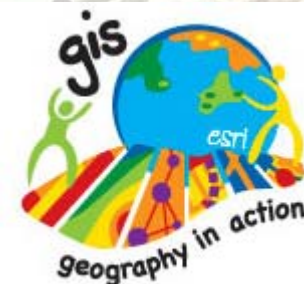


Federal Oil and Gas Accessibility of the United States

Presented by Richard L. Watson
Senior Physical Scientist
USDI - BLM Washington Office
Division of Fluid Minerals

Presented to the 2008 ESRI
International User Conference
San Diego, California
August 5, 2008



The EPCA Inventory

The background of the slide is a photograph of an oil pumpjack in a desert landscape. The pumpjack is a large, mechanical structure used for extracting oil from a well. It is situated in a dry, open area with sparse vegetation and mountains in the distance. The image is slightly faded to allow the text to be clearly visible.

- What is the EPCA Inventory?
- Phase III Inventory
 - Study Area Delineation
 - Spatial Data Needs
 - GIS Methodology
 - Results
 - Additional GIS Analytical Techniques
- Lessons Learned
- Conclusion

Legislative Mandate

Energy Policy and Conservation Act (EPCA) of 2000, Sec. 604

As amended by the Energy Policy Act of 2005, Sec. 347

Requires Interior (lead delegated to BLM), to consult with Agriculture (USFS) and Energy, to conduct an **inventory of onshore Federal lands** identifying the USGS estimate of the **oil and gas resources and any “restrictions or impediments” (constraints)** to their development.

EPCA Steering Committee

❖ Department of the Interior

- Bureau of Land Management – Oil and Gas Restrictions
- Geological Survey – Undiscovered Resources



❖ Department of Agriculture

- Forest Service – Oil and Gas Restrictions



❖ Department of Energy

- Office of Fossil Energy – Technical Assistance
- Energy Information Administration – Reserves Growth



Contractors



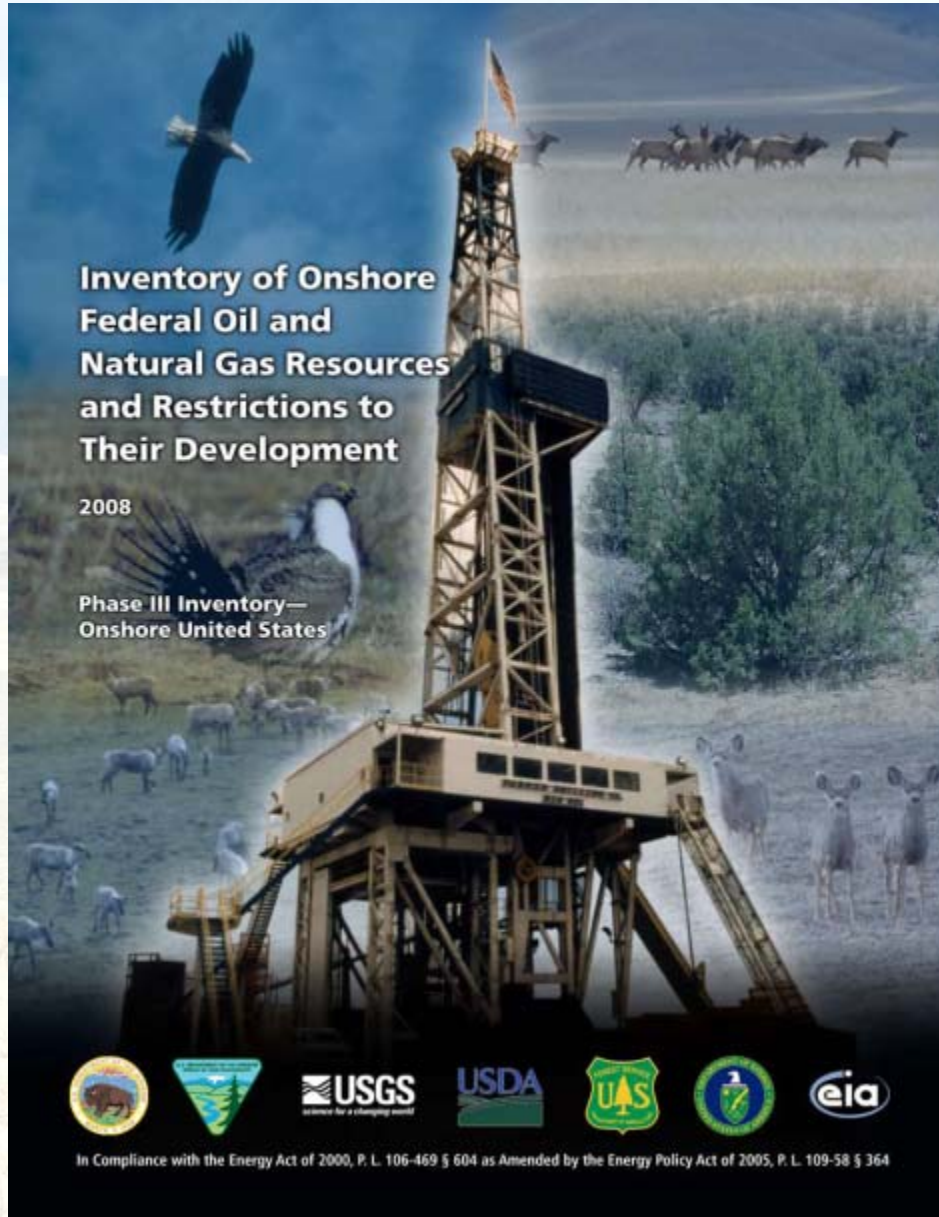
Advanced Resources International
(now Enegis, LLC)

Arlington, VA



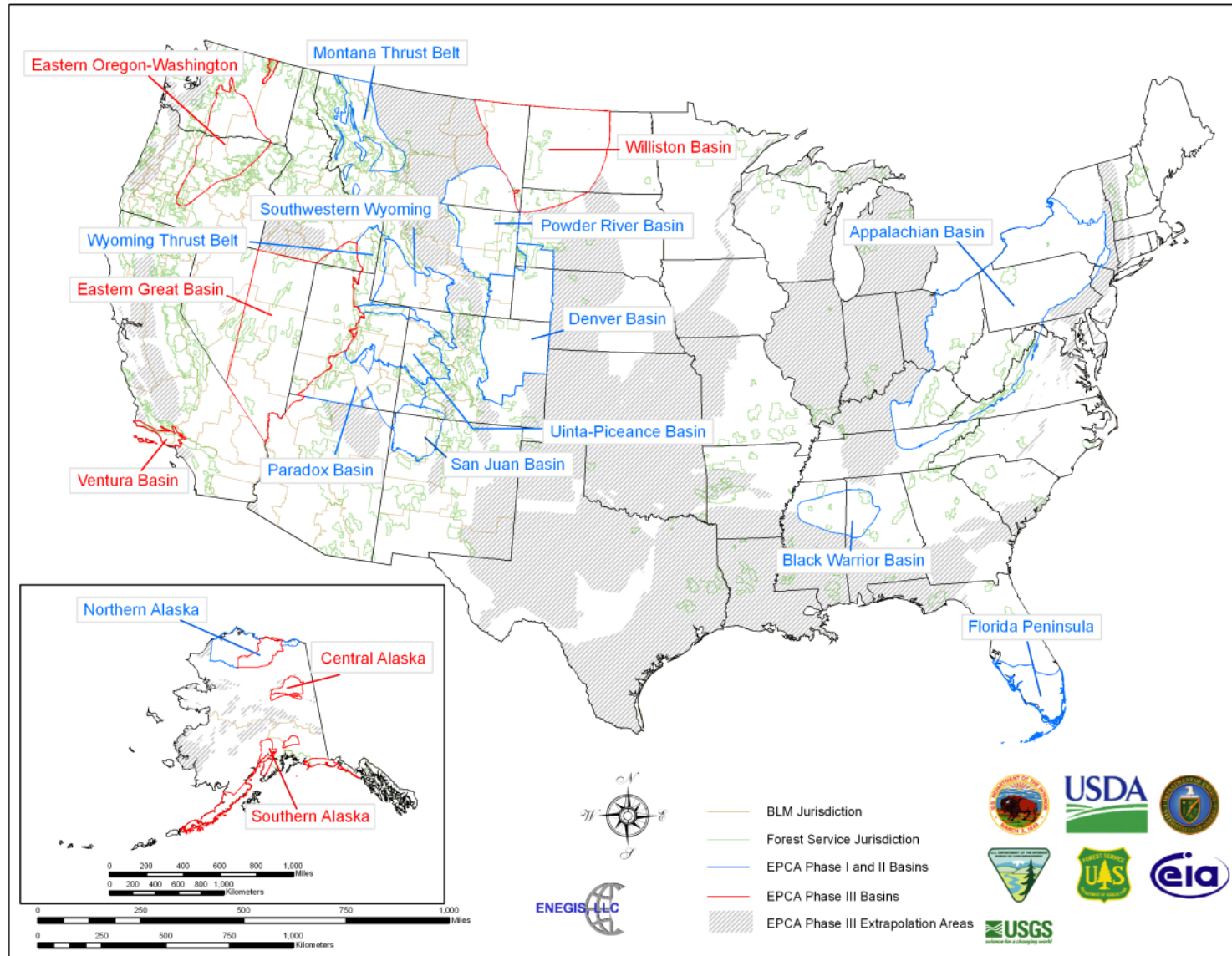
Premier Data Services

Englewood, CO



**Phase III
Inventory
Released
May 2008**

EPCA Phase III Study Areas



Spatial Data Needs

The background of the slide is a photograph of an oil pumpjack in a desert landscape. The pumpjack is a large, yellow metal structure with a long arm and a counterweight, used for extracting oil from a well. It is situated in a dry, open field with sparse, low-lying vegetation. In the distance, there are rolling hills and mountains under a clear sky.

