



A Spatially-Based Planning Tool Designed to Reduce Negative Impacts from Development on the Lesser Prairie Chicken (*Tympanuchus pallidicinctus*) in Oklahoma

A Multi-Entity Collaboration to Promote Voluntary Habitat
Conservation and Prioritized Management Actions

Presenters:

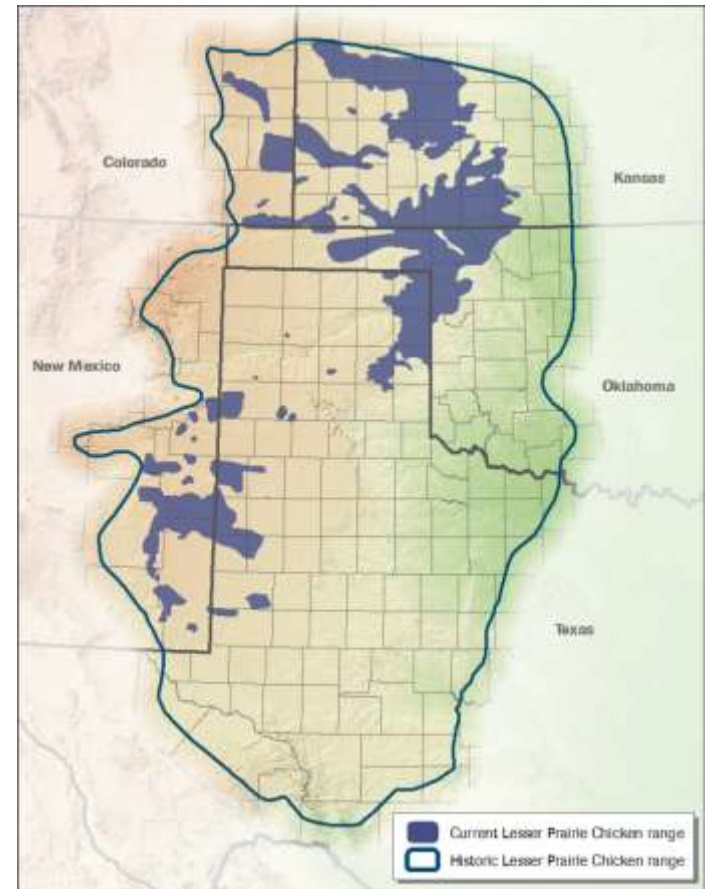
Chris Hise, The Nature Conservancy
Luke Bell, U.S. Fish and Wildlife Service

Oklahoma State Geographic Information Council
January 8, 2010



Lesser Prairie Chicken

- Endemic to the southern High Plains of North America
- Extirpated from ~80% of historic range
- Population decline of 95% since late 19th century
- Candidate for endangered species listing
- Requires large tracts of well-managed native rangeland
- Considered an 'umbrella' species for grassland bird conservation







Threats

- Habitat fragmentation and loss
- Behavioral avoidance
- Fatal collisions

Pre-settlement landscape



Altered landscape

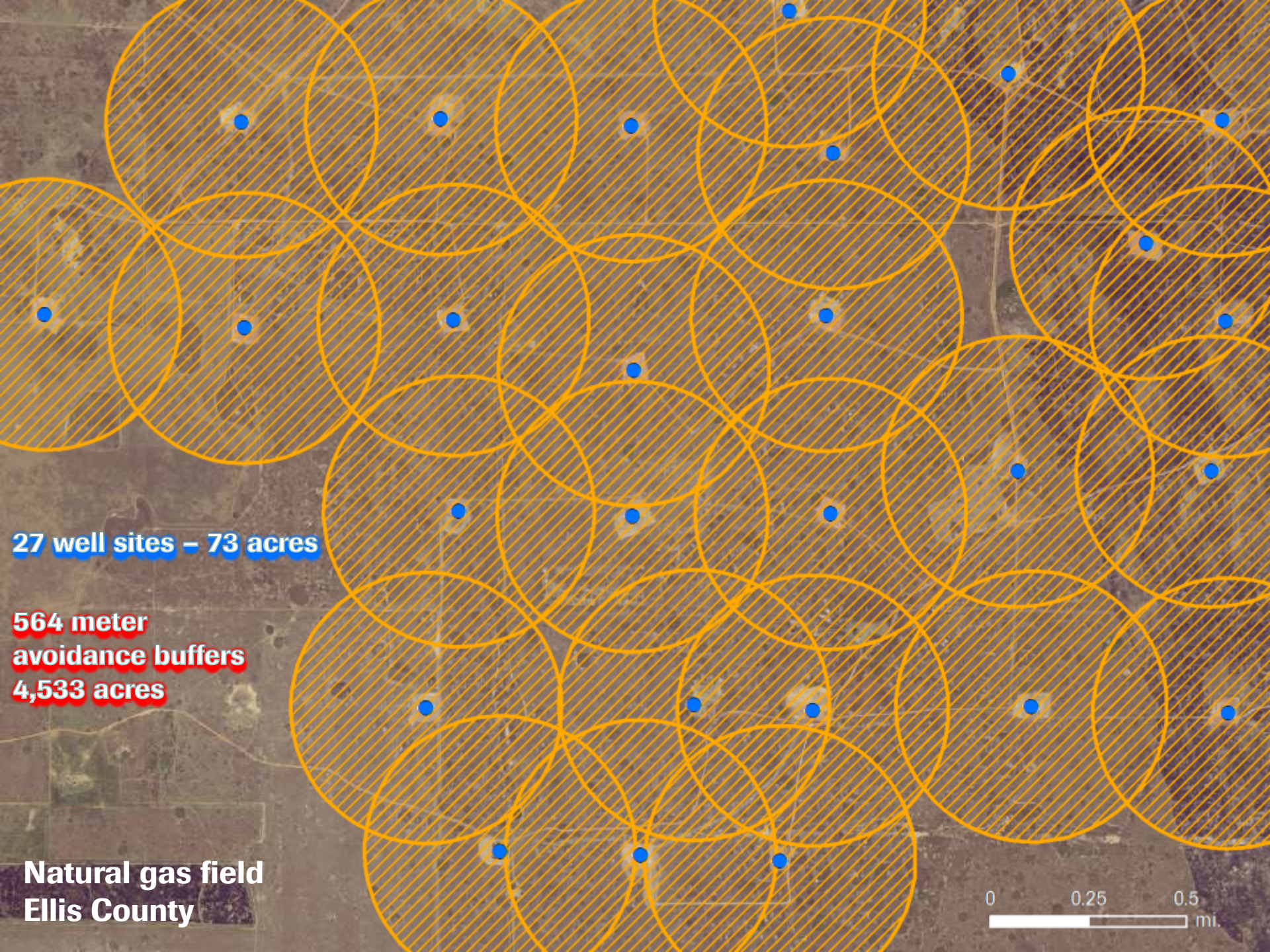


Fire exclusion / juniper encroachment



Anthropogenic features





27 well sites – 73 acres

**564 meter
avoidance buffers
4,533 acres**

**Natural gas field
Ellis County**



Collision mortality

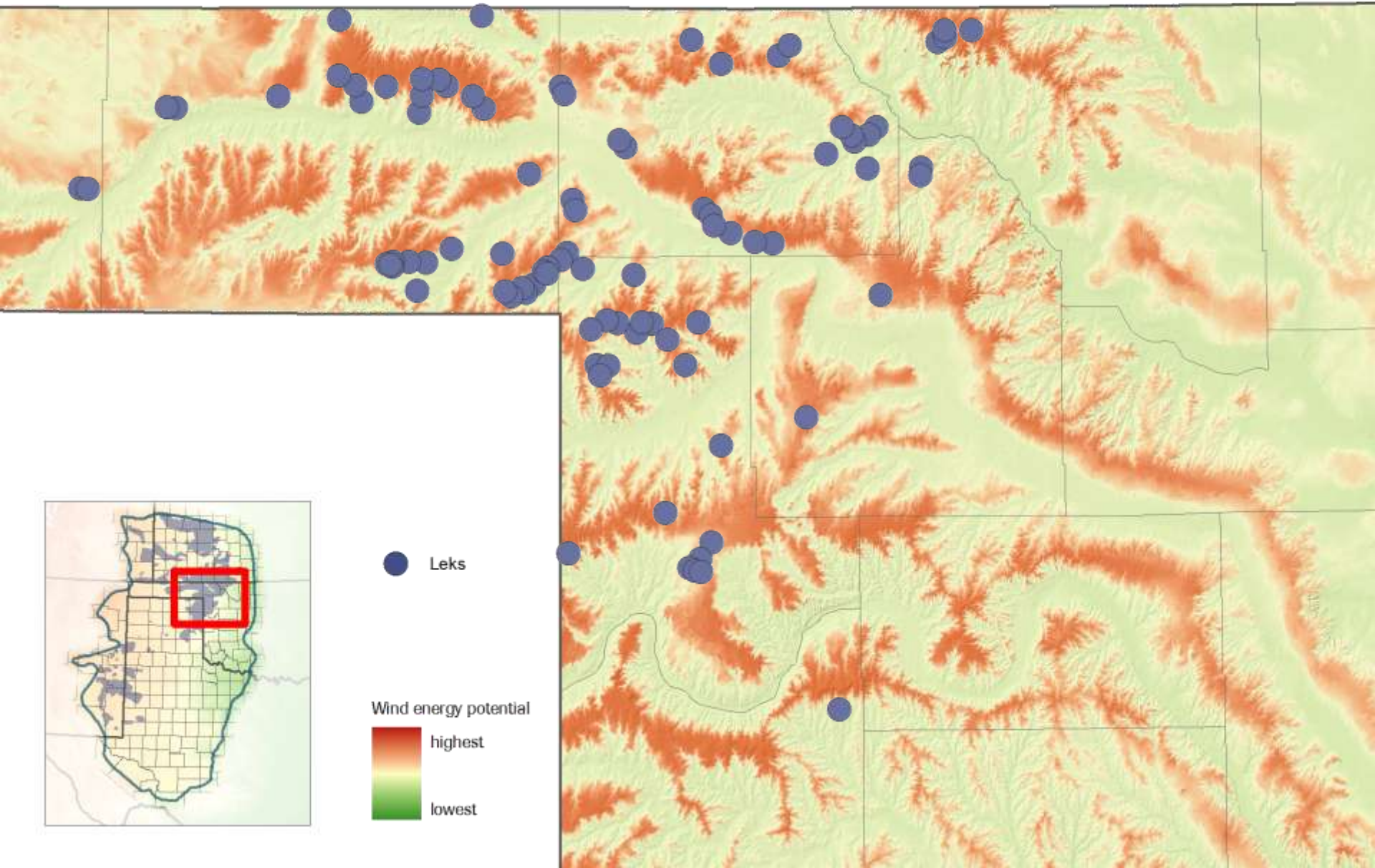




Threats

- Habitat fragmentation and loss
 - Behavioral avoidance
 - Fatal collisions
-
- ❖ High degree of overlap between remaining habitat and areas targeted for wind energy development

Wind energy potential





The planning tool

- Conceptual spatial model
- Based on species occurrence and habitat requirements
- 30 meter resolution raster product
- Pixels are assigned a numeric rank and monetary mitigation value

