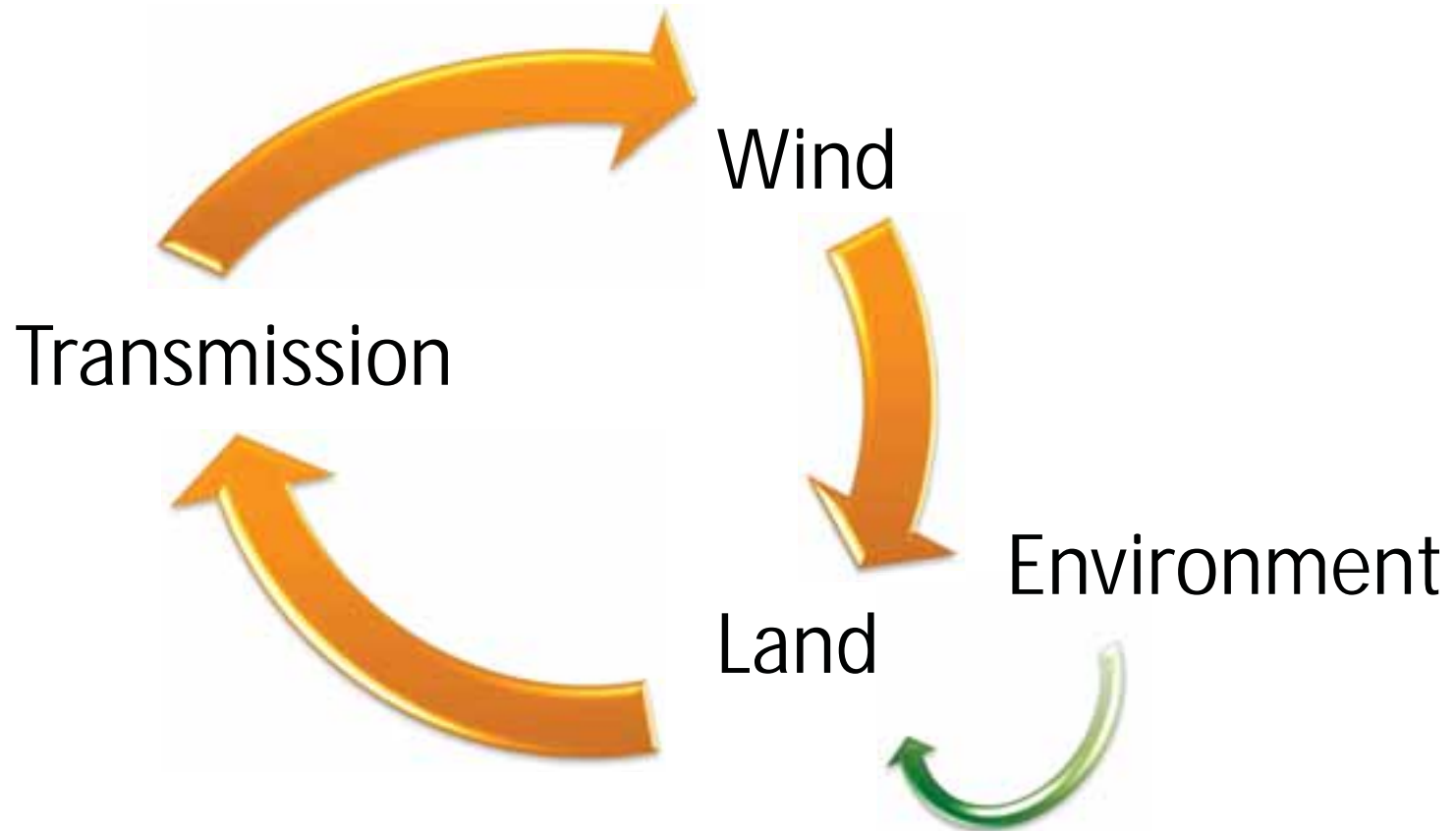


Landscape Wind Energy Siting for Transmission System Planning

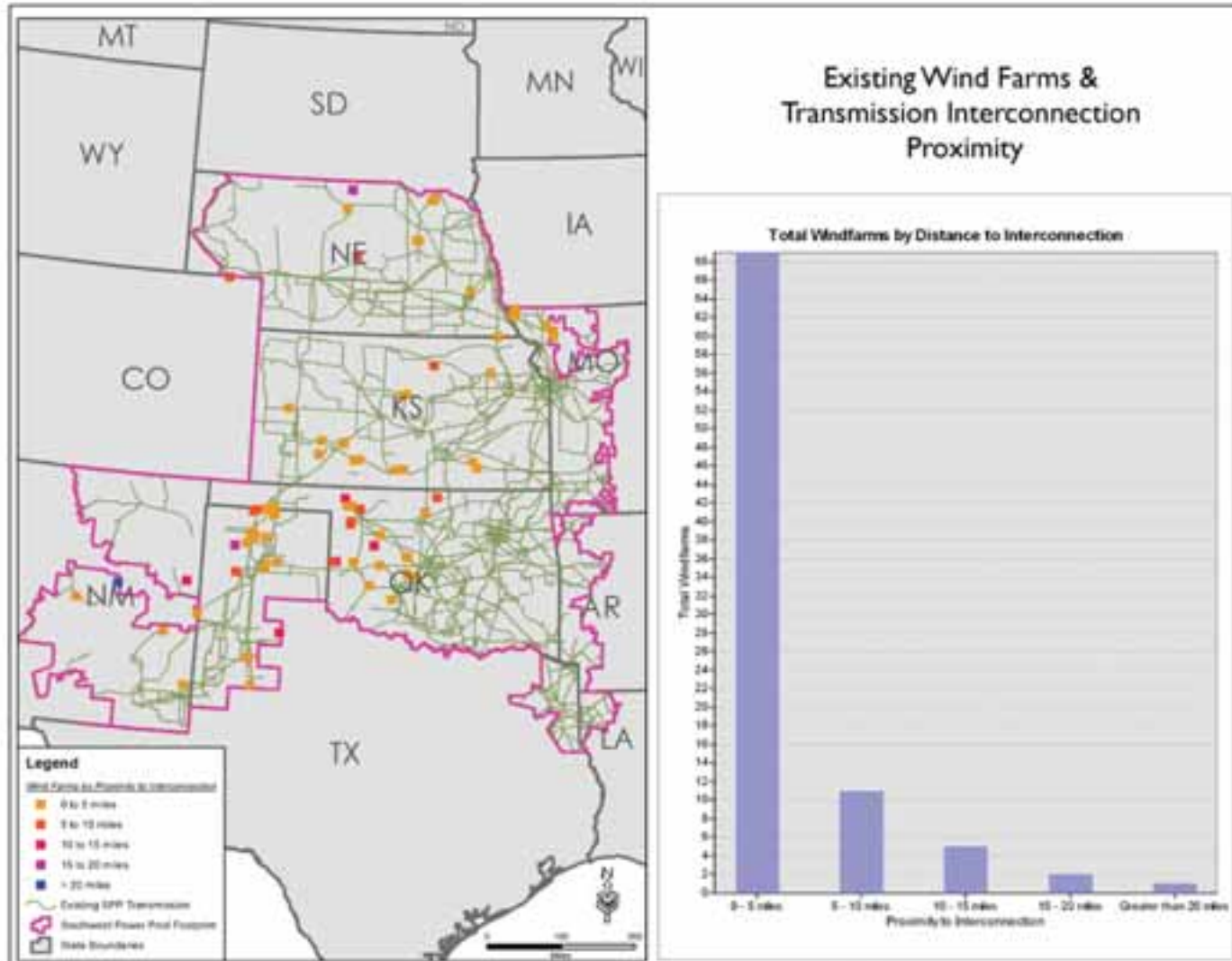
Presented by Ty White

Typical wind farm development is accomplished by balancing the “Three-Legged Stool”