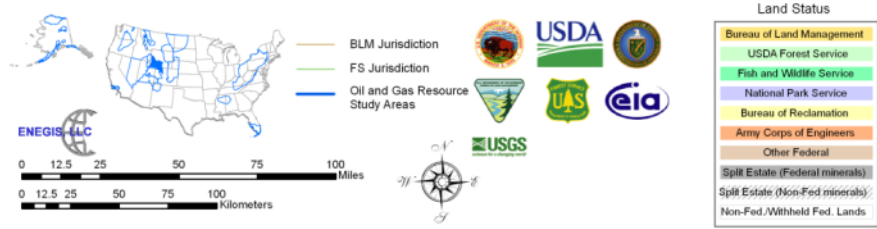
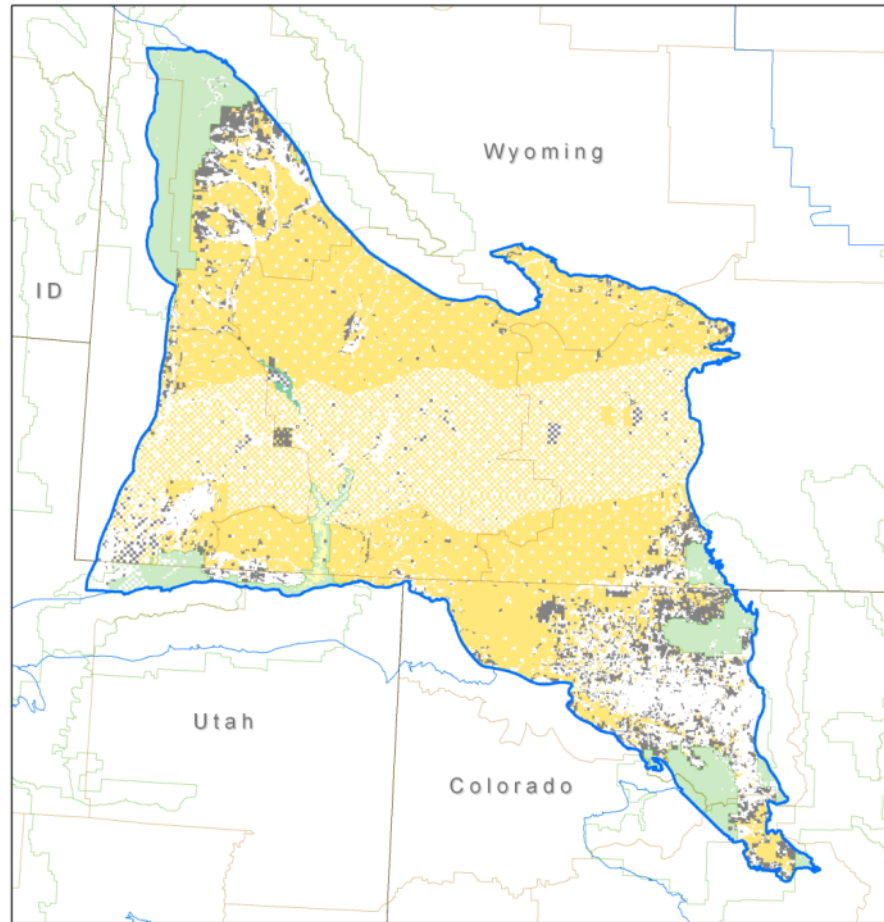
- Layer

- Onshore Federal Mineral (Oil & Gas) Ownership
- Undiscovered Resources and Reserves Growth
- Oil & Gas Lease Stipulations