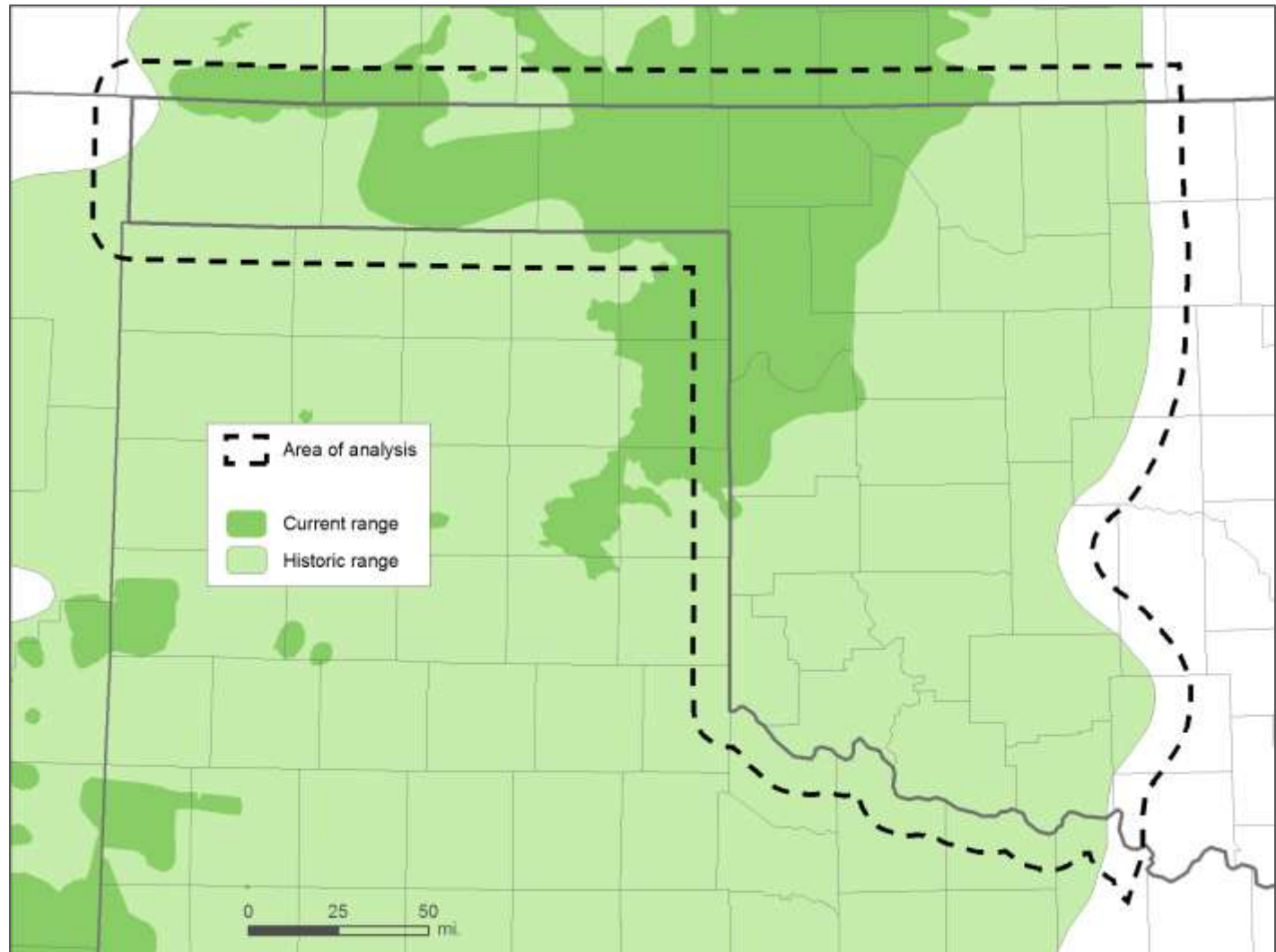


Intended uses

- Guide development away from areas important for Lesser Prairie Chicken conservation and recovery
- Calculate voluntary mitigation costs for proposed development sites
- Target conservation work in areas of greatest benefit to Lesser Prairie Chickens

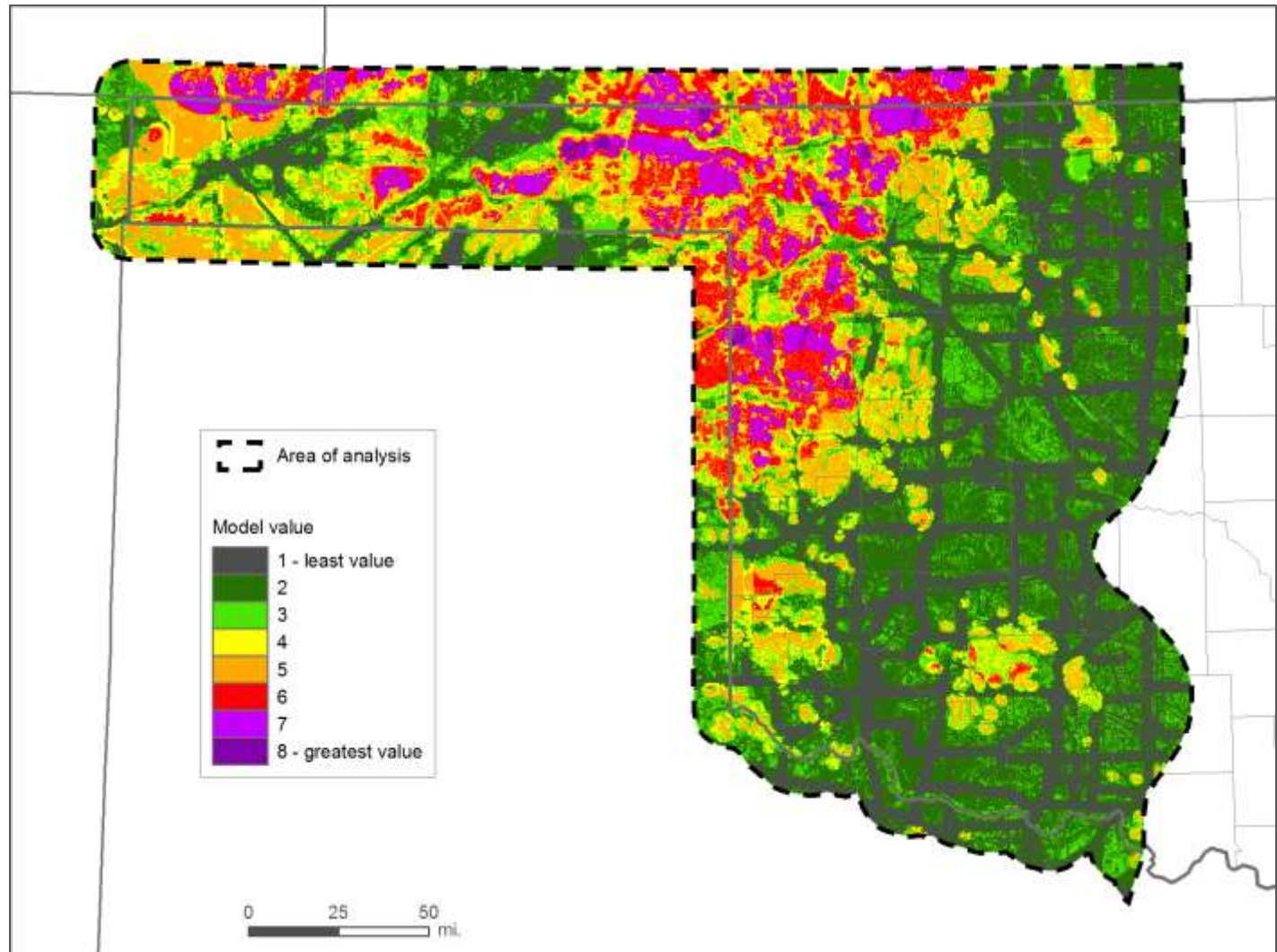


Area of analysis





Model output





Eight factors determine model rank

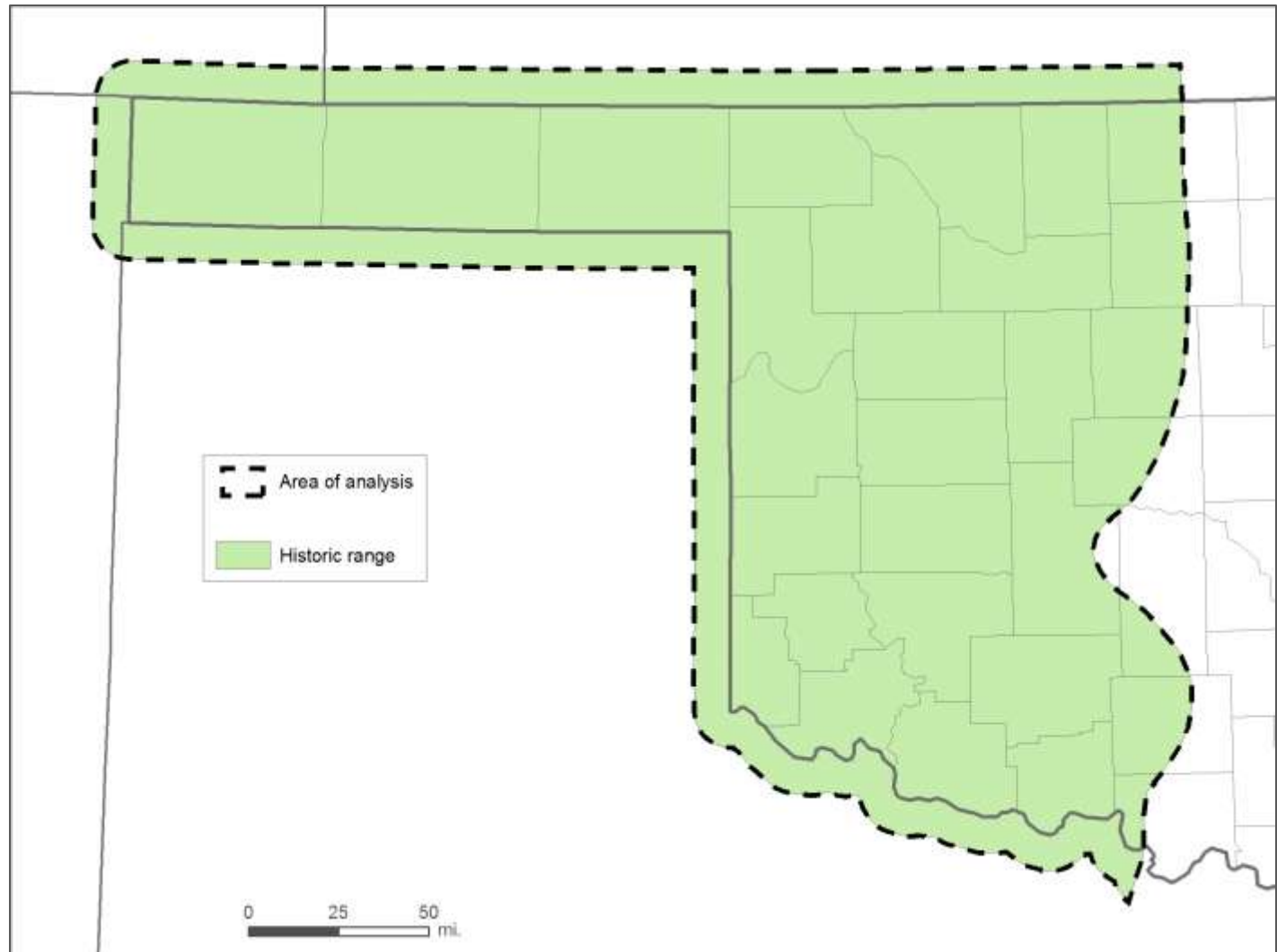
Ranking Factor	Pixel Criteria	Pixel Value	
		True	False
1. Historic Range	Within 10-miles of boundary	1	0
2. Current Range	Within boundary	1	0
3. Leks	Within 5-mile radius	1	0
4. Habitat Suitability	Suitable or Potentially Suitable	1	0
5. Core Habitat Patch	Within core patch	1	0
6. Core Buffer Habitat	Within core buffer	1	0
7. Managed/Protected Land	Within 2-km buffer of boundary	1	0
8. Avoided Structures	Outside all avoidance buffers	1	0

