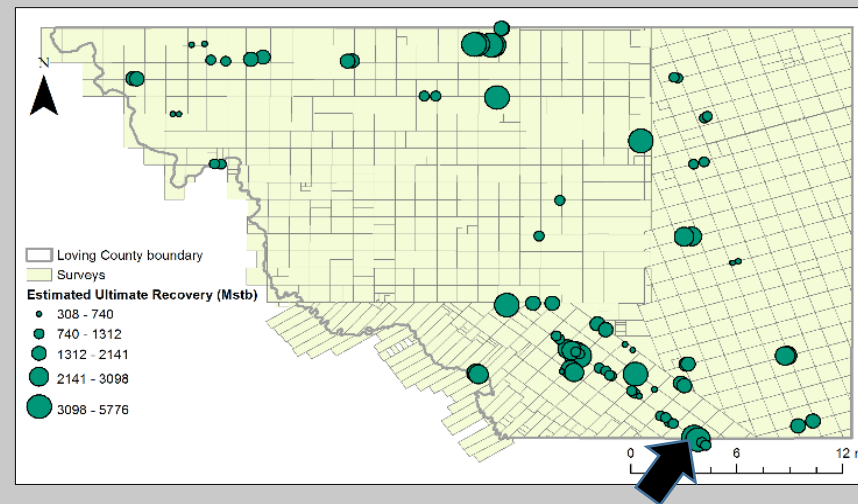
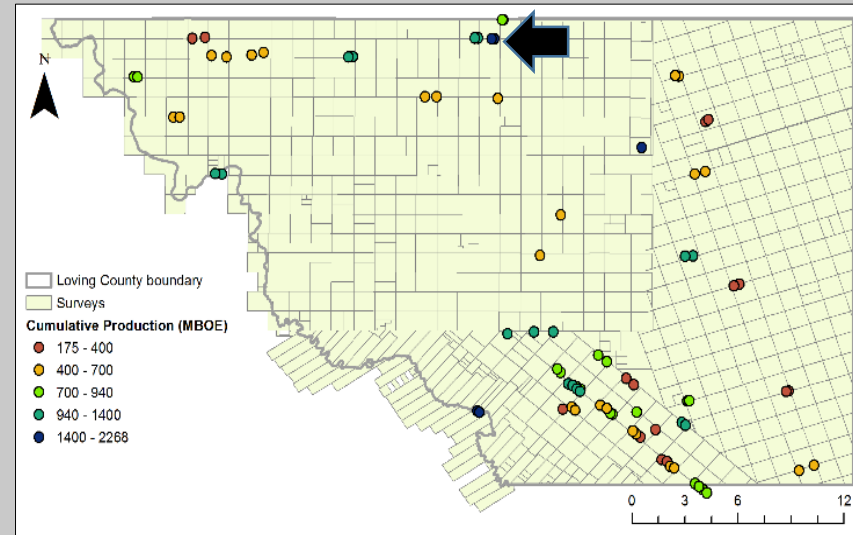
# Single-well lease ranking and reserve forecast

- 152 single-well leases
- APC (36%) and RDSA (24%)
- Maximum cumulative production is 1,384 MBOE
- Highest EUR (2,059 Mstb) and lowest (59 Mstb) both operated by APC
- At least 90% probability that EUR equals or exceeds about 164 Mstb