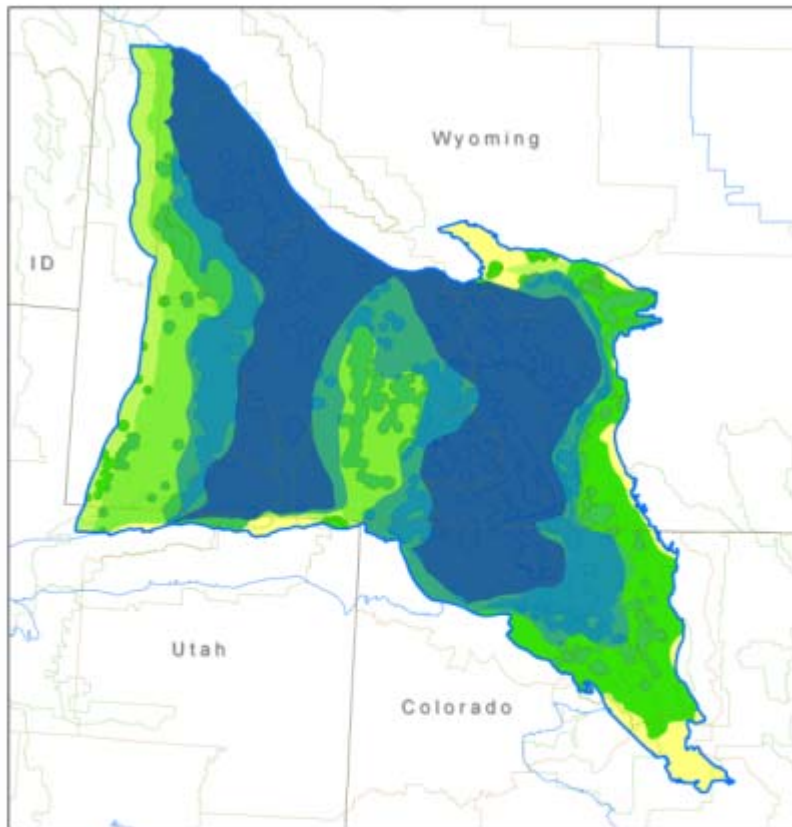
- Source

- BLM
- USGS/EIA
- BLM/USFS

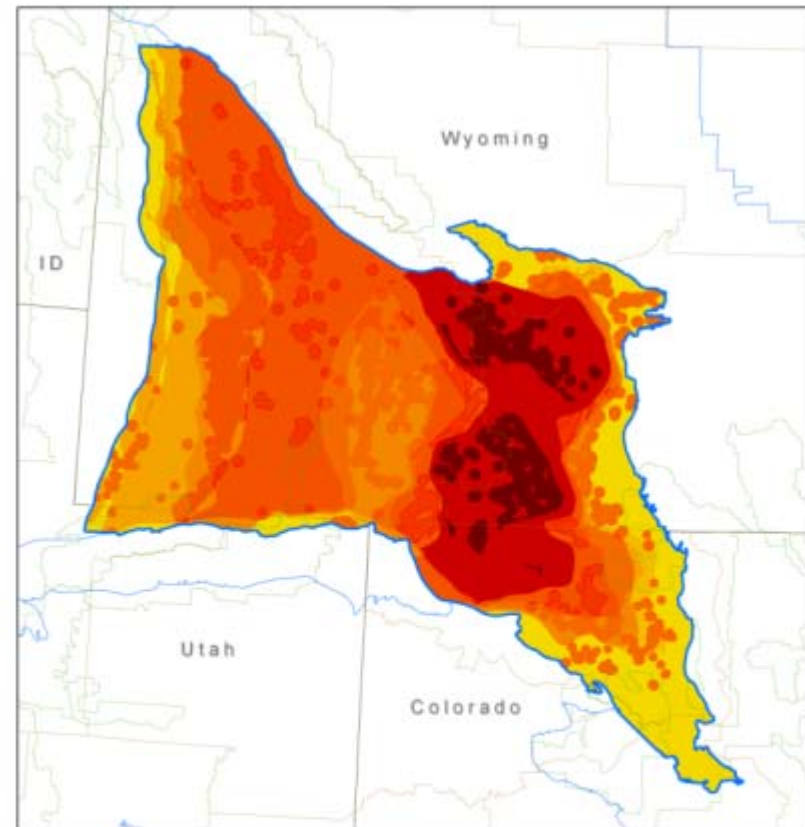
Southwestern Wyoming Federal Lands



USGS Undiscovered Technically Recoverable Resources



Oil

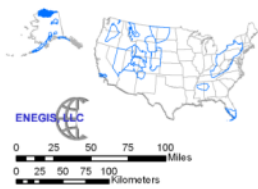
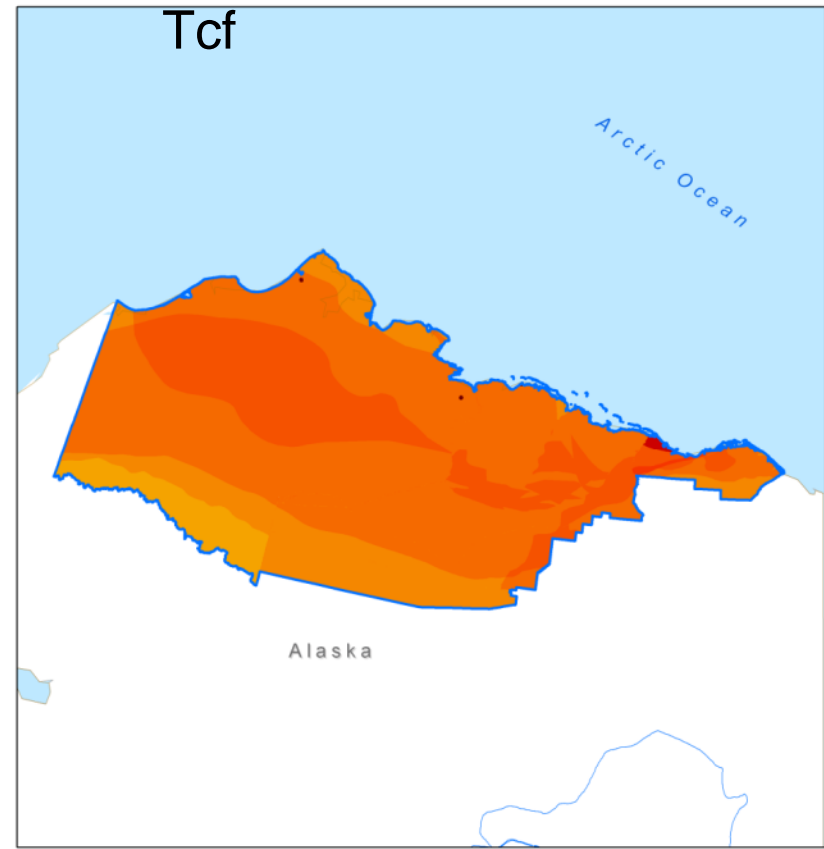
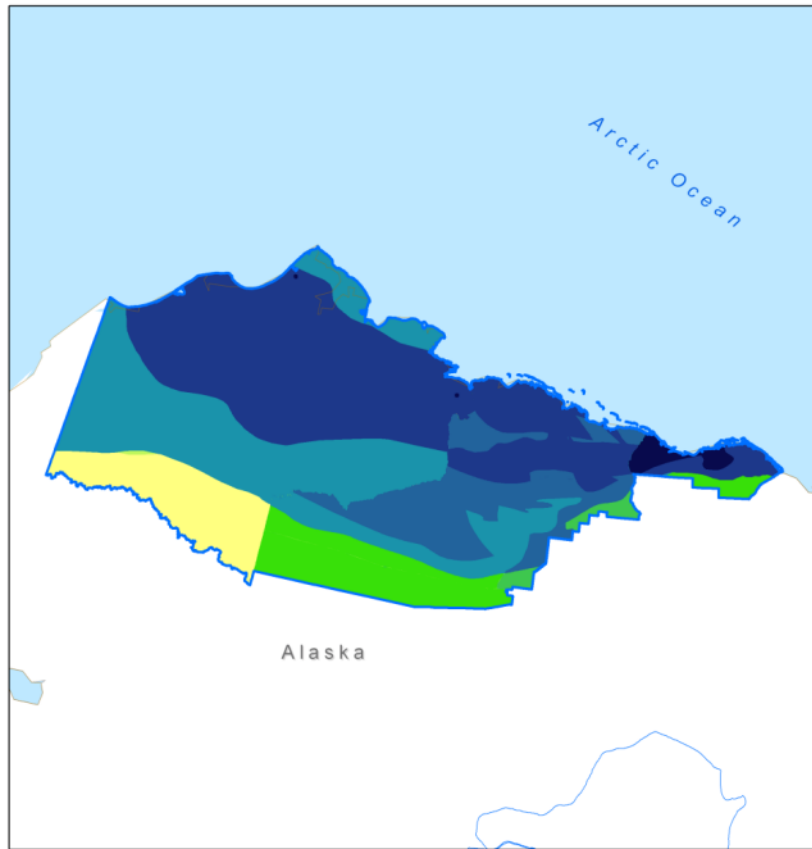


Northern Alaska Resources

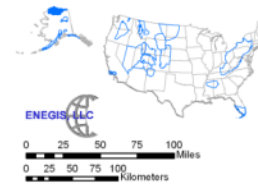
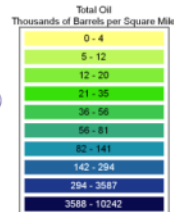
All Lands

Oil: 25.5 BBbl

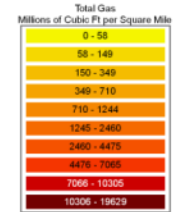
Natural Gas: 79.6 Tcf



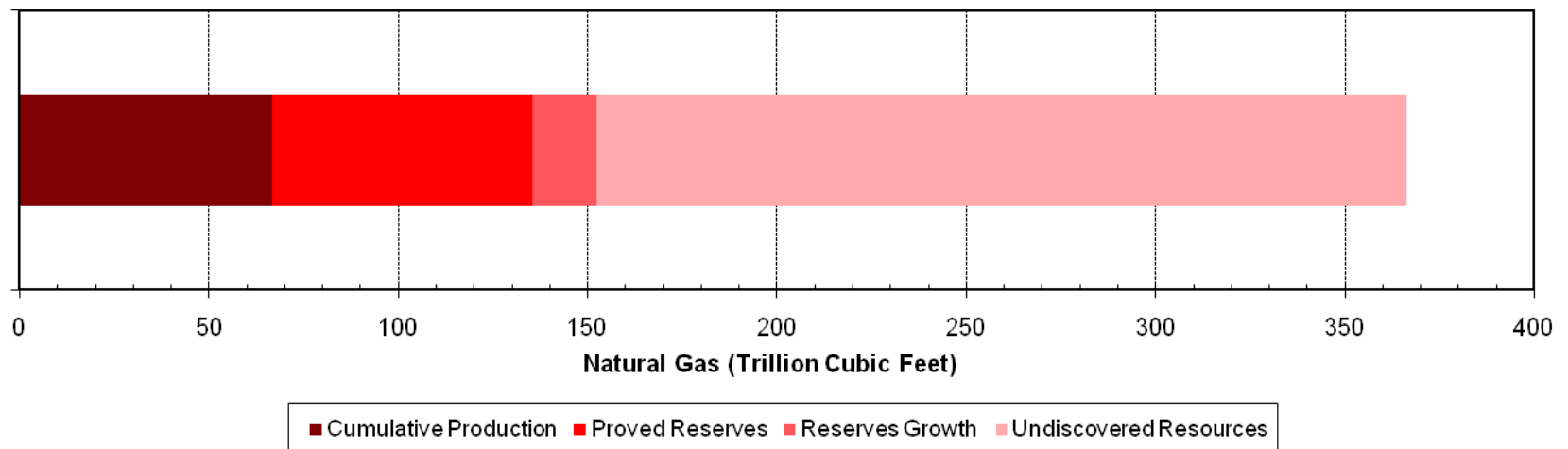
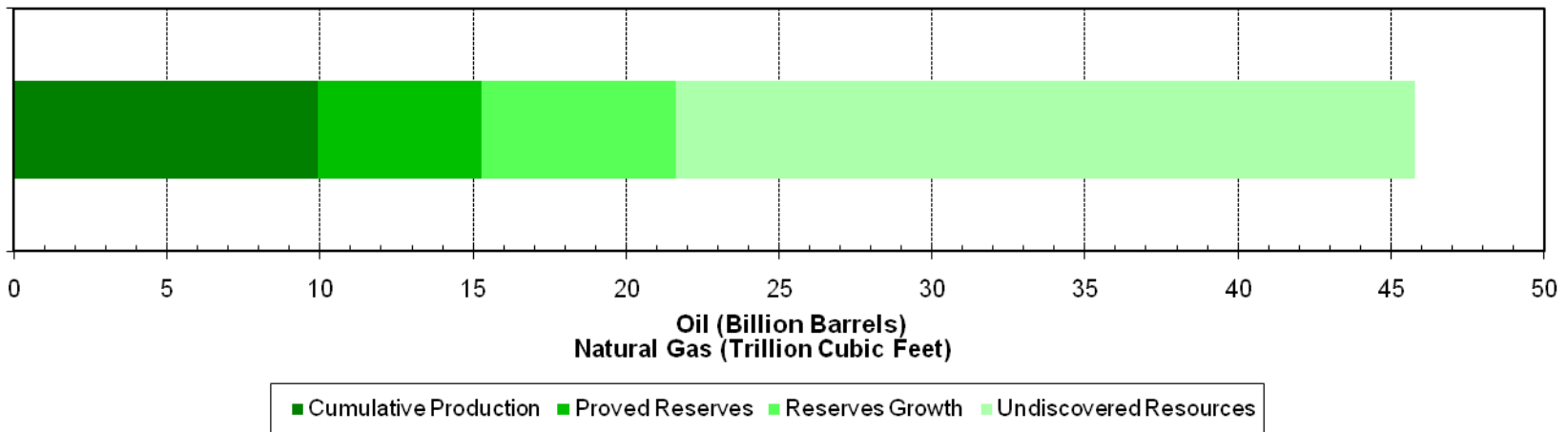
- BLM Jurisdiction
- FS Jurisdiction
- Oil and Gas Resource Study Areas