Max Rank = 8

Min Rank = 1

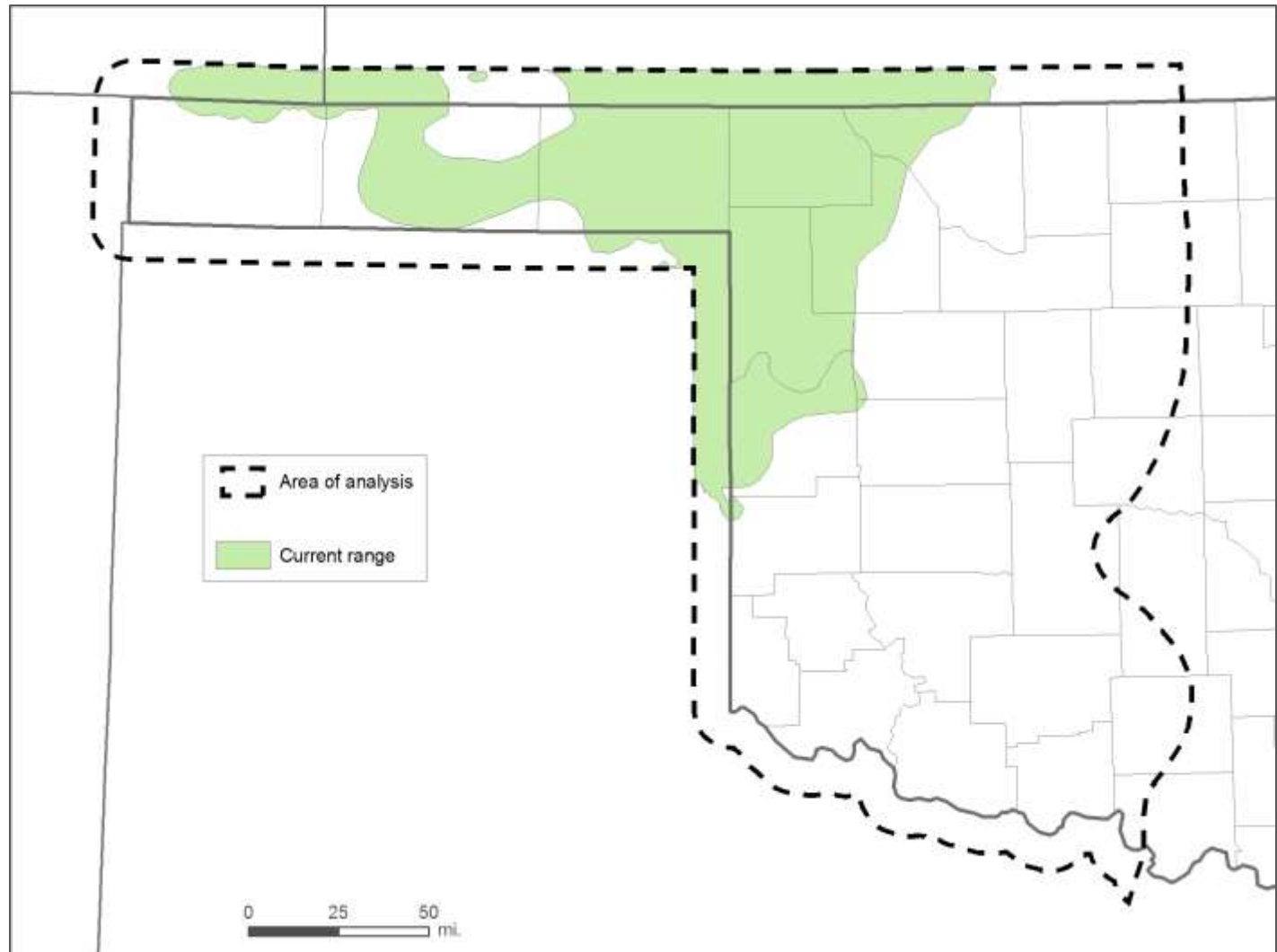


Factor 1 – historic range



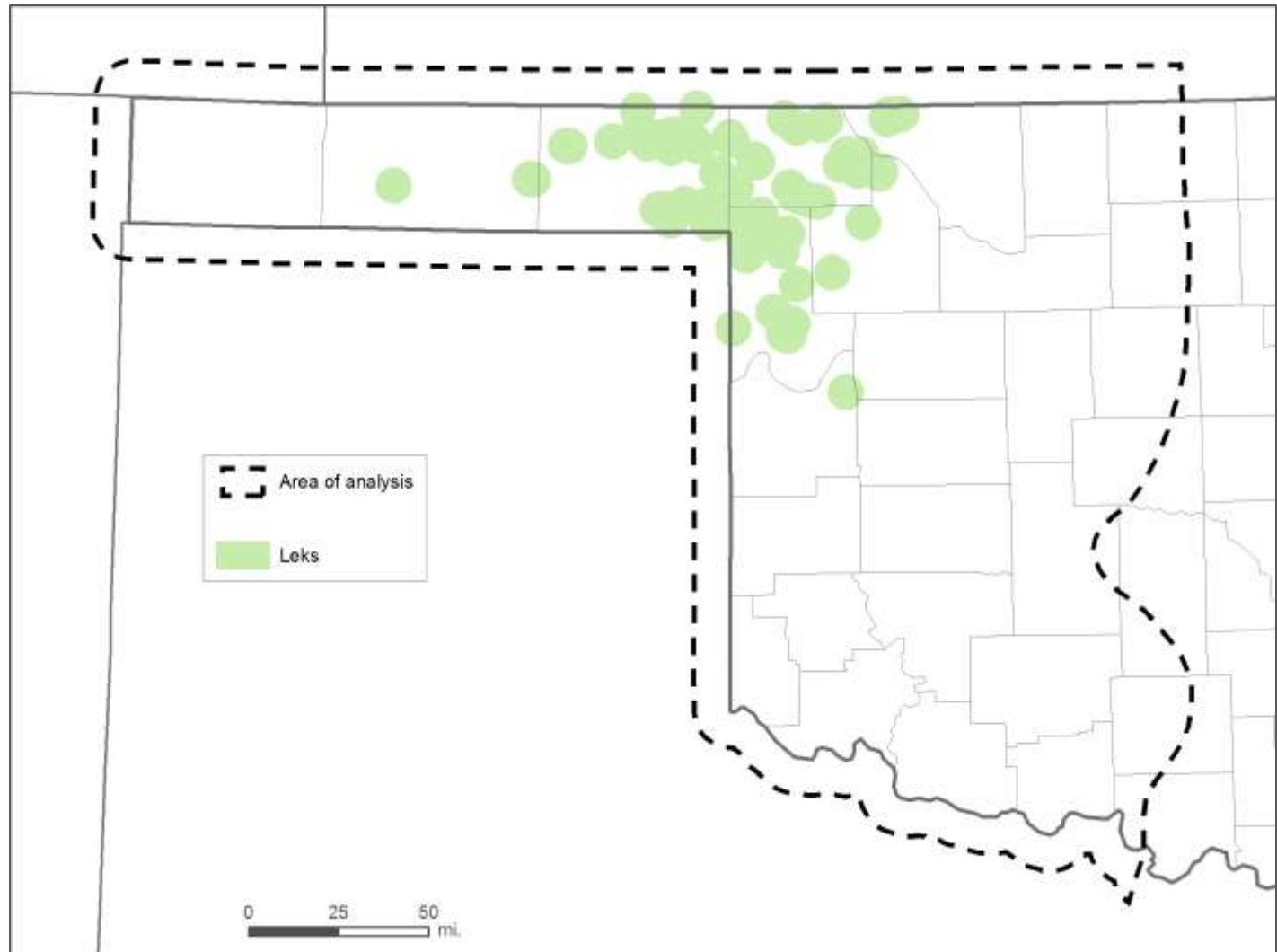


Factor 2 – current range



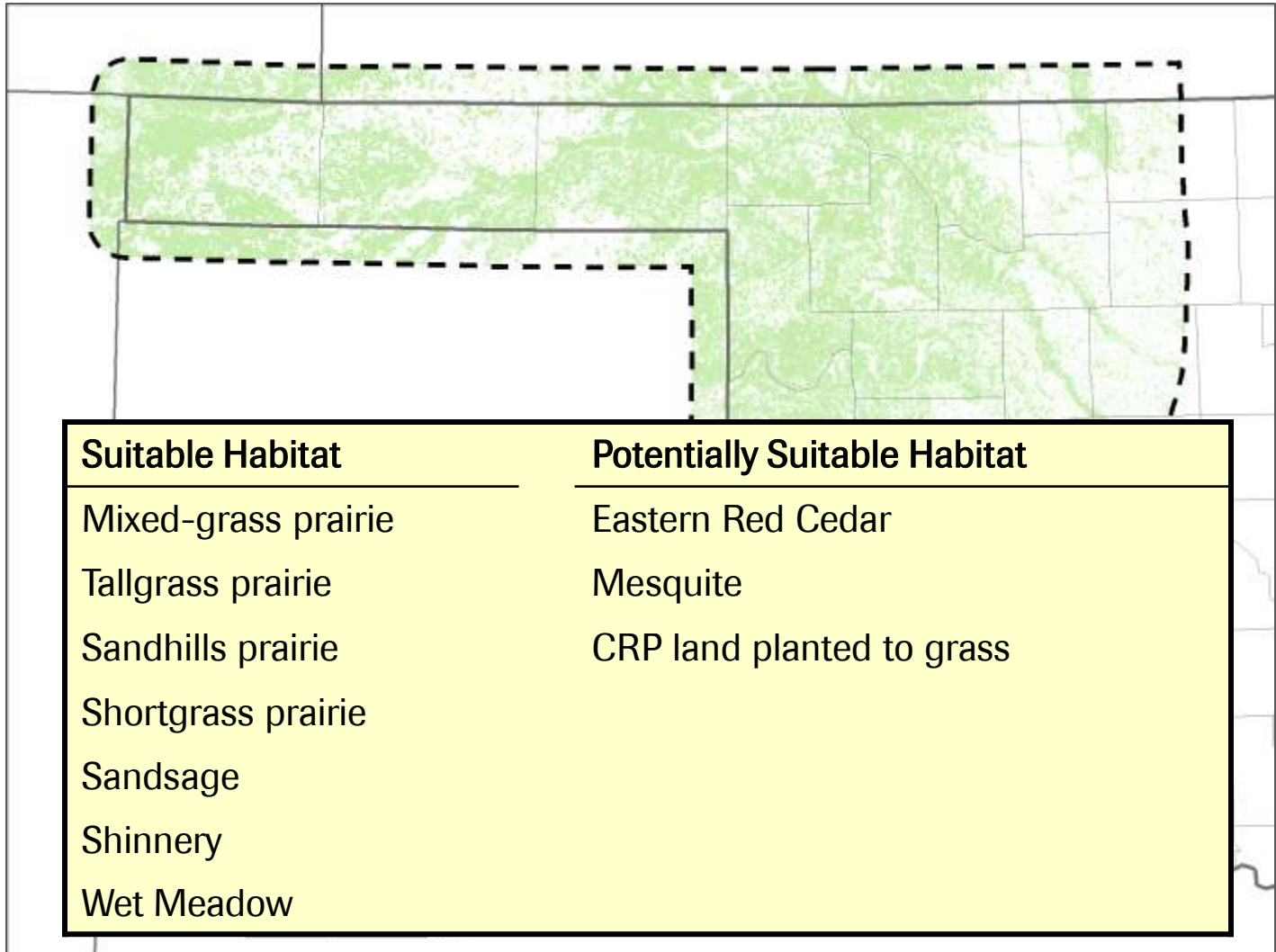


Factor 3 - leks



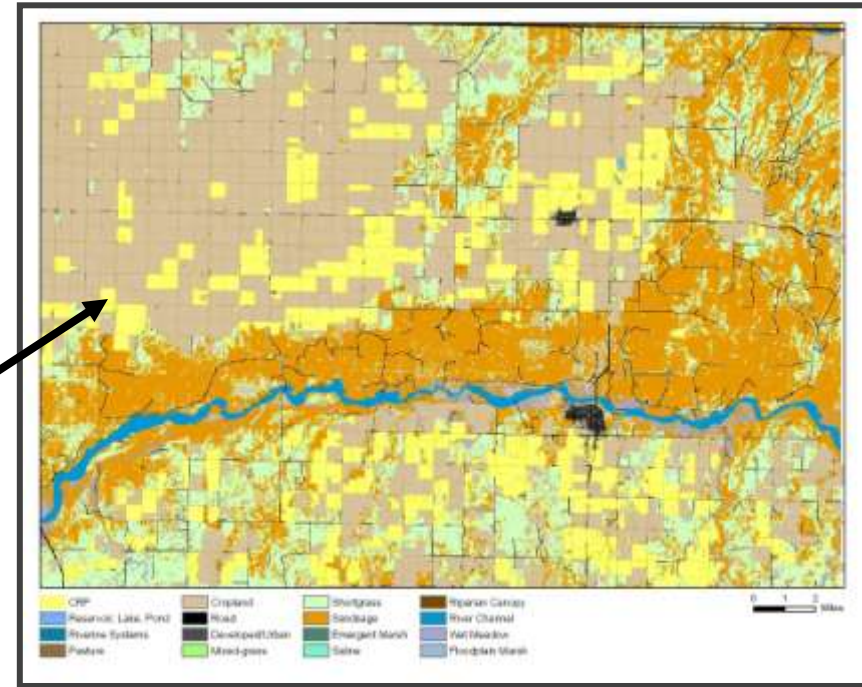
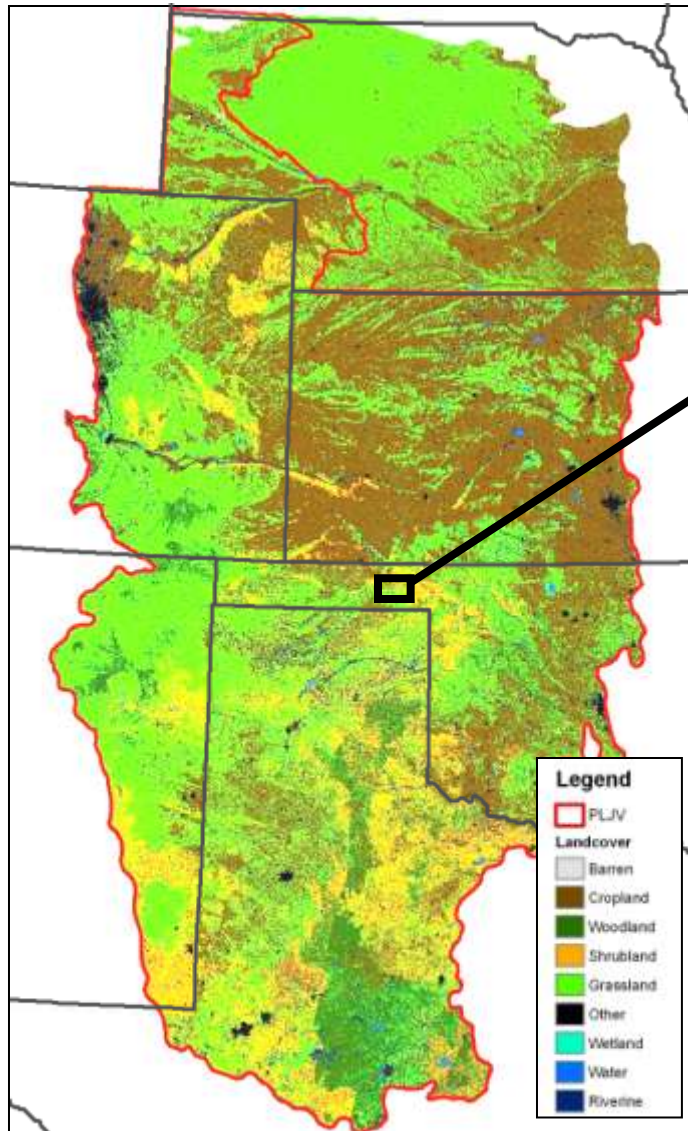


Factor 4 – habitat suitability



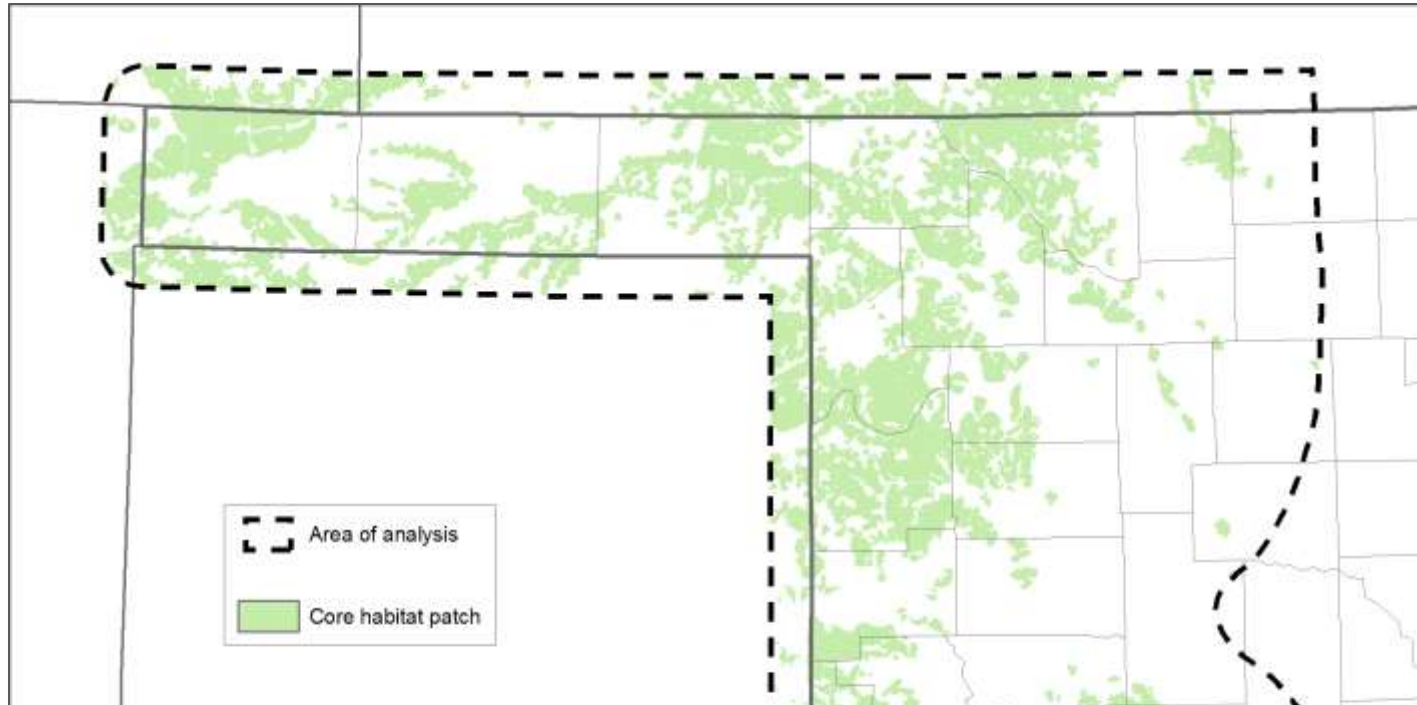


PLJV seamless landcover