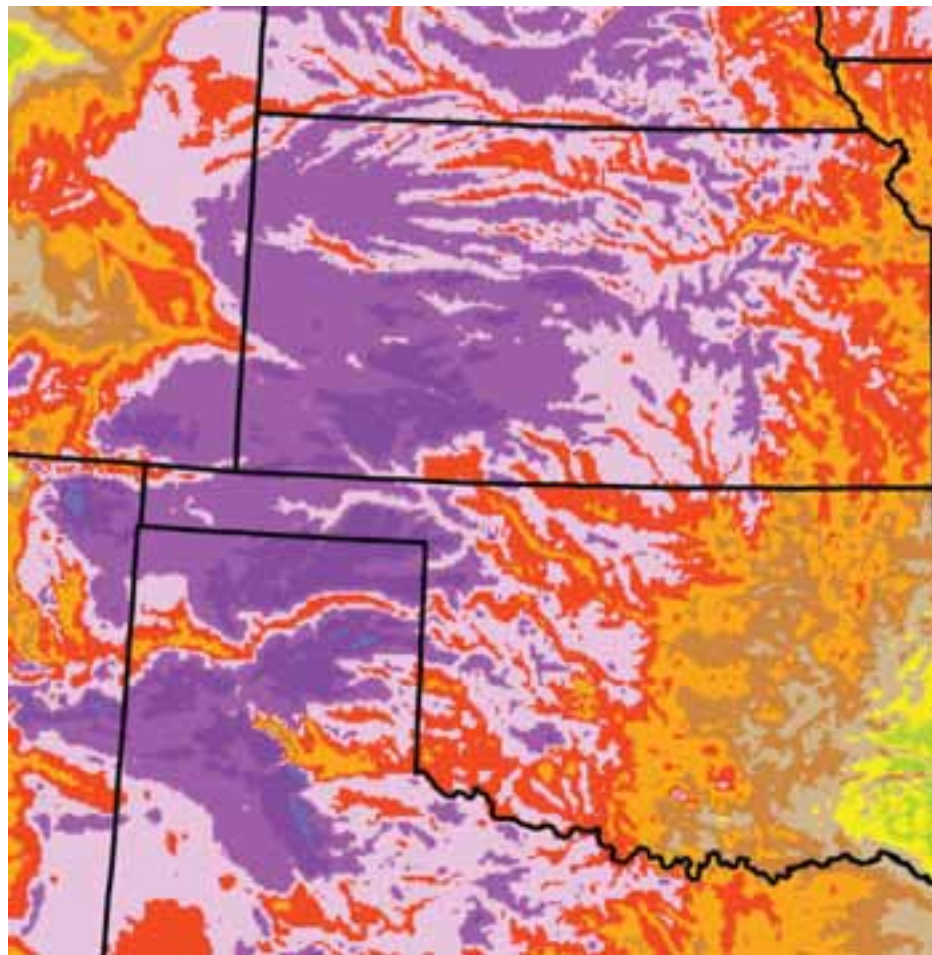


As transmission capacity diminishes, a new approach is warranted to facilitate economic integration of wind energy.

96.5% of wind farms are < 15 mi. from interconnect

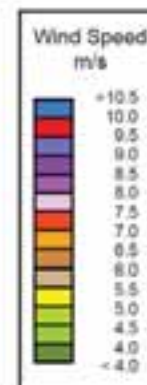


Mesoscale Wind Maps have Limited Analytical Capability



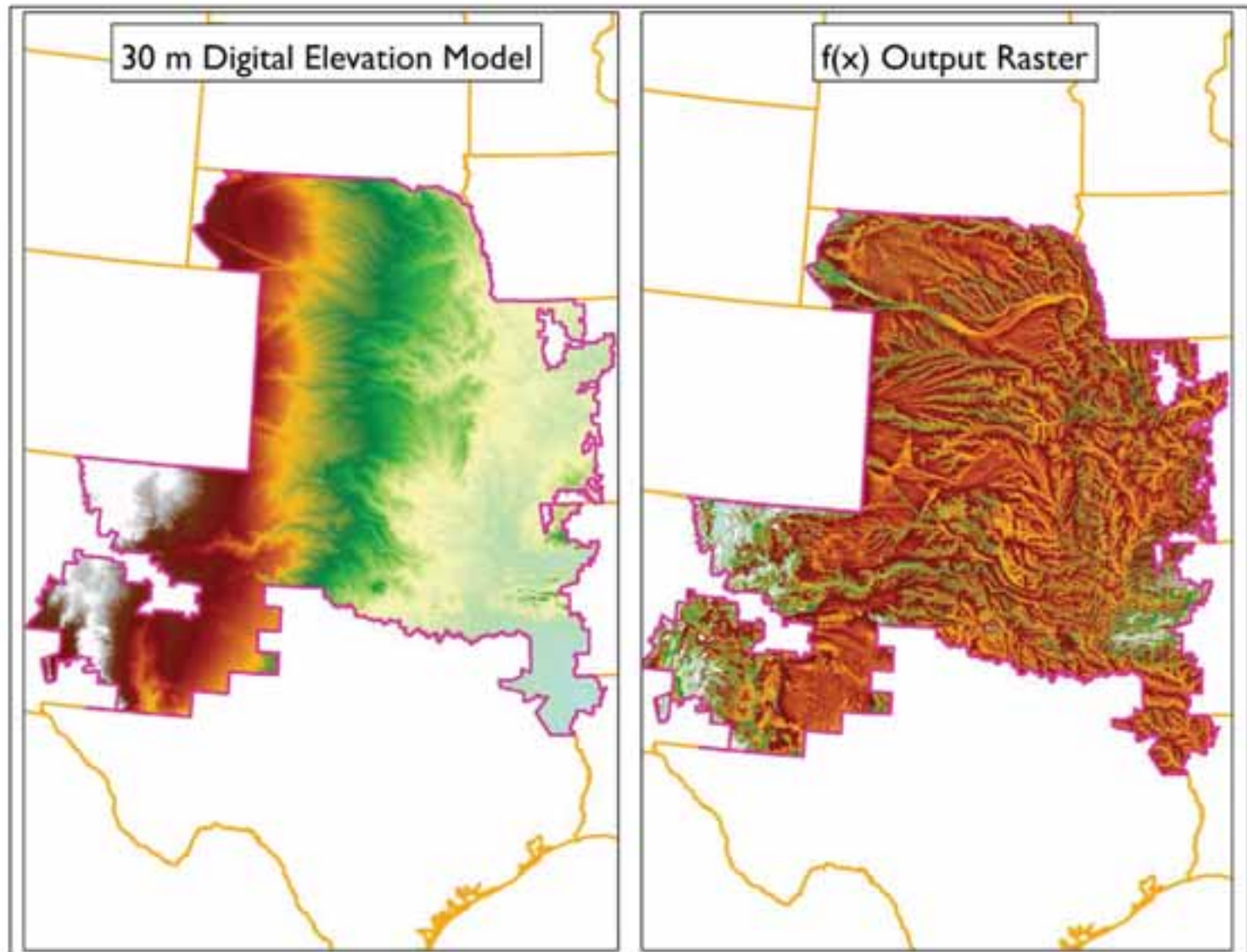
Great for determining local Meteorology.

Not so great for determining potential capacity