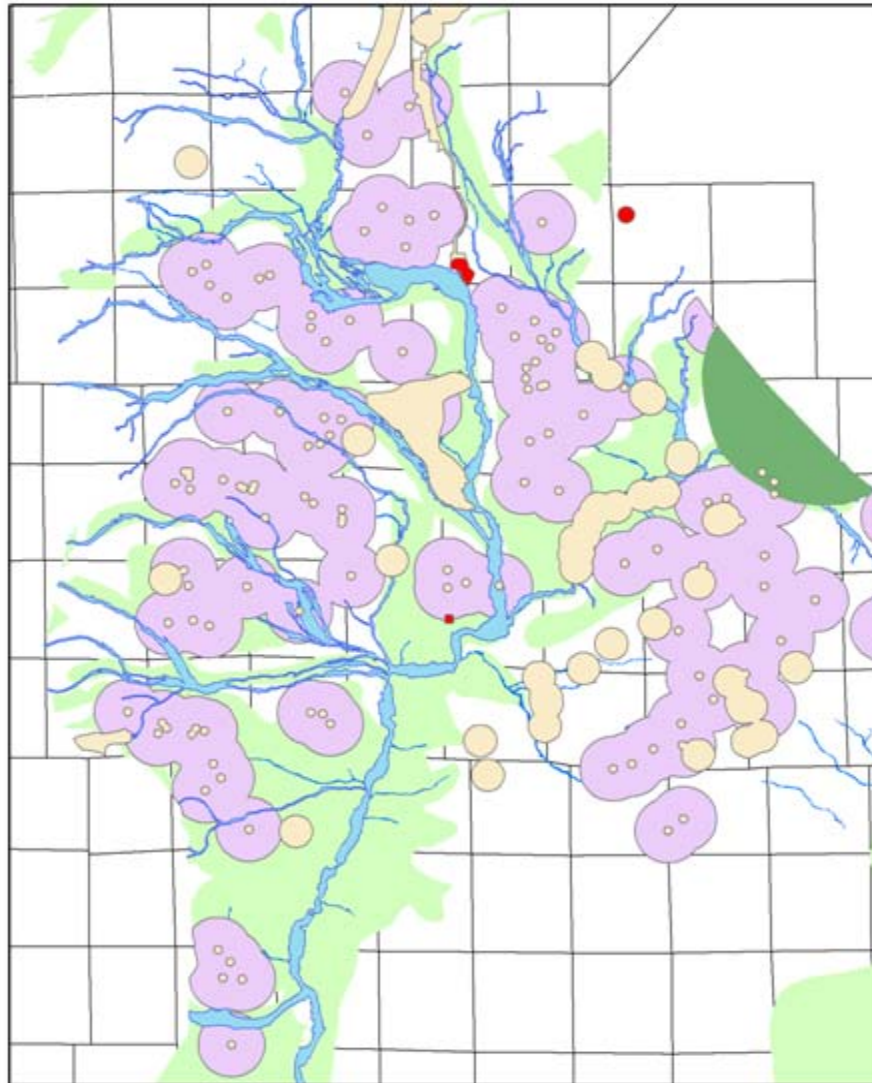
- BLM Jurisdiction
- FS Jurisdiction
- Oil and Gas Resource Study Areas



Distribution of Total Federal Onshore Hydrocarbon Endowment by Type and Resource Category



Stipulations (Constraints)



Oil and Gas Lease Stipulations
Pinedale Field Office

Legend

-  NSO - National Register Sites
-  CSU - Sage Grouse, Raptors, ACEC
-  NSO - Campgrounds
-  NSO - Flood Hazard or Perennial Water
-  TLS - Sage Grouse Nesting
-  CSU - Flood Hazard
-  TLS - Big Game Winter Range
-  Townships



Complex Overlapping Polygons

Accessibility Categories

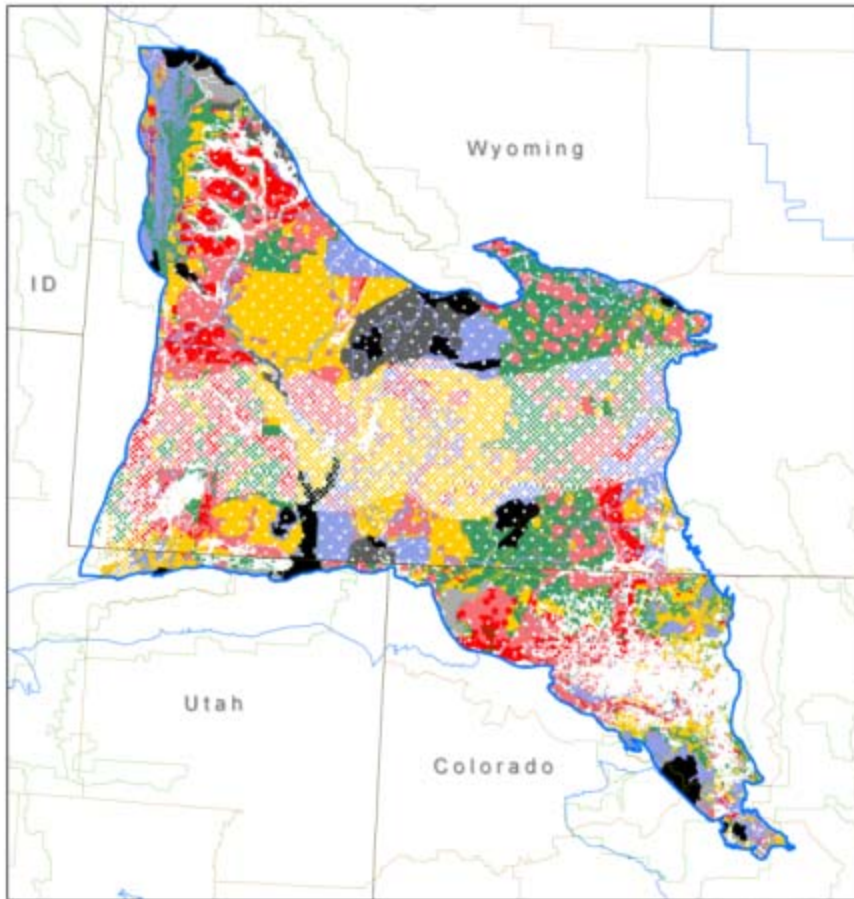
Developed from Land Use Plans and NEPA Documents

	Level	Access Category	Comments
Inaccessible (No Leasing)		NL (Statutory/Executive Order)	
	1	No Leasing (Statutory/Executive Order), (NLS)	Status set by Law or Executive Order; drilling prohibited
	2	No Leasing (Administrative), general category (NLA)	Status set by Federal surface management agency; drilling prohibited
	3	No Leasing (Administrative), Pending Land Use Planning or NEPA Compliance (NLA/LUP)	Status set by Federal surface management agency; drilling prohibited pending planning
Available with Restrictions	4	Leasing, No Surface Occupancy (NSO) (Net NSO for O&G Resources)	Not accessible for drilling except for resources within an extended drilling zone
	5	Leasing, Cumulative Timing Limitations (TLs) on Drilling >9 Months	Categorized by the cumulative effect of seasonal leasing stipulations during which drilling is prohibited, generally for protection of wildlife
	6	Leasing, Cumulative Timing Limitations (TLs) on Drilling >6 - ≤9 Months	
	7	Leasing, Cumulative Timing Limitations (TLs) on Drilling >3 - ≤6 Months	
	8	Leasing, Controlled Surface Use (CSU)	Drilling permitted, specialized mitigation plan required for CSU (this category includes Cumulative Timing Limitations (TLs) on Drilling ≤3 Months, which are minimal)
Available »	9	Leasing, Standard Lease Terms (SLTs)	Drilling permitted, mitigation plan required