Factor 5 – core habitat patch

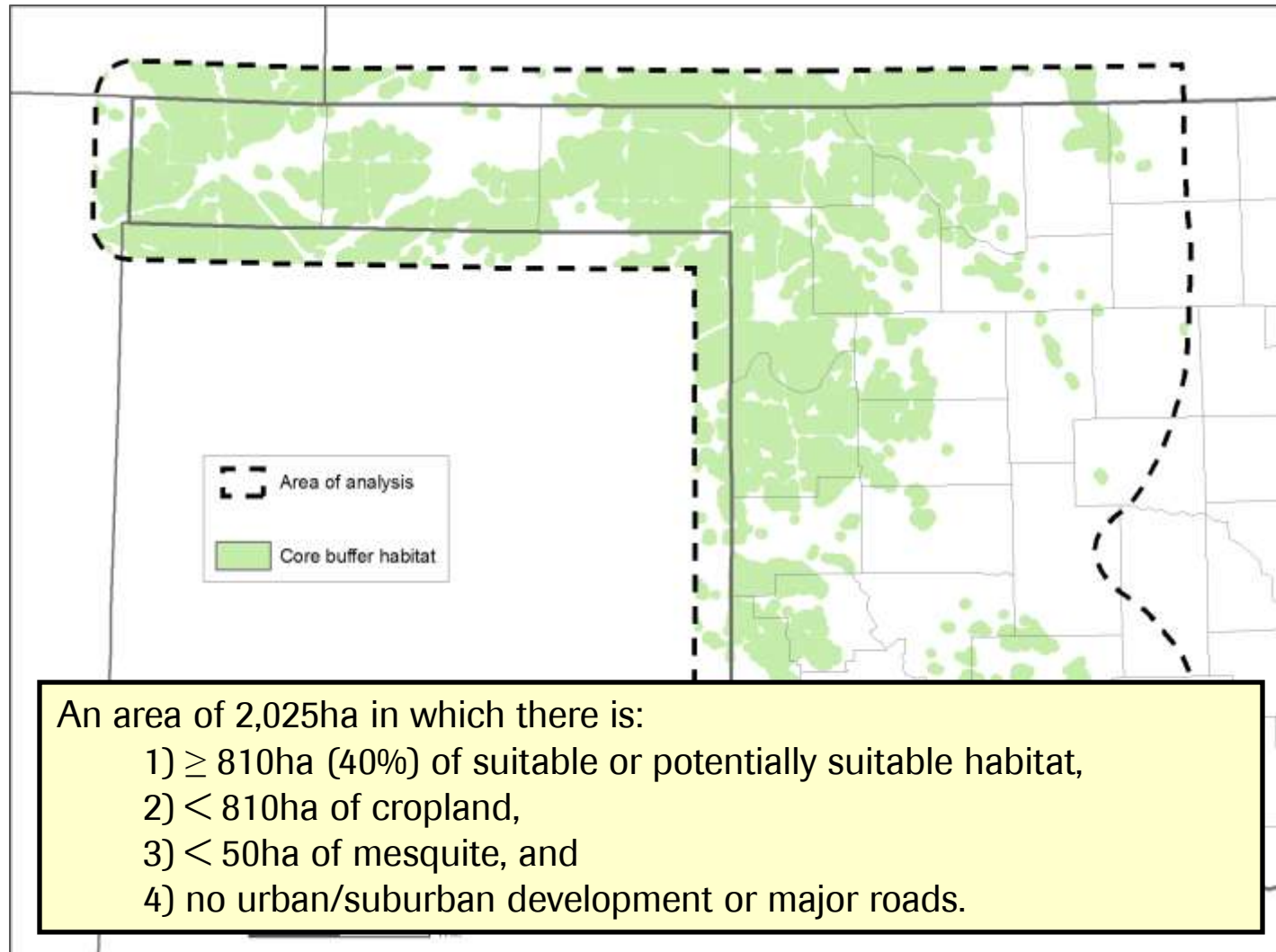


Patches of suitable or potentially suitable habitat that are:

- 1) either $> 2,000\text{ha}$ or $500\text{ha} - 2,000\text{ha}$ and $< 10\text{km}$ from another patch $\geq 500\text{ha}$ (i.e., patches with high connectivity),
- 2) $\geq 1600\text{m}$ wide (~ 1 mile), and
- 3) contain gaps of unsuitable habitat $\leq 450\text{m}$ (~ 0.25 mile).