# Two-well lease ranking and reserve forecast

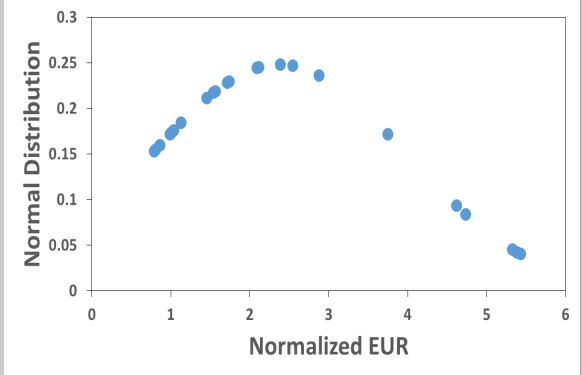
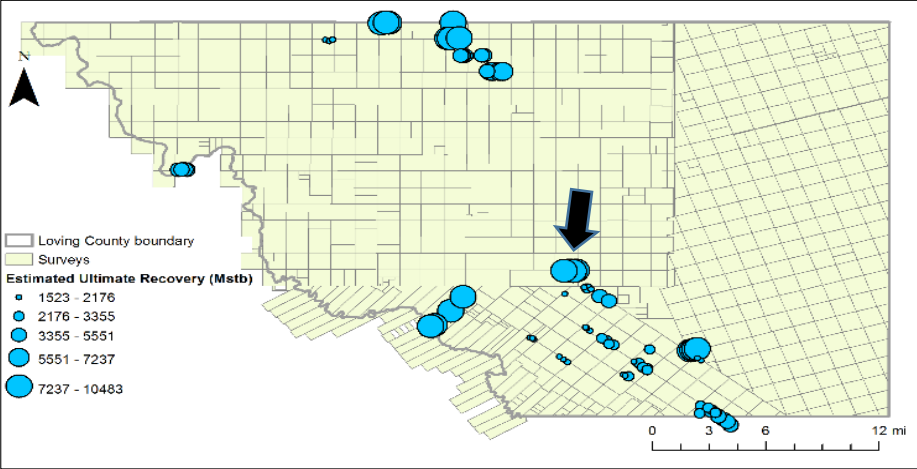
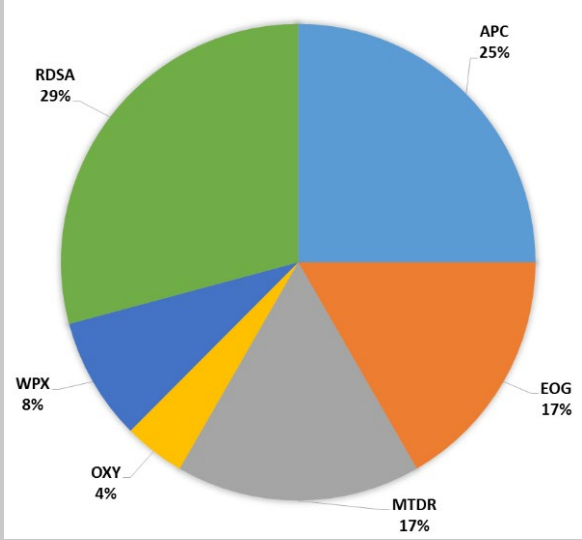
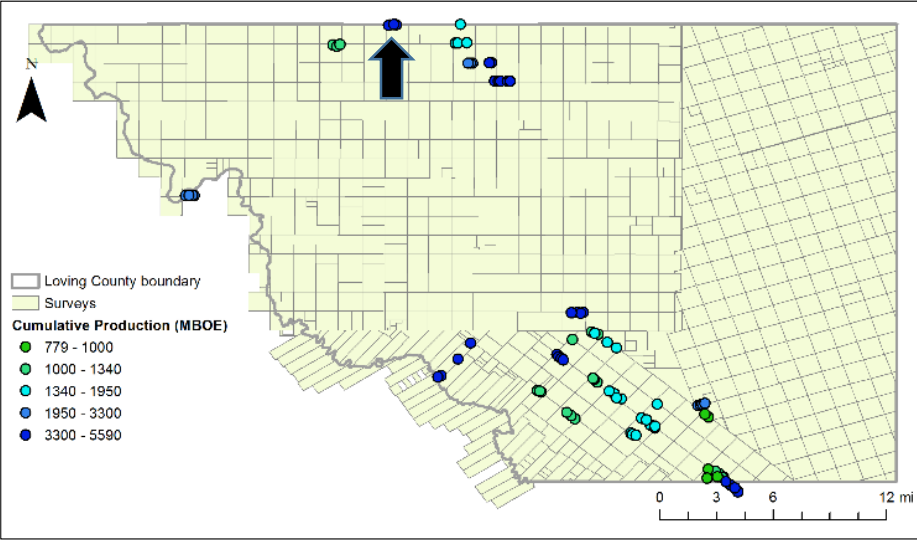
- 41 two-well leases
- RDSA (32%) and APC (22%)
- Maximum cumulative production is 2,268 MBOE
- Highest EUR (5,775 Mstb) and lowest (309 Mstb) both operated by APC
- At least 90% probability that EUR equals or exceeds about 571 Mstb