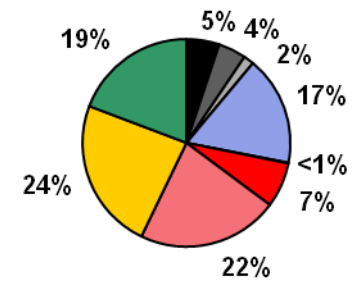
Spatial Union



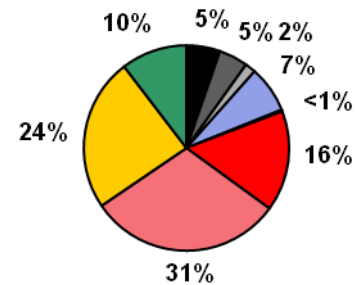
SW Wyoming Categorization



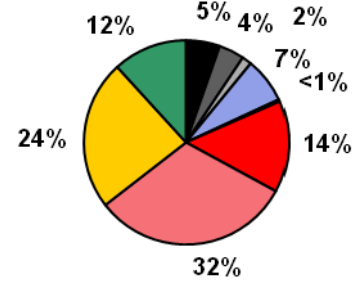
Acreage (11 Million Acres)*



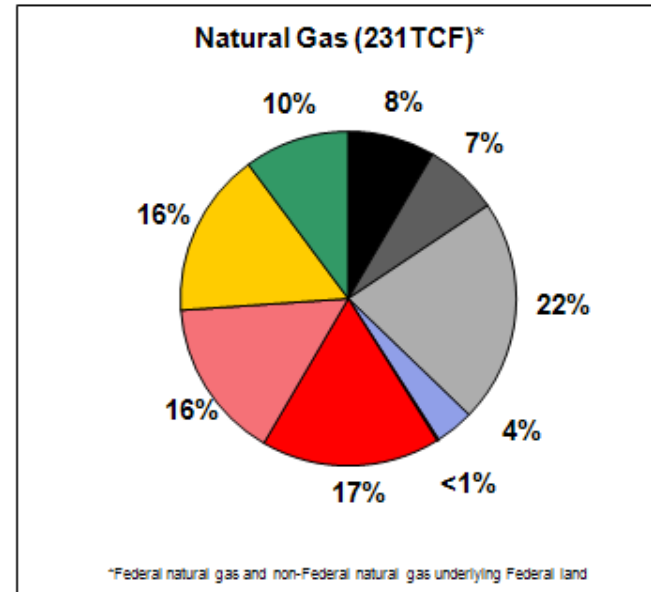
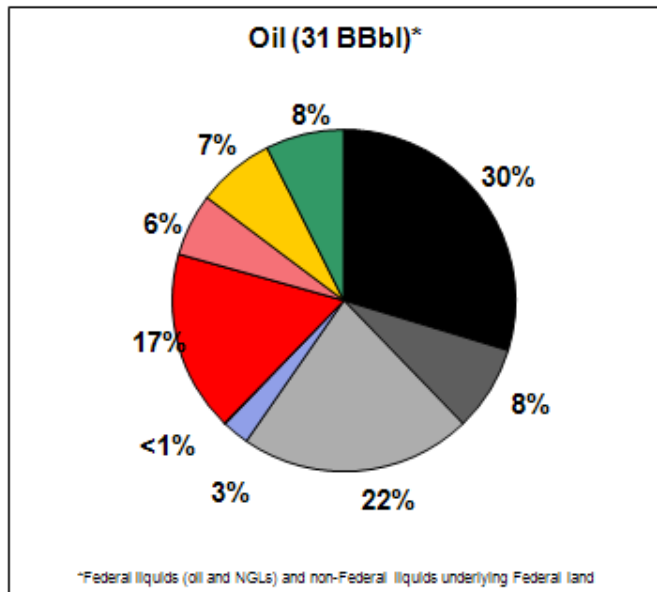
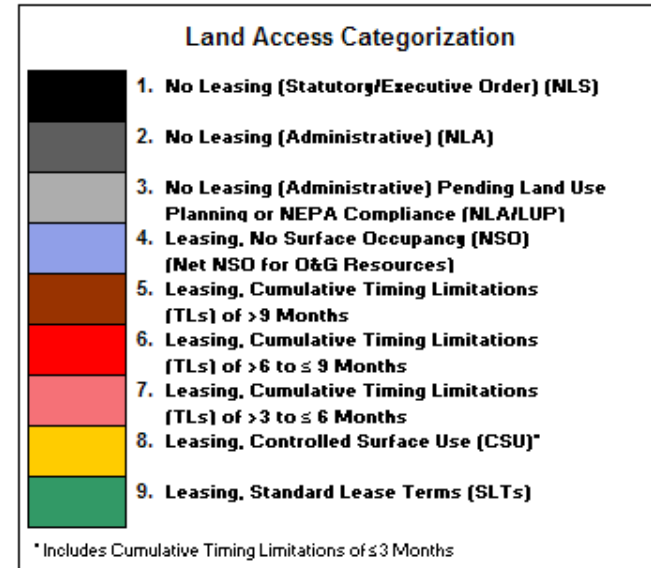
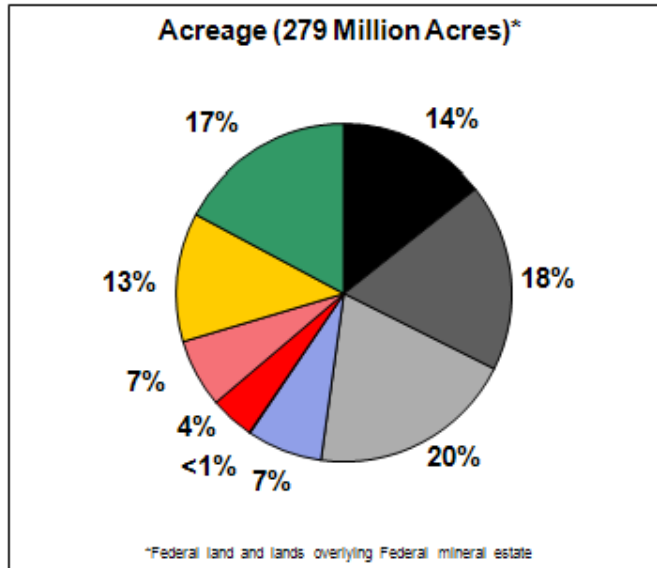
Oil (2 BBbl)



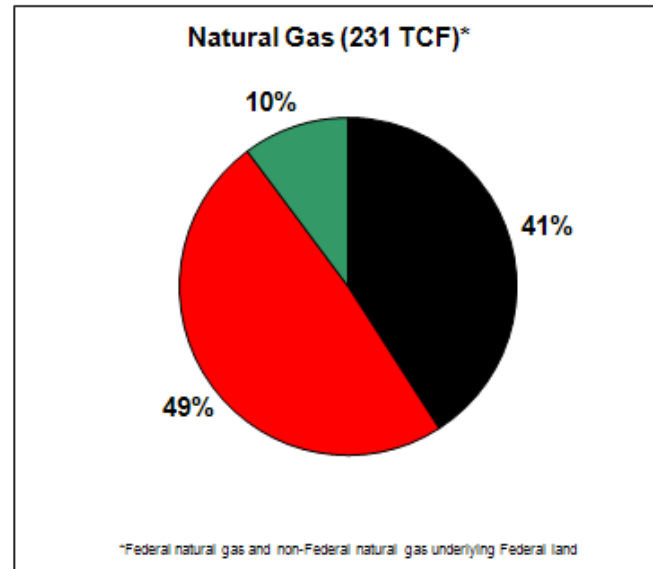
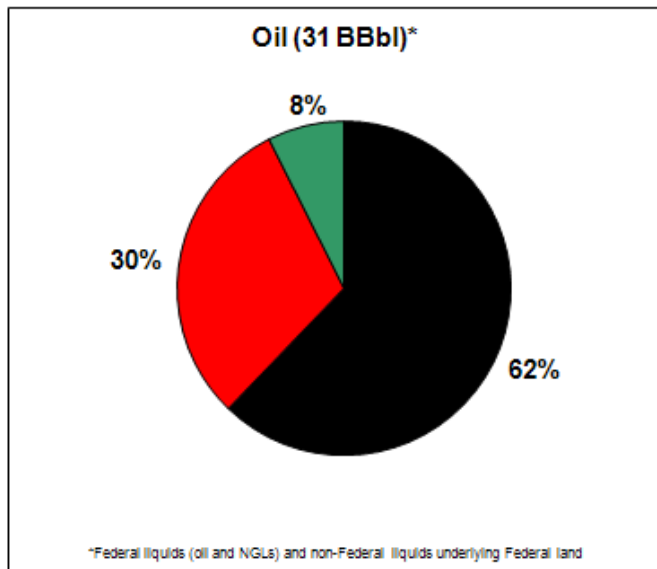
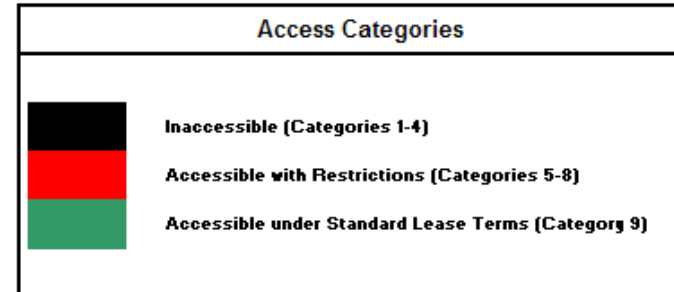
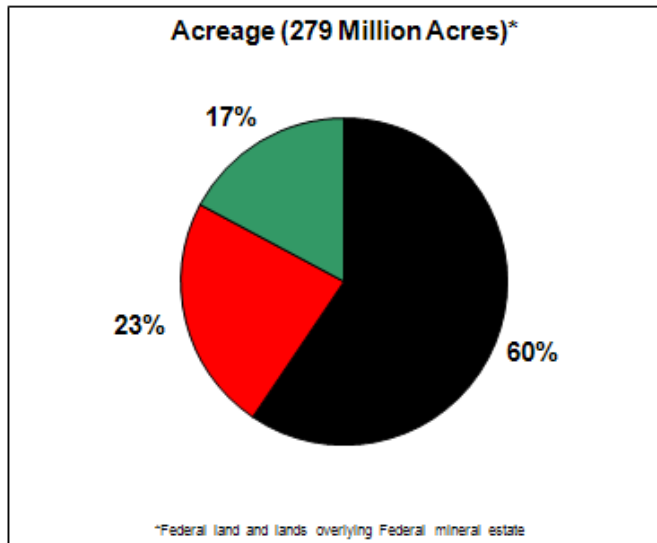
Gas (68 TCF)