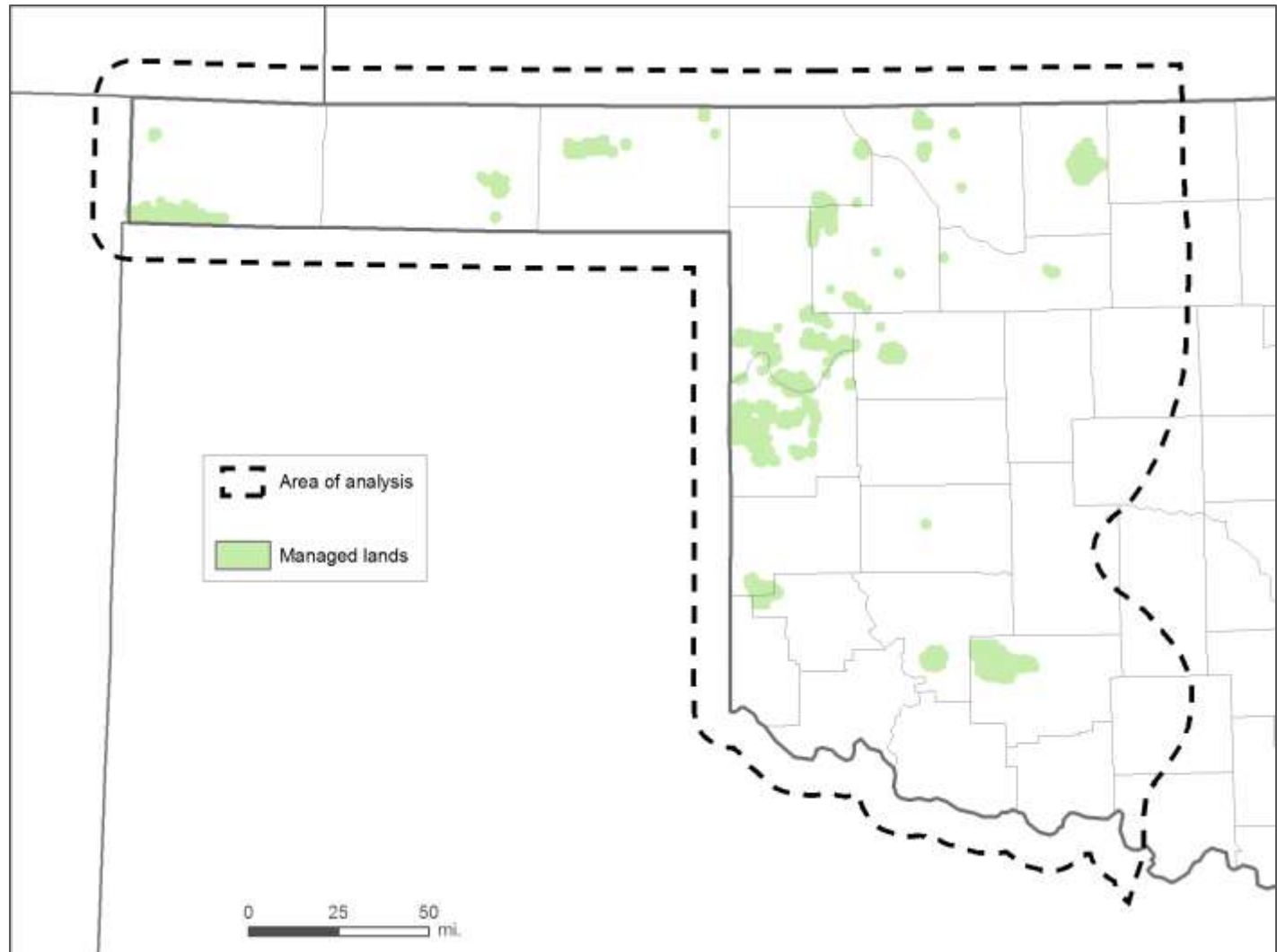


Factor 6 – core buffer habitat



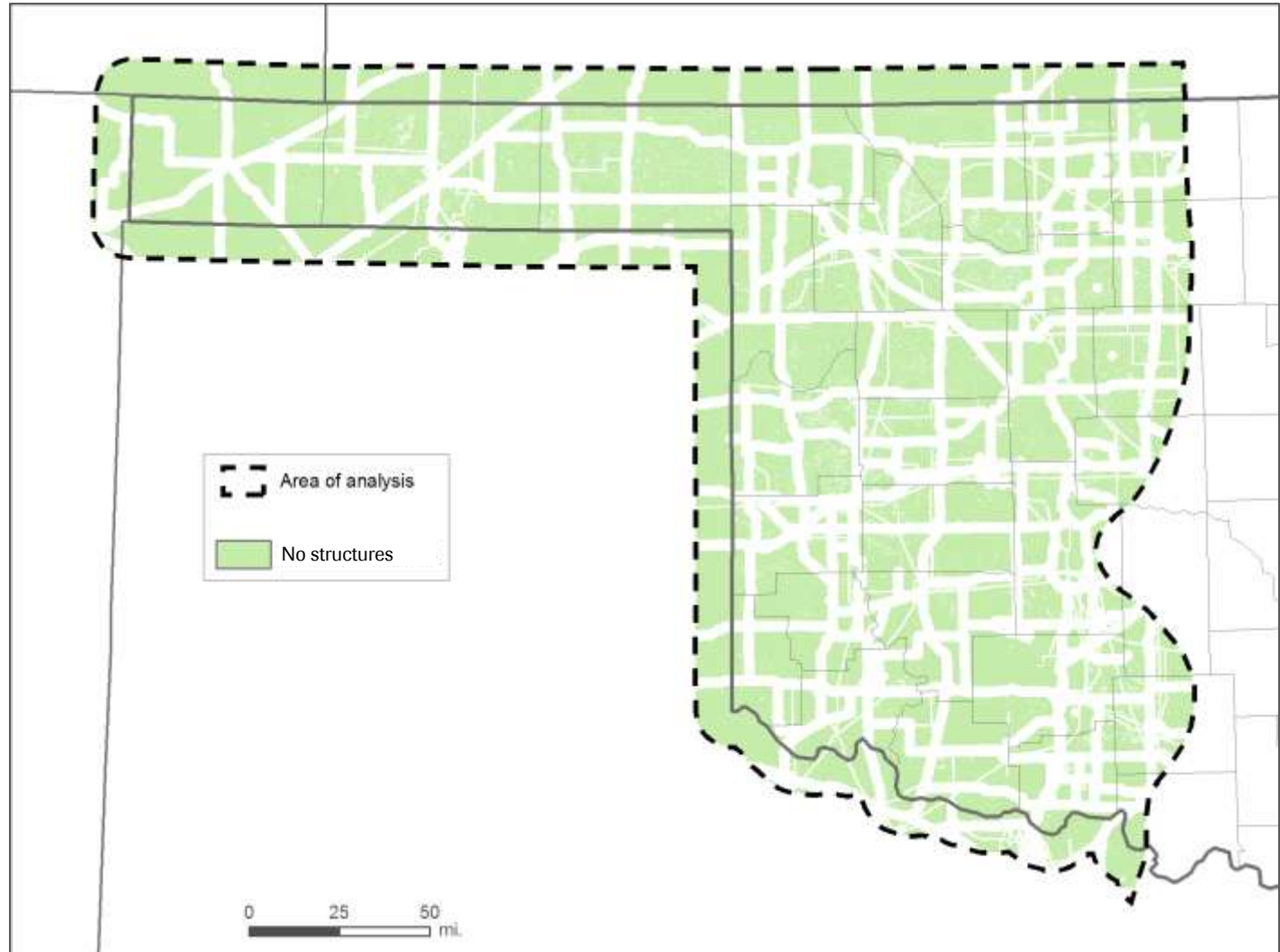


Factor 7 – managed / protected lands



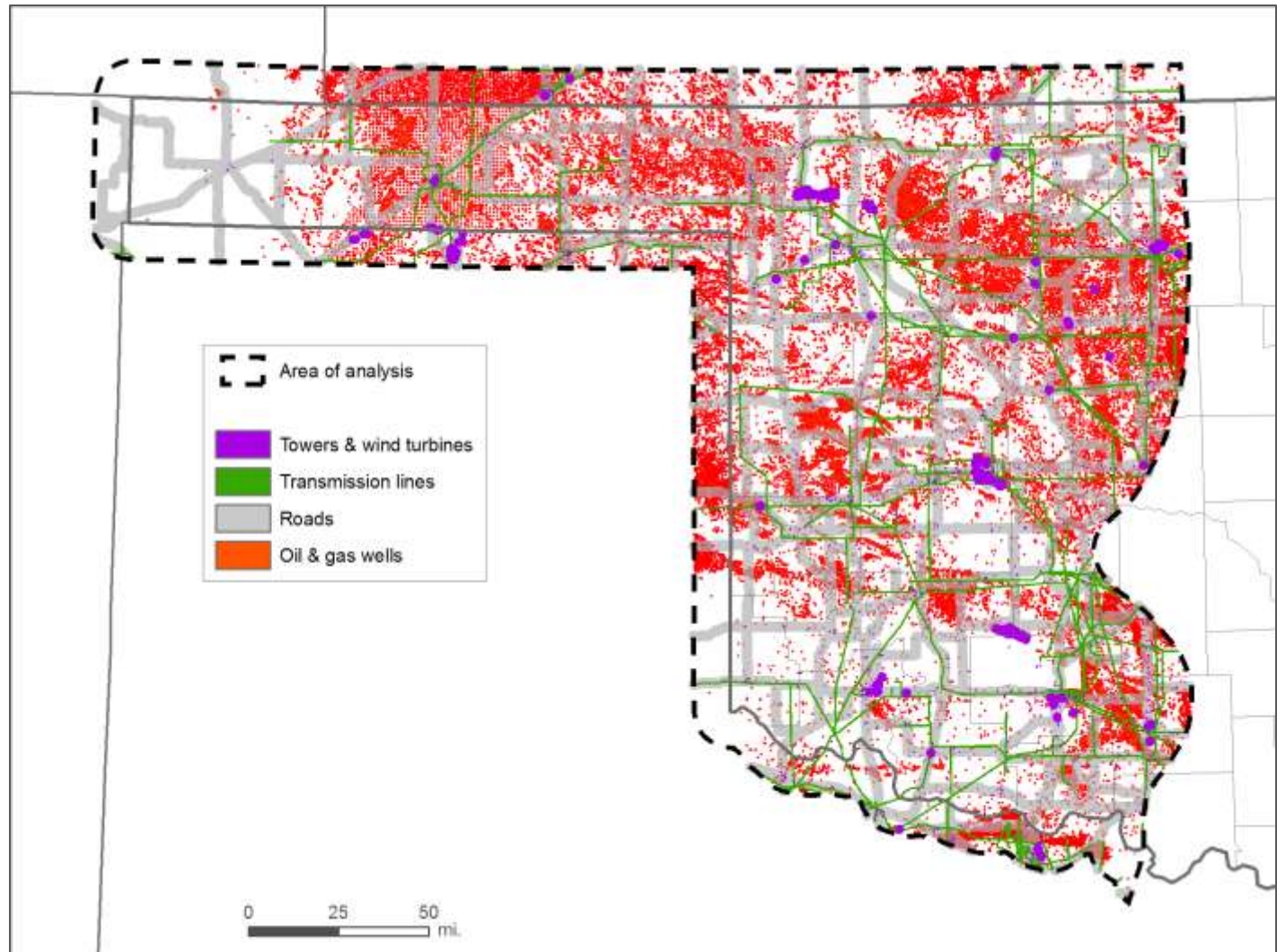


Factor 8 – avoided structures



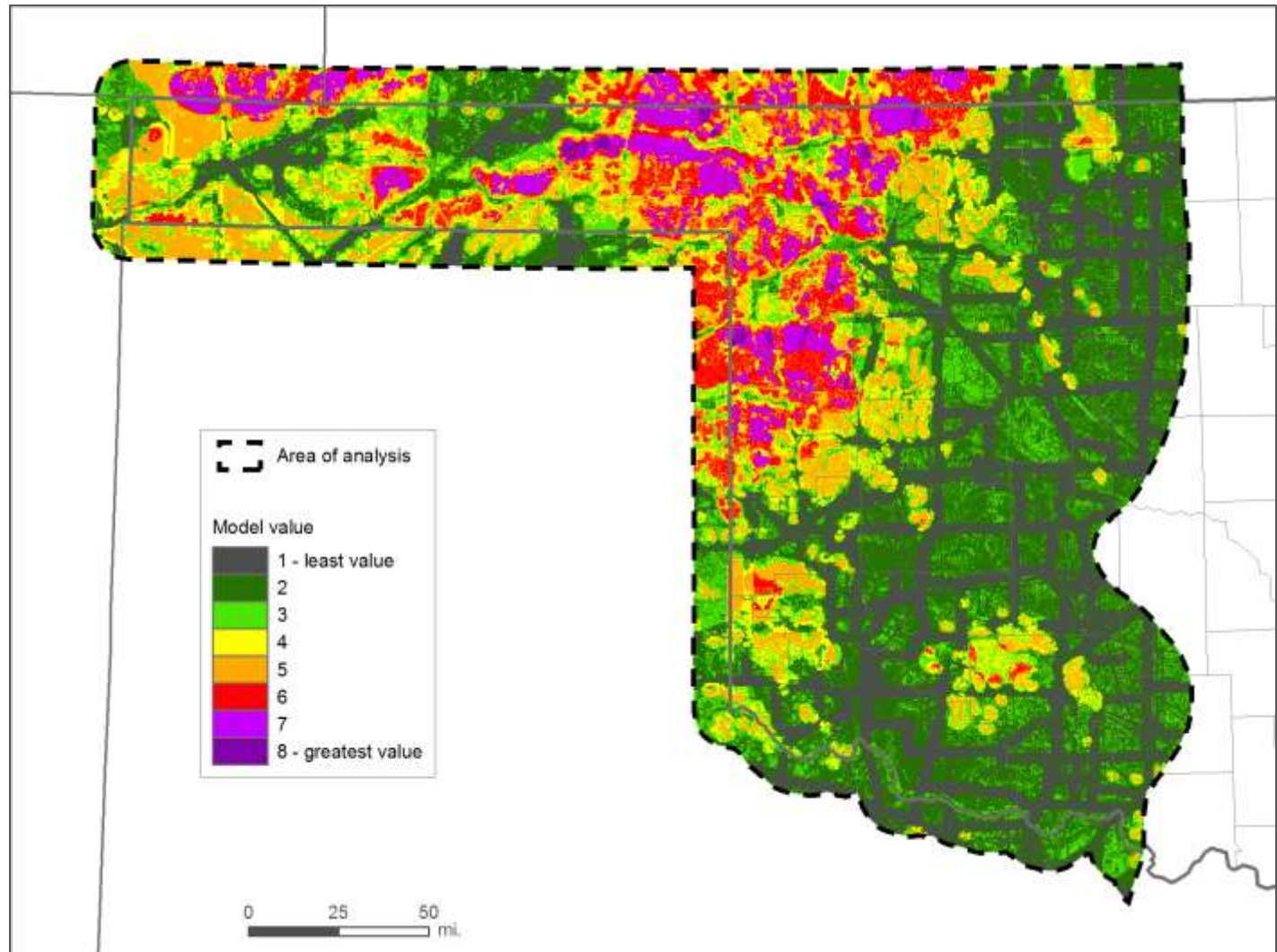


Avoided structure buffers



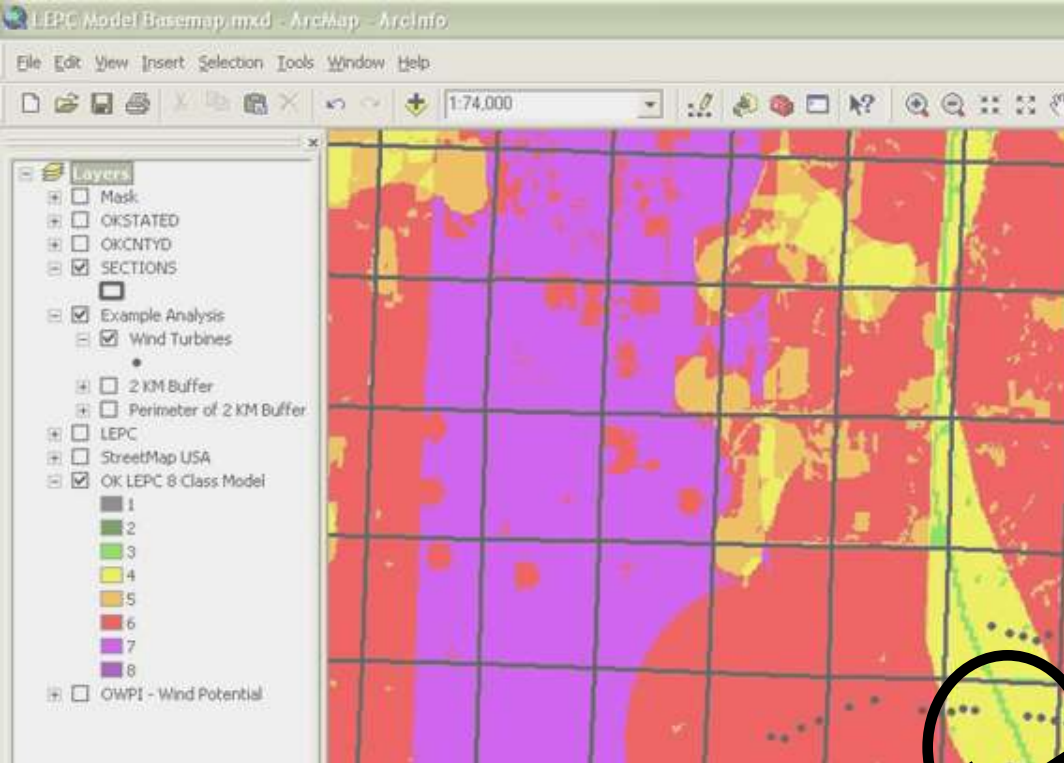


Model output

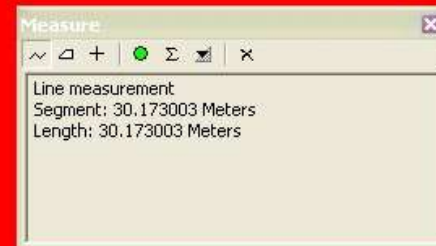