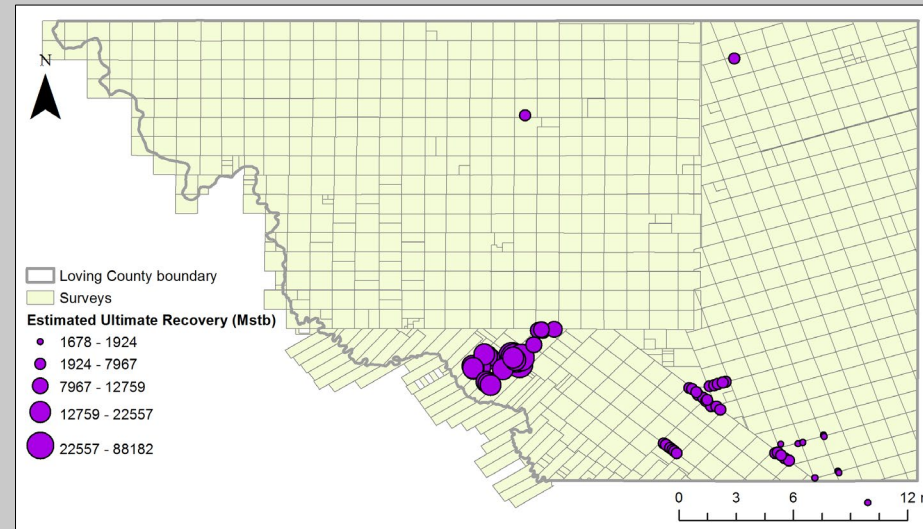
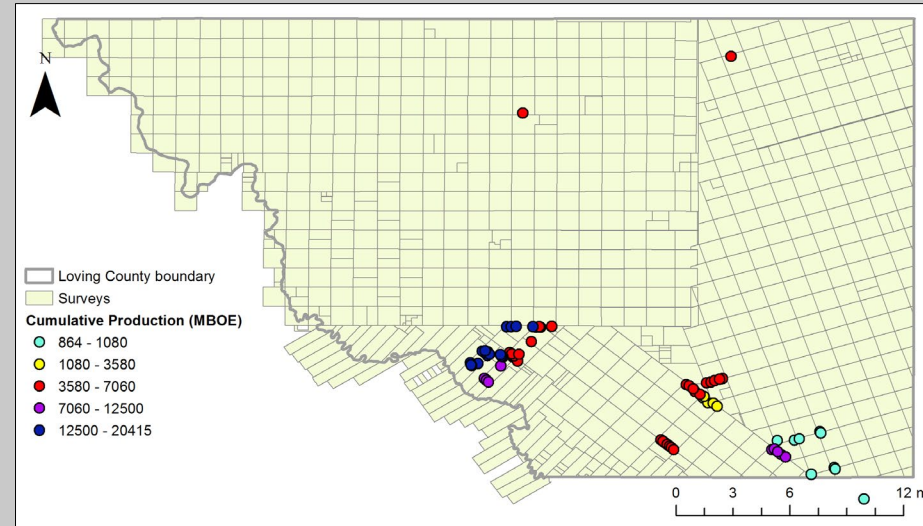
# Three-Four well lease ranking and reserve forecast

- 24 two-well leases
- RDSA (29%) and APC (25%)
- Maximum cumulative production is 5,584 MBOE
- Highest EUR (10,484 Mstb) operated by MTDR
- At least 90% probability that EUR equals or exceeds about 1,611 Mstb



# Five-Plus well lease ranking and reserve forecast

- RDSA (2), APC (4), APA(5)
- Highest EUR (88,183 Mstb) operated by APA (10 wells)
- At least 90% probability that equal or exceed about 1,728 Mstb



## **Acknowledgement**

IHS Harmony was used in this study to perform decline curve analysis on the data obtained from the Texas Railroad Commission (RRC) website. A special thanks to ESRI GIS for ArcGIS Software.