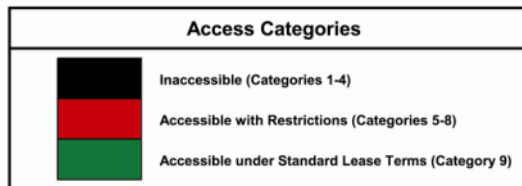
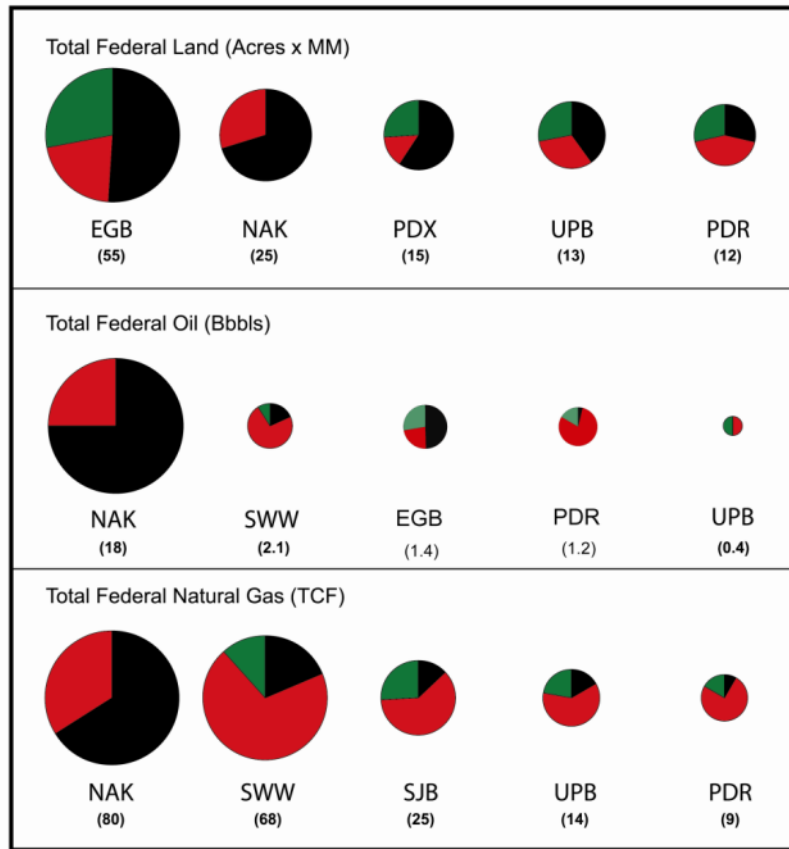
Phase III Aggregate Results



Phase III Simplified Results



Top Five Study Areas



NAK – Northern Alaska

PDX – Paradox Basin

UPB – Uinta-Piceance Basin

PDR – Powder River Basin

SWW – Southwestern Wyoming

EBG – Eastern Great Basin

SJB – San Juan Basin

Press Reactions

The background of the slide is a photograph of an oil pumpjack (jack-o'-lantern) in a desert landscape. The pumpjack is a large, yellow metal structure used for extracting oil from a well. It is positioned in the center of the frame, with its long arm and counterweight visible. The surrounding environment is arid, with dry, yellowish-brown vegetation and a clear, light blue sky. In the distance, there are low, hazy mountains or hills. The overall scene is typical of an oil field in a desert region.

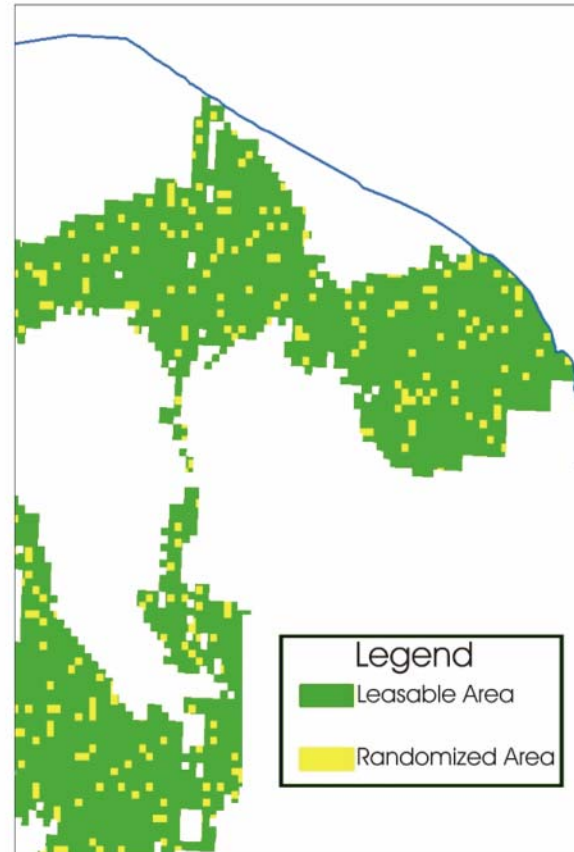
- “Feds: Much of oil, gas under lands off limits”
– *Associated Press*
- “Official says agency can help ease energy woes”
– *Rocky Mountain News*
- “Tap federal lands for oil, BLM urges” – *Deseret News*
- “Bush administration’s latest effort to open sensitive areas to drilling should be stopped” – *Las Vegas Sun*
- “A misleading misuse of science to support the oil and gas industry” – *The Wilderness Society*

Factoring In Conditions of Approval

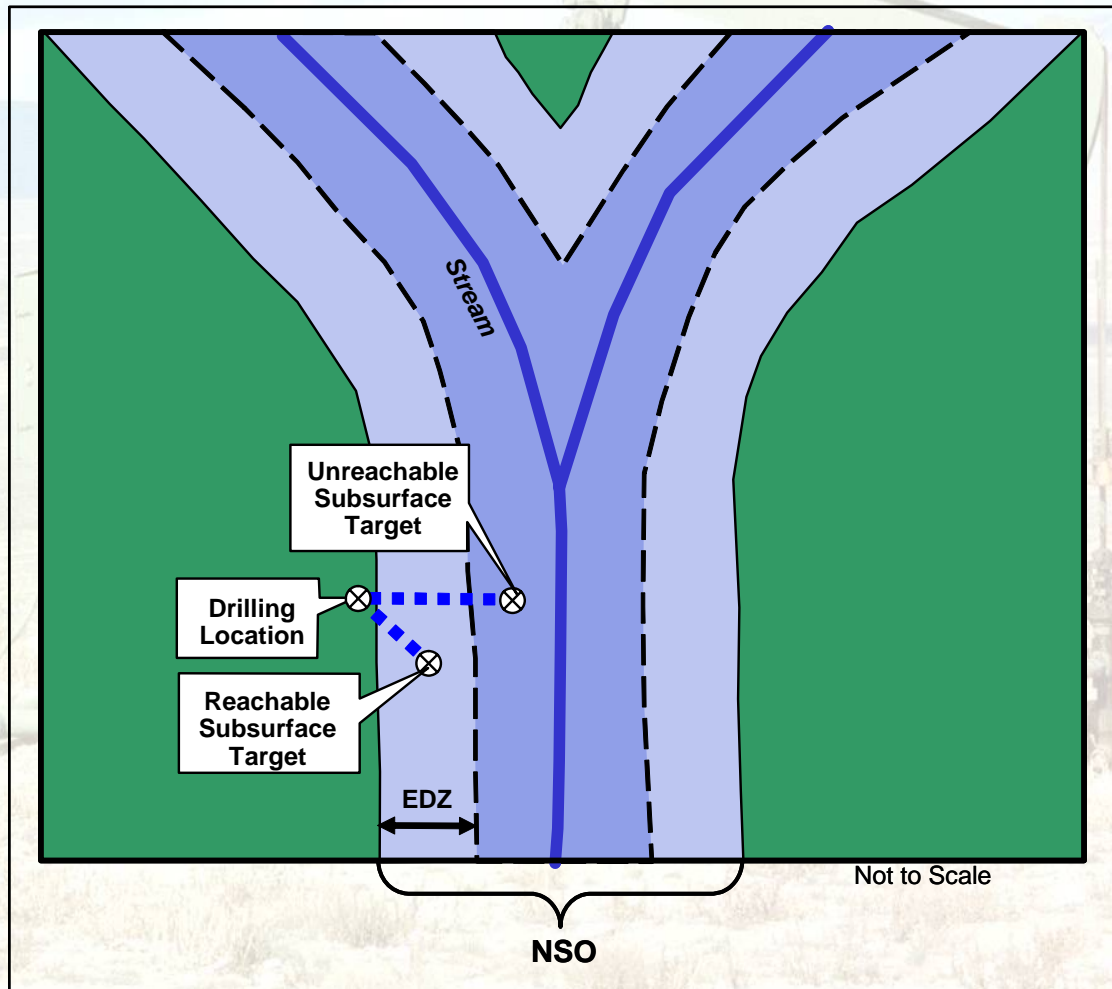
10% Scenario
Randomized area change

$$\%uniqueCOA = \frac{(\#Wells)_{uniqueCOA}}{(\#Wells)_{Acc.Area}} = 10\%$$

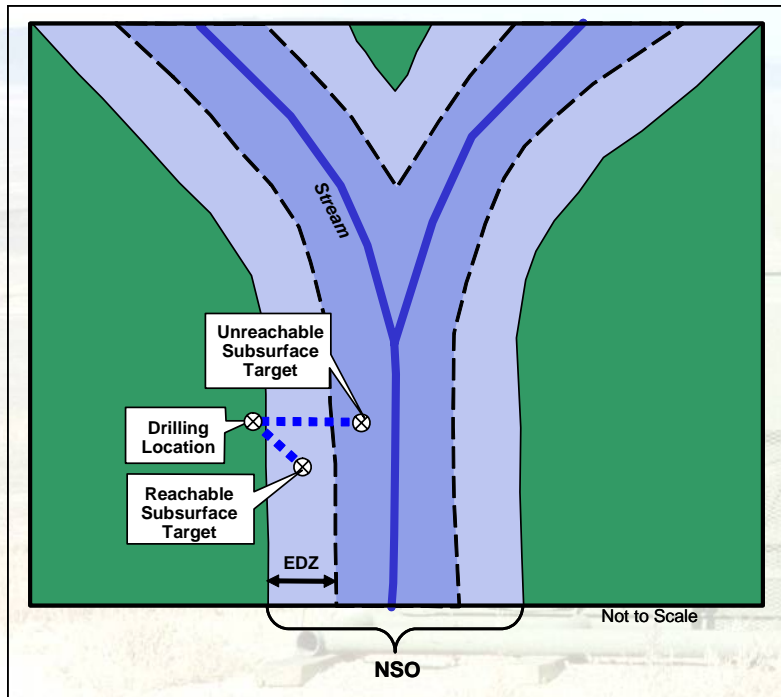
- Randomization performed on a grid of 400 x 400 meter (~40 acre) cells
- Different scenarios run for each BLM Field Office and National Forest