Applications



30 METER RESOLUTION

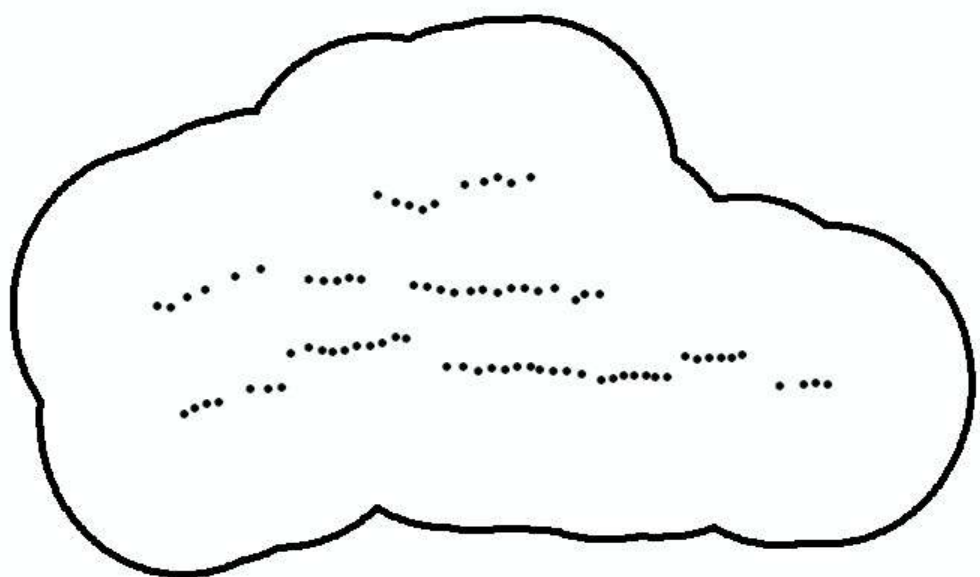


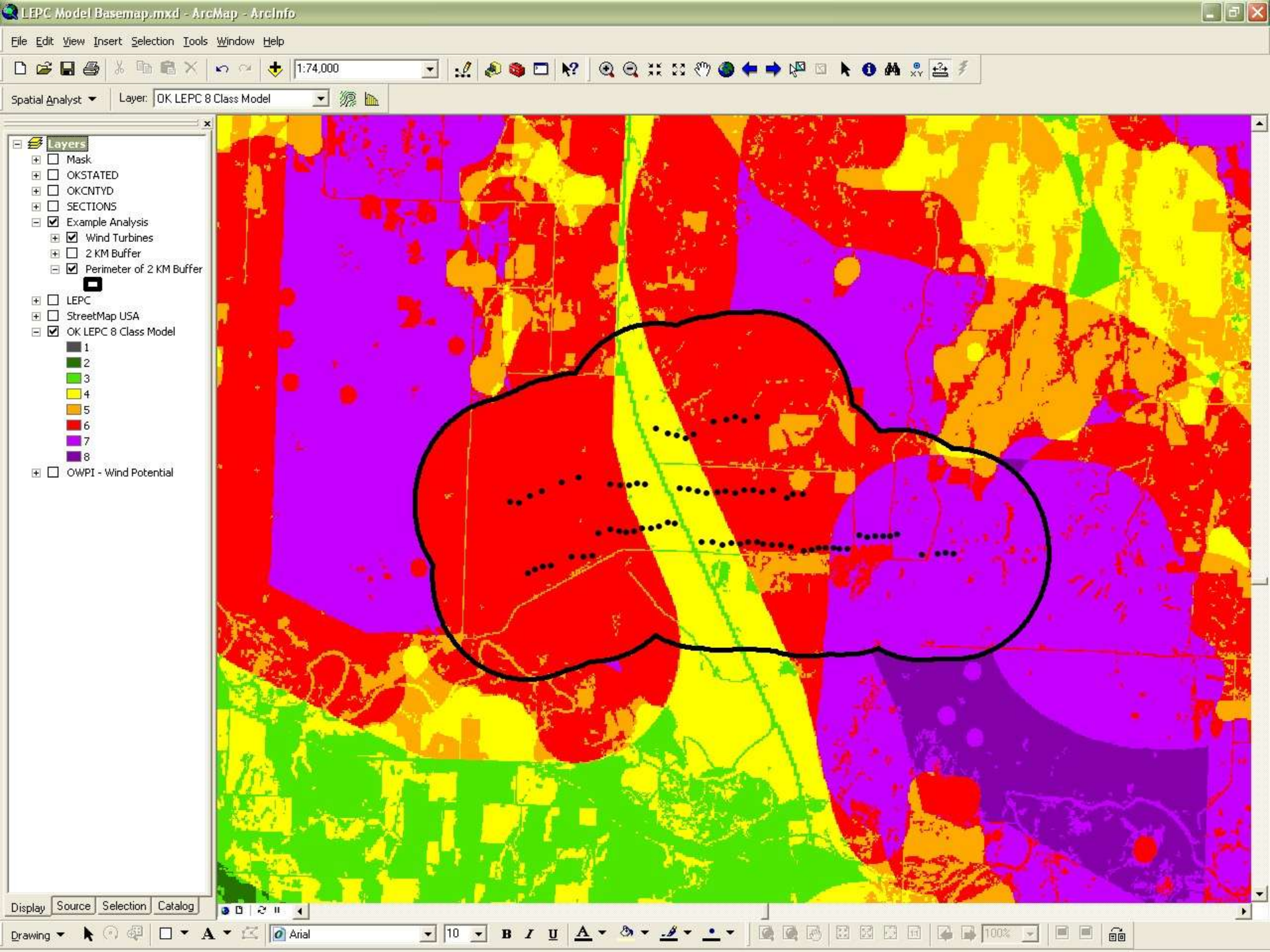
640 acres

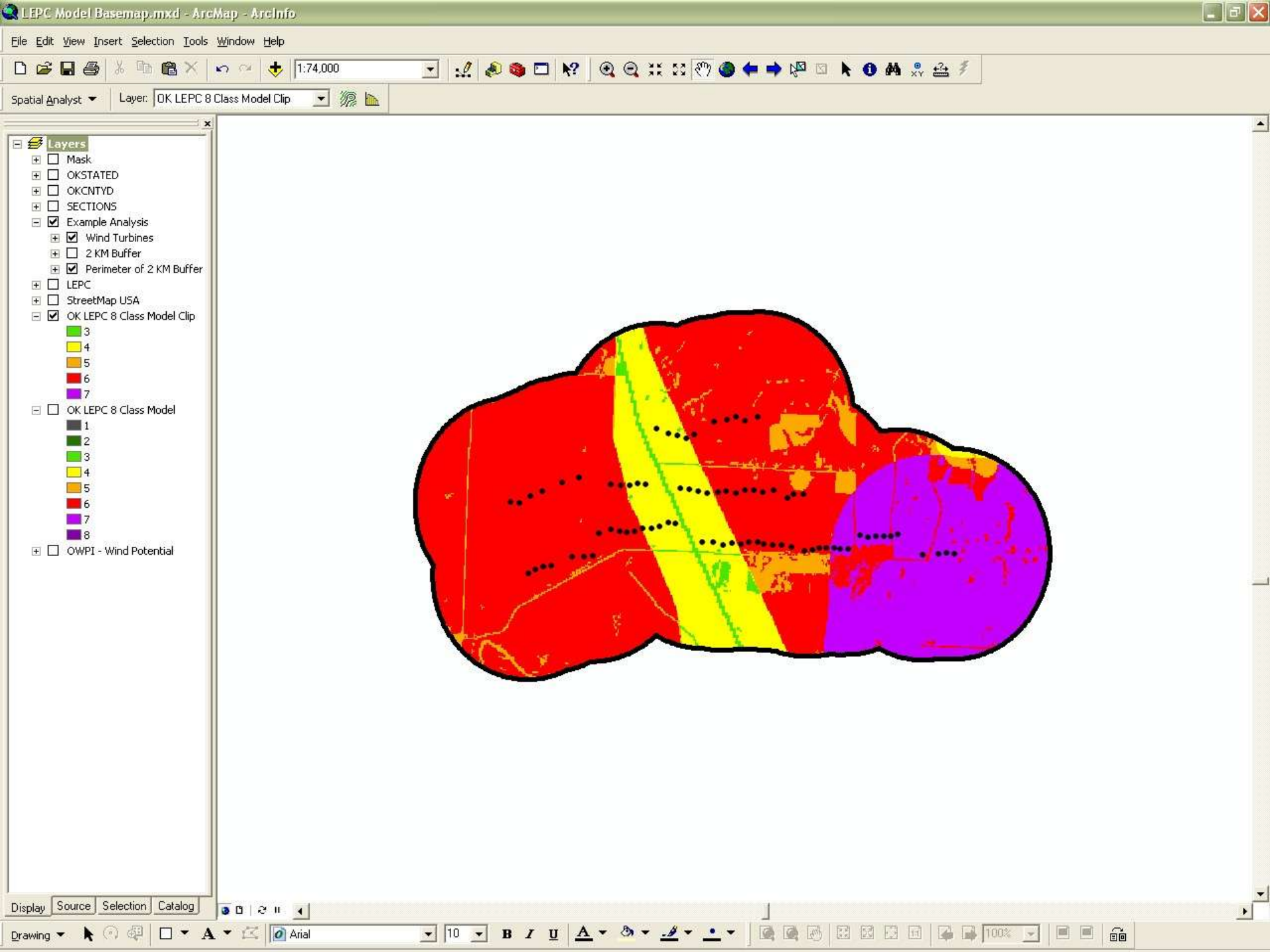
- Layers**
- ☐ Mask
 - ☐ OKSTATED
 - ☐ OKCNTYD
 - ☐ SECTIONS
 - ☒ Example Analysis
 - ☒ Wind Turbines
 -
 - ☐ 2 KM Buffer
 - ☐ Perimeter of 2 KM Buffer
 - ☐ LEPC
 - ☐ StreetMap USA
 - ☐ OK LEPC 8 Class Model
 - ☐ OWPI - Wind Potential



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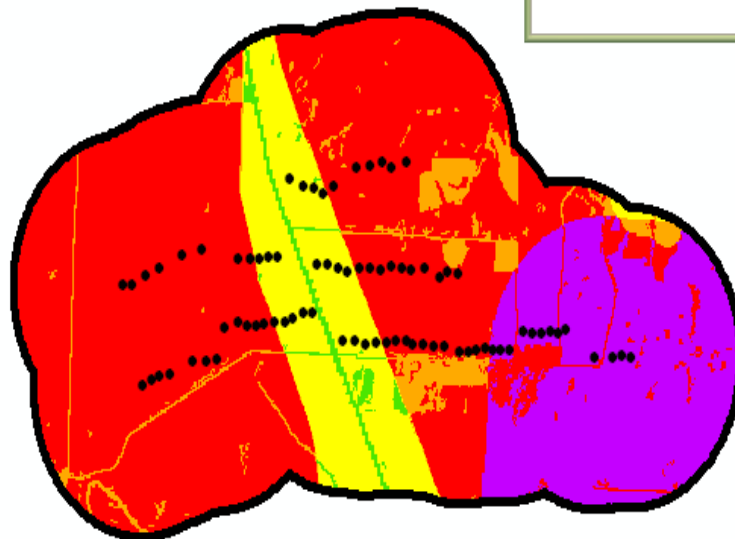
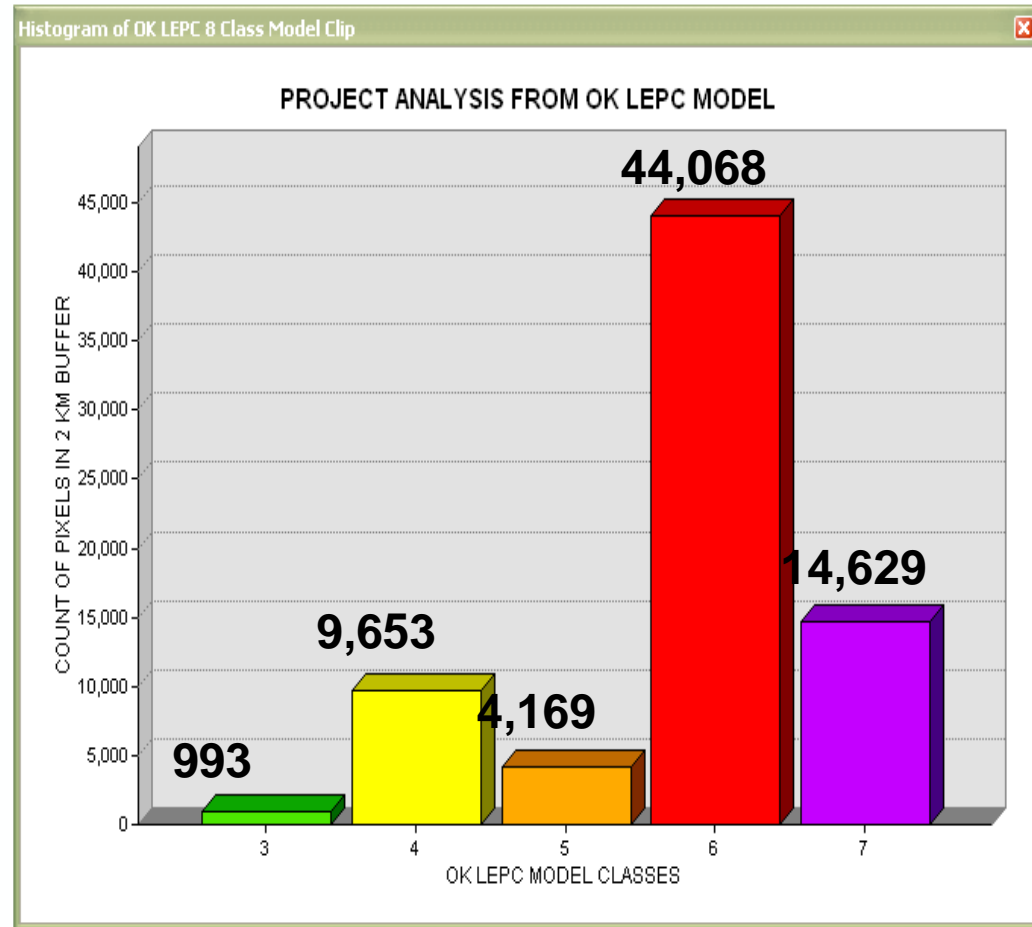






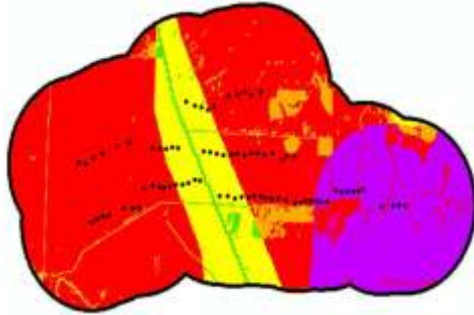


Count pixels by
class within 2 km
buffer





Voluntary Mitigation Fund



Cost by Class per Pixel

Class 1 = \$

Class 2 = \$

Class 3 = \$

Class 4 = \$

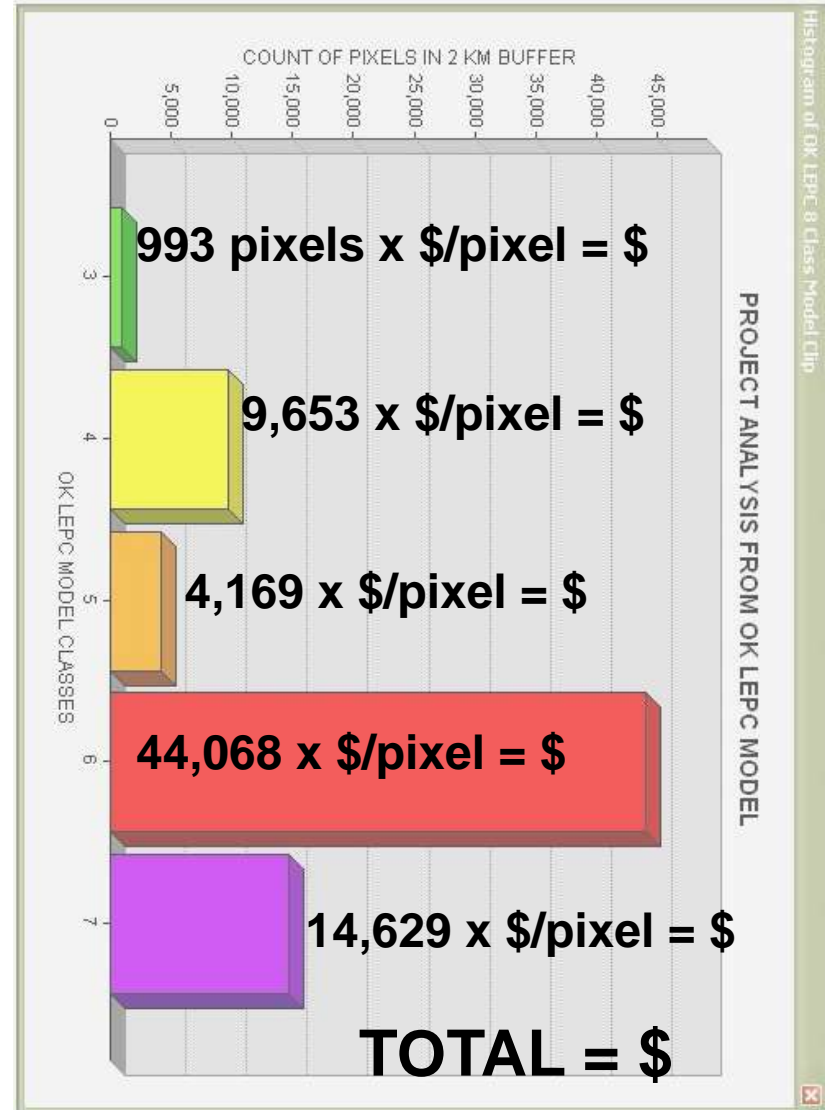
Class 5 = \$

Class 6 = \$

Class 7 = \$

Class 8 = \$

OKLAHOMA DEPARTMENT OF WILDLIFE
CONSERVATION
IS THE VOLUNTARY MITIGATION FUND
MANAGER BECAUSE THE LEPC IS UNDER
STATE AUTHORITY





Voluntary mitigation fund

Mitigation work will be used under the following mechanisms:

- LEPC targeted fee title land acquisition
- LEPC targeted conservation easements
- LEPC targeted management agreements



Maps / Analyses of “where wind could go” and have little or no impact on lesser prairie-chicken conservation:

- Wind class 3 or greater and,
- LEPC Model 3 or less and,
- Contiguous 5,000 or more acre thresholds

AND

- Wind class 3 or greater and,
- LEPC Model 3 or less and,
- Contiguous 10,000 or more acre thresholds

Wind models:

AWS Truewind

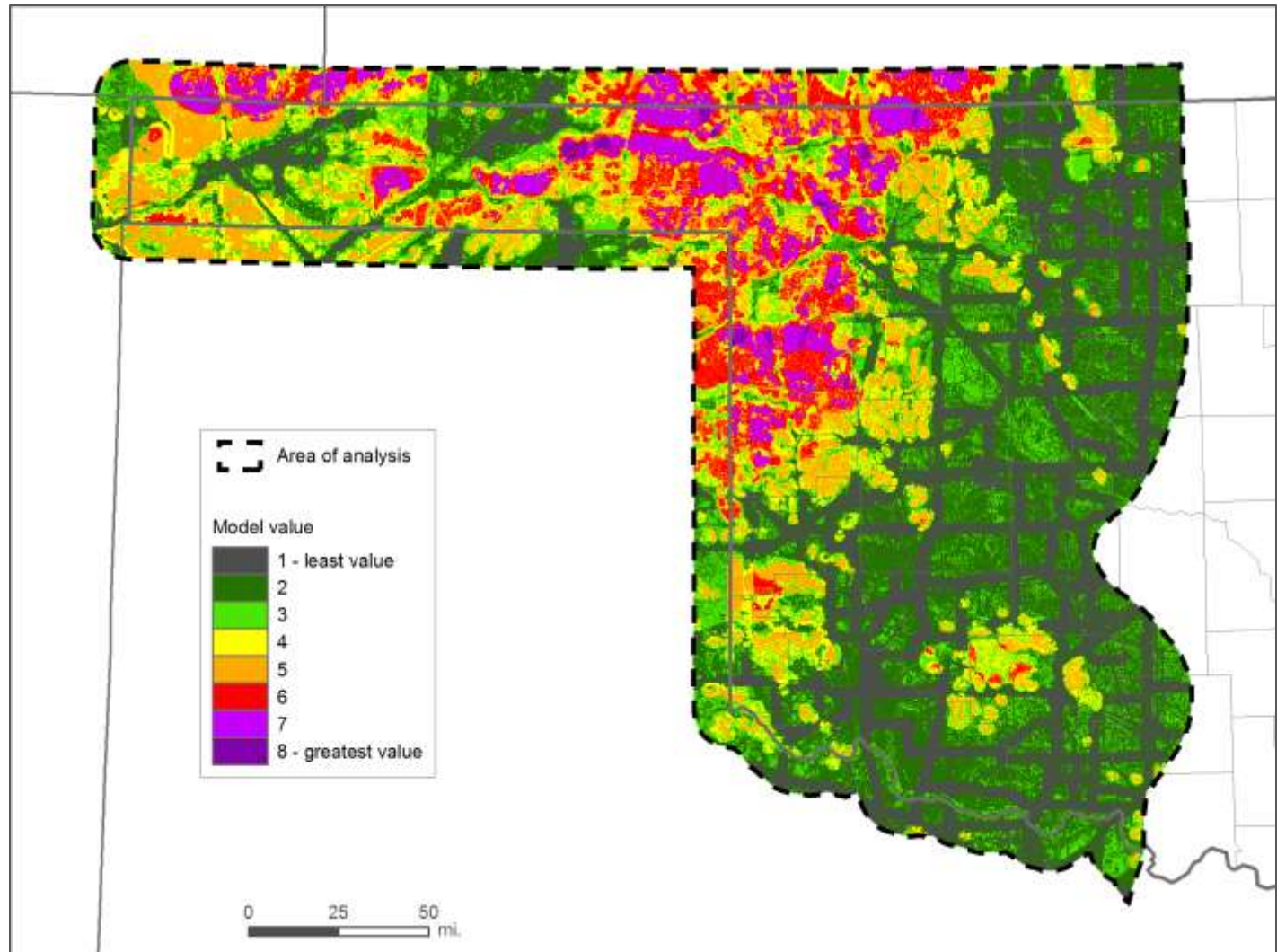
USDOE, National Renewable Energy Labs

Oklahoma Wind Power Initiative

Others?