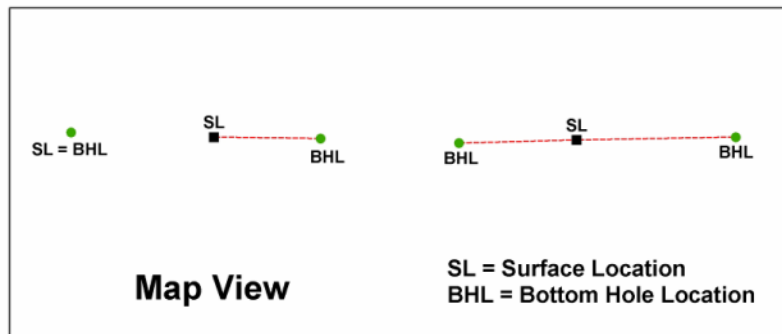
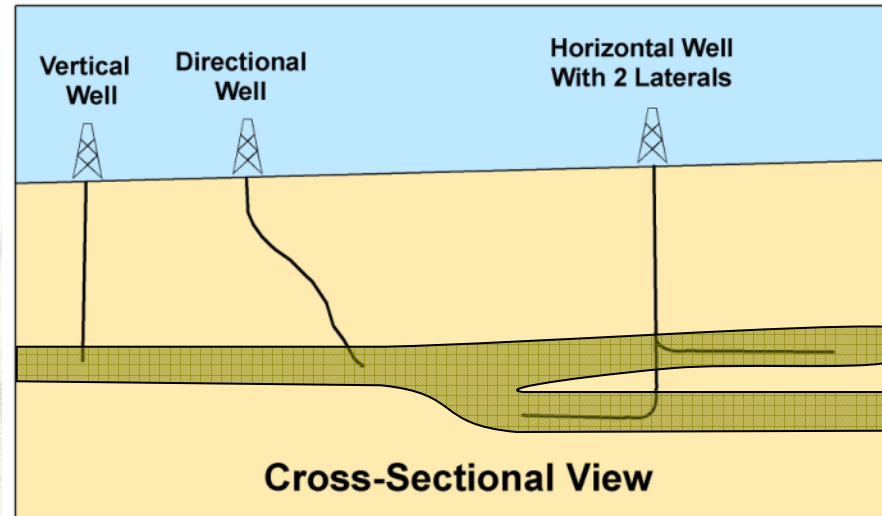
Factoring In the Extended Drilling Zone (EDZ)



Borehole Geometries

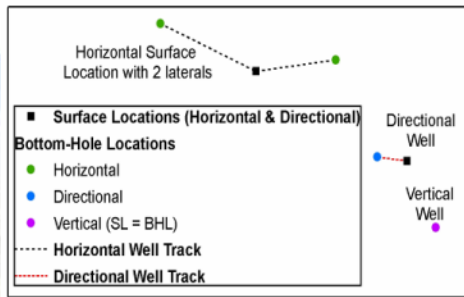


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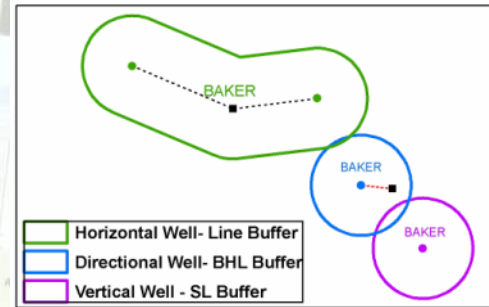


Oil and Gas Field Delineation

Buffer Technique for Three Borehole Geometries

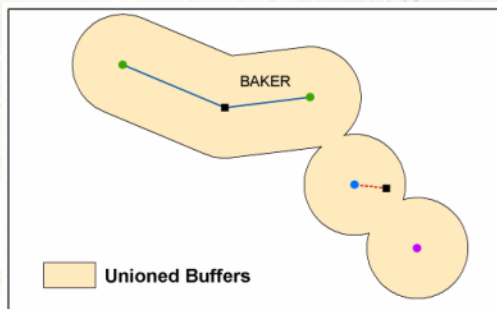


(1) Horizontal, Directional and Vertical Well Types

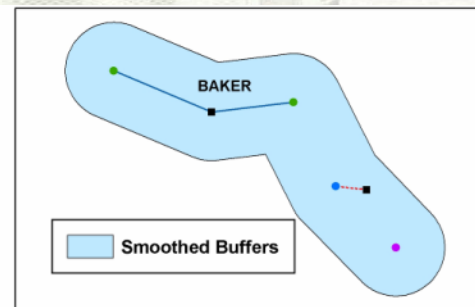


(2) Buffers Vary by Well Type

Object to be Buffered By Well type:
Vertical: Surface Location (SL)
Directional: Bottom-Hole Location (BHL)
Horizontal: Line Between SL and BHL



(3) Union & Dissolve Buffers by Field Name



(4) Smooth Buffers

Buffered Field Outline Issues (Pre-Smoothing)

Scalloped / Botryoidal Appearance

Small Interior Non-field "Islands"

Small Spaces between Multiple Polygon Rings

Narrow "Fiords"

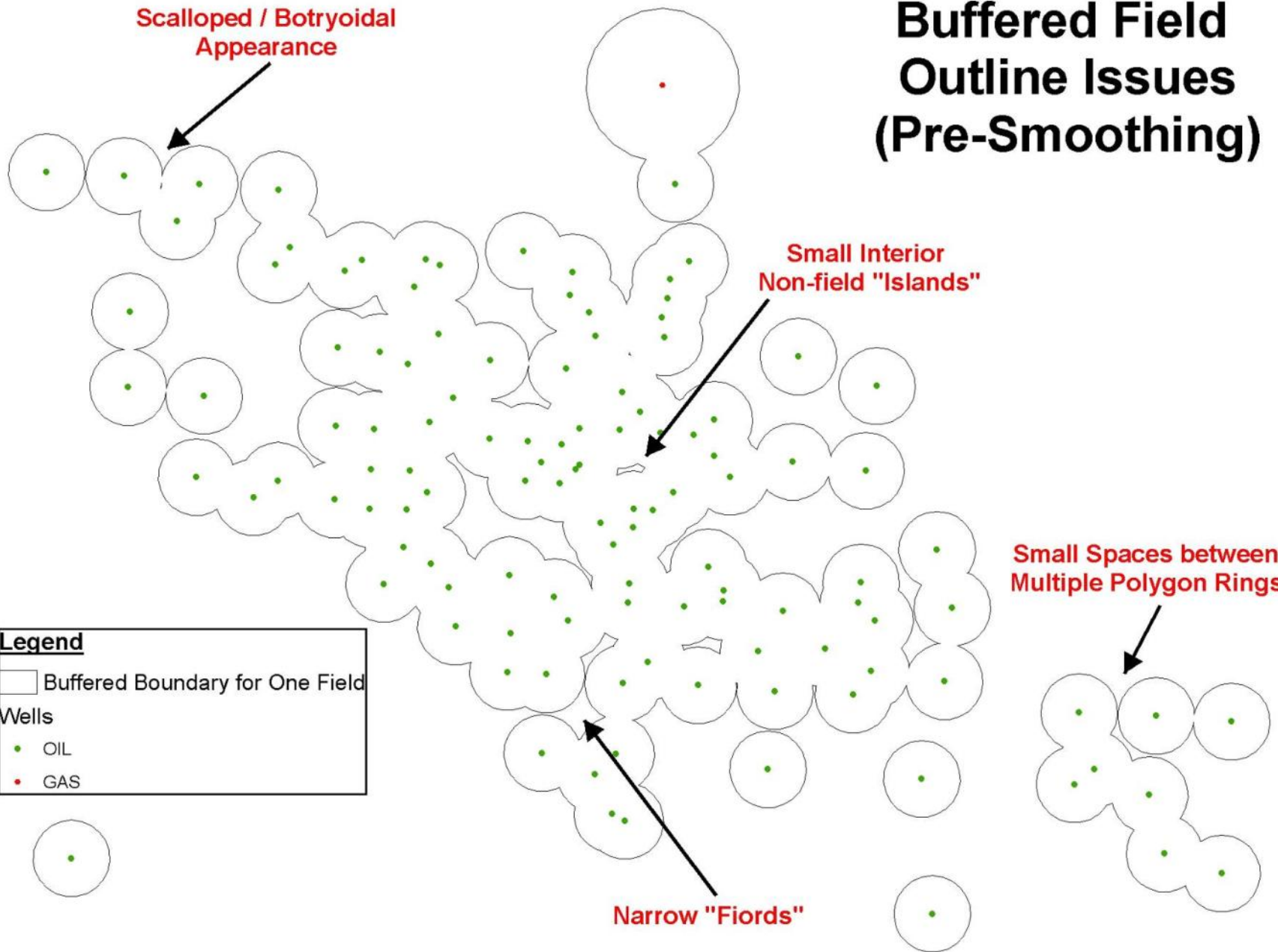
Legend

□ Buffered Boundary for One Field

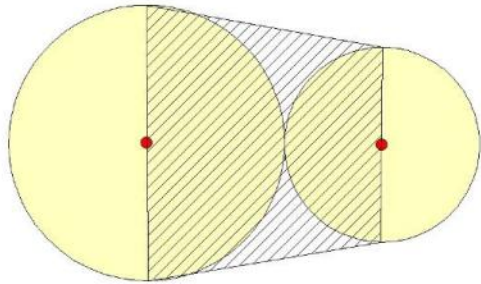
Wells

● OIL

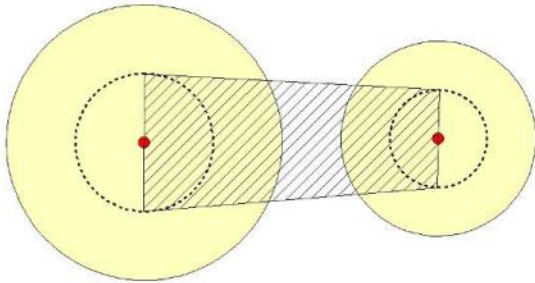
● GAS



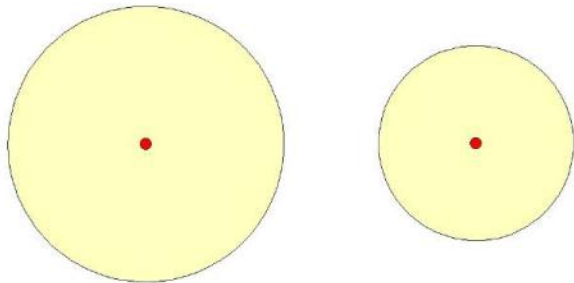
Trapezoids Rules for Smoothing Application



(A) Distance between wells $\leq 2 \times$ (average buffer size):
Draw Full Diameter Trapezoid & Union with Buffers

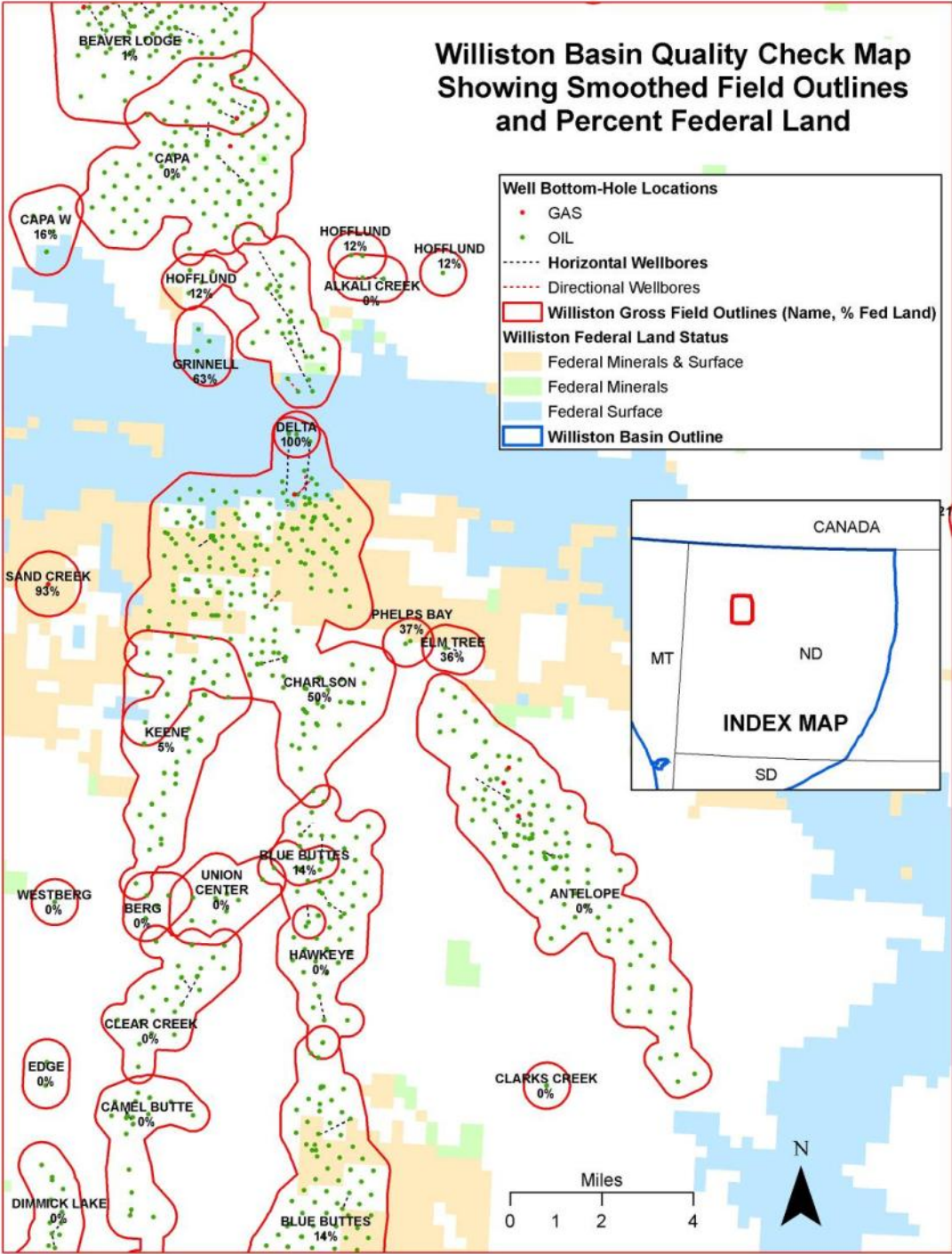


(B) Distance between wells = $2 - 2.5 \times$ (average buffer size):
Draw Half Buffer Diameter Trapezoid & Union with Buffers



(C) Distance between wells $> 2.5 \times$ (average buffer size):
Do not Draw Trapezoid

Williston Basin Quality Check Map Showing Smoothed Field Outlines and Percent Federal Land



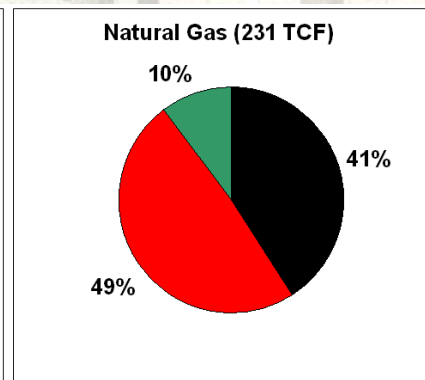
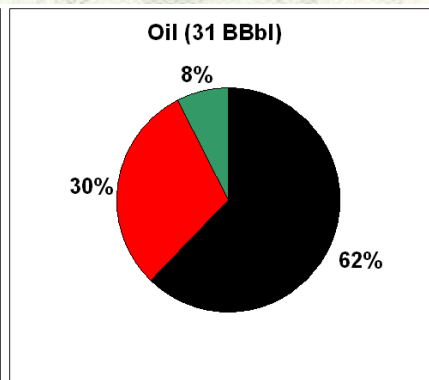
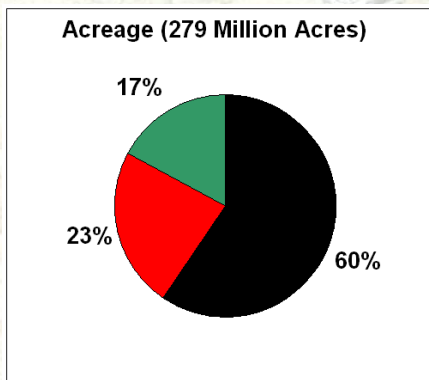
Data Collection Challenges

The background of the slide is a photograph of an oil pumpjack (jack-o'-lantern) in a desert environment. The pumpjack is a large, mechanical structure used for extracting oil from a well. It is situated in a dry, arid landscape with sparse, low-lying vegetation and distant mountains under a clear sky. The image is slightly faded to allow the text to be the primary focus.

- DOD Confidentiality Agreements
- Sensitive Wildlife and Cultural Resources Data
- Lack of GIS Data in Eastern Basins
- Lack of Staff/Higher Priority Projects
- Fragmented Leasing Decisions
- Florida Hurricanes

Conclusion

- EPCA Phase III inventoried 279 million acres of Federal land
- 60 % of the oil resources are inaccessible
- 41% of the natural gas resources are inaccessible
- We couldn't have done this without GIS!



EPCA on the Web



The first truly national assessment of the restrictions and impediments to oil and gas exploration and development

EPCA Phase III Inventory Energy Policy Act of 2005
Energy Policy and Conservation Act of 2000

Section 604 of the Energy Policy and Conservation Act (EPCA) of 2000, as amended by Section 364 of the Energy Policy Act of 2005, required an inventory of all onshore Federal lands to identify:

- the United States Geological Survey estimates of the oil and gas resources underlying these lands; and
- the extent and nature of any restrictions or impediments to the development of the resources..."

EPCA required the Secretary of the Interior, in consultation with the Secretaries of Agriculture and Energy, to provide the inventory to Congress. The Secretary of the Interior designated the Bureau of Land Management (BLM) to lead the effort. That inventory, now referred to as EPCA Phase I, was released in January 2003. Phase II was released in November 2006.

This report, titled *Inventory of Onshore Federal Oil and Natural Gas Resources*

EPCA Phase III Inventory
EPCA Phase III GIS Data
EPCA Phase III Questions and Answers
News Release on EPCA Phase III Inventory

www.blm.gov

Questions?

EPCA reports and DVDs will
be available from the Bureau
of Land Management





For more information contact:

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Senior Physical Scientist

USDI-Bureau of Land Management

Division of Fluid Minerals - WO-310

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Washington, DC 20036

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