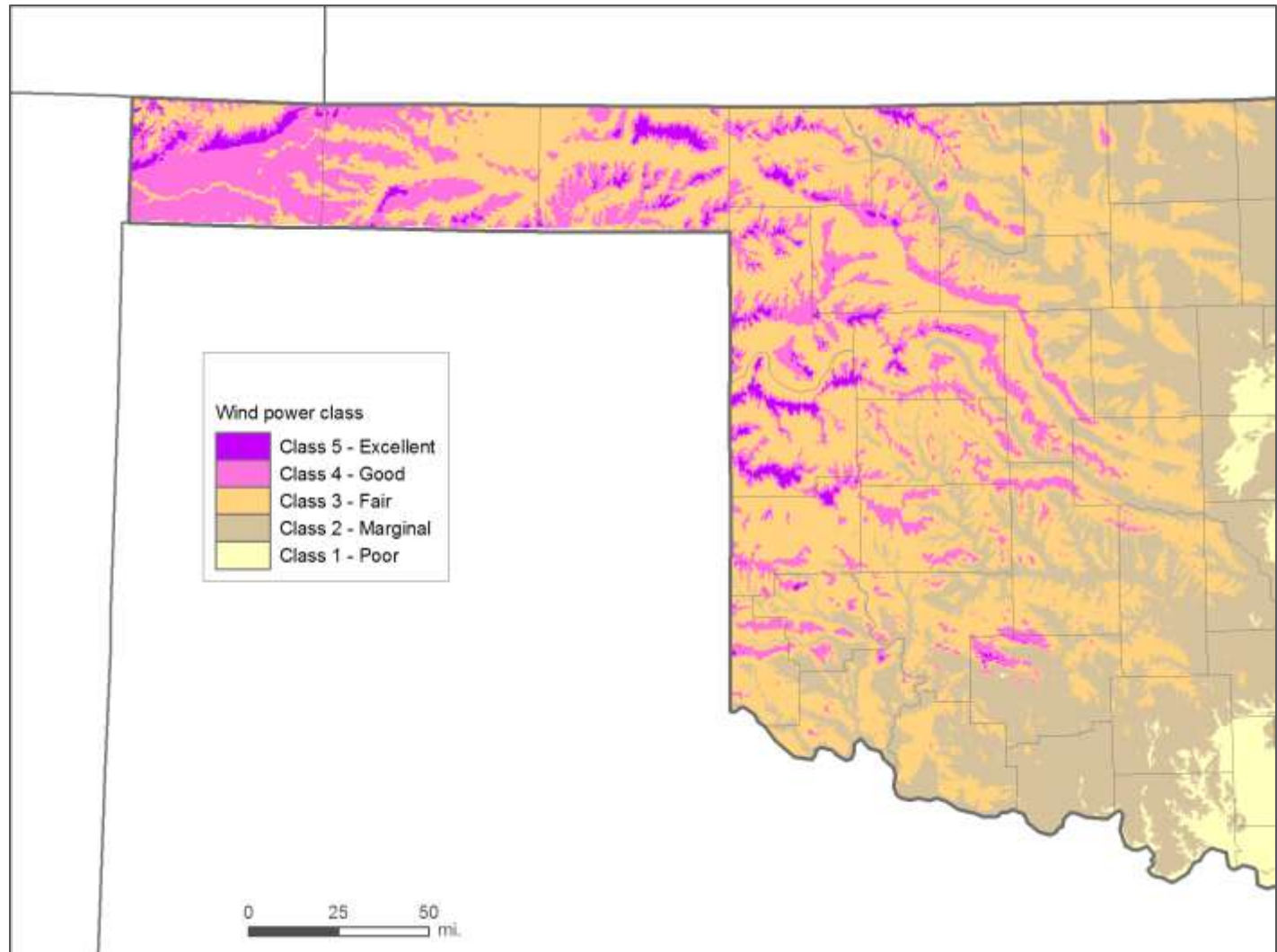


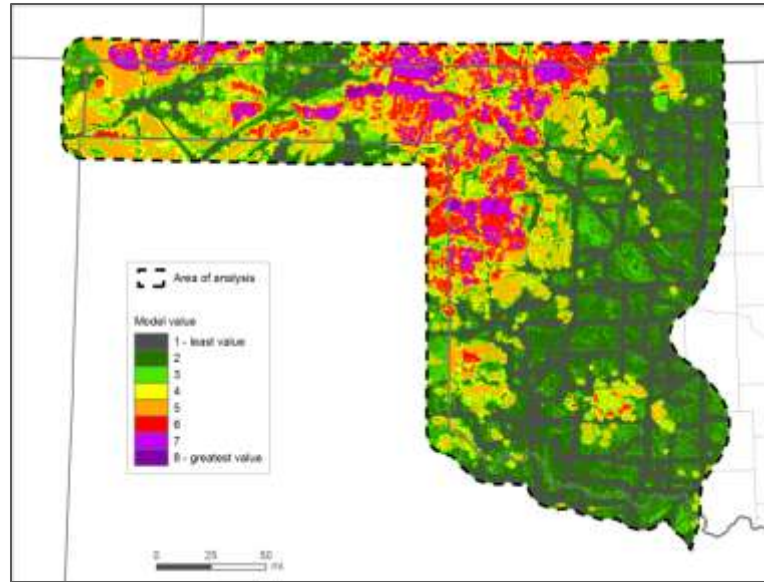
Model output





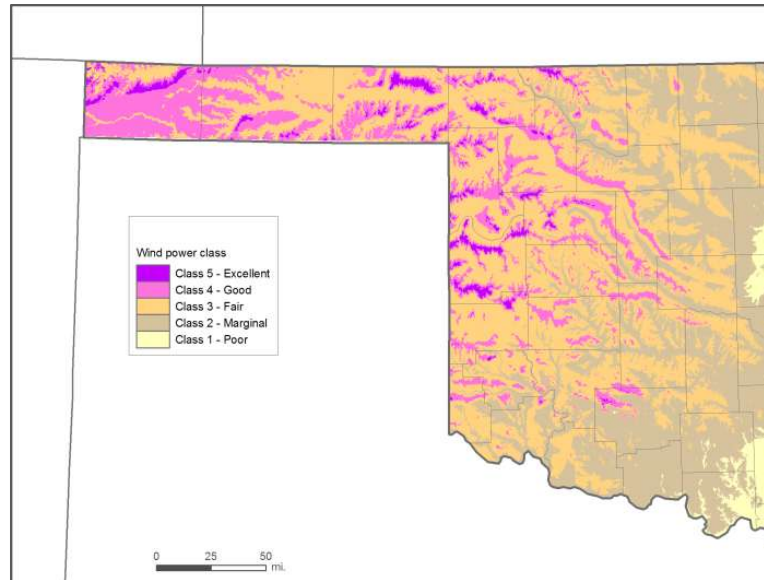
OWPI – wind power density at 50 meters





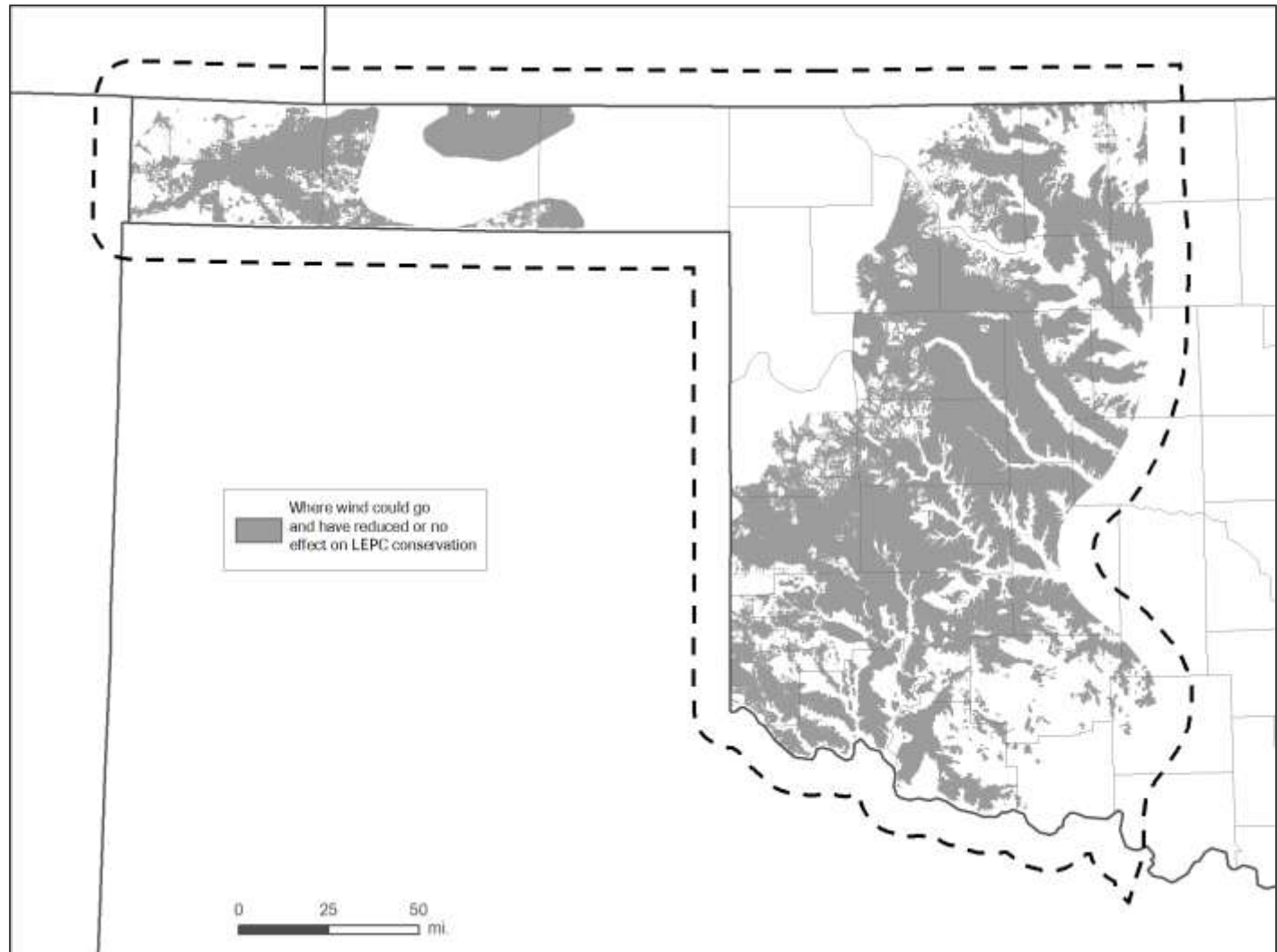
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'Where wind could go' product



<http://www.wildlifedepartment.com/lepcdevelopmentplanning.htm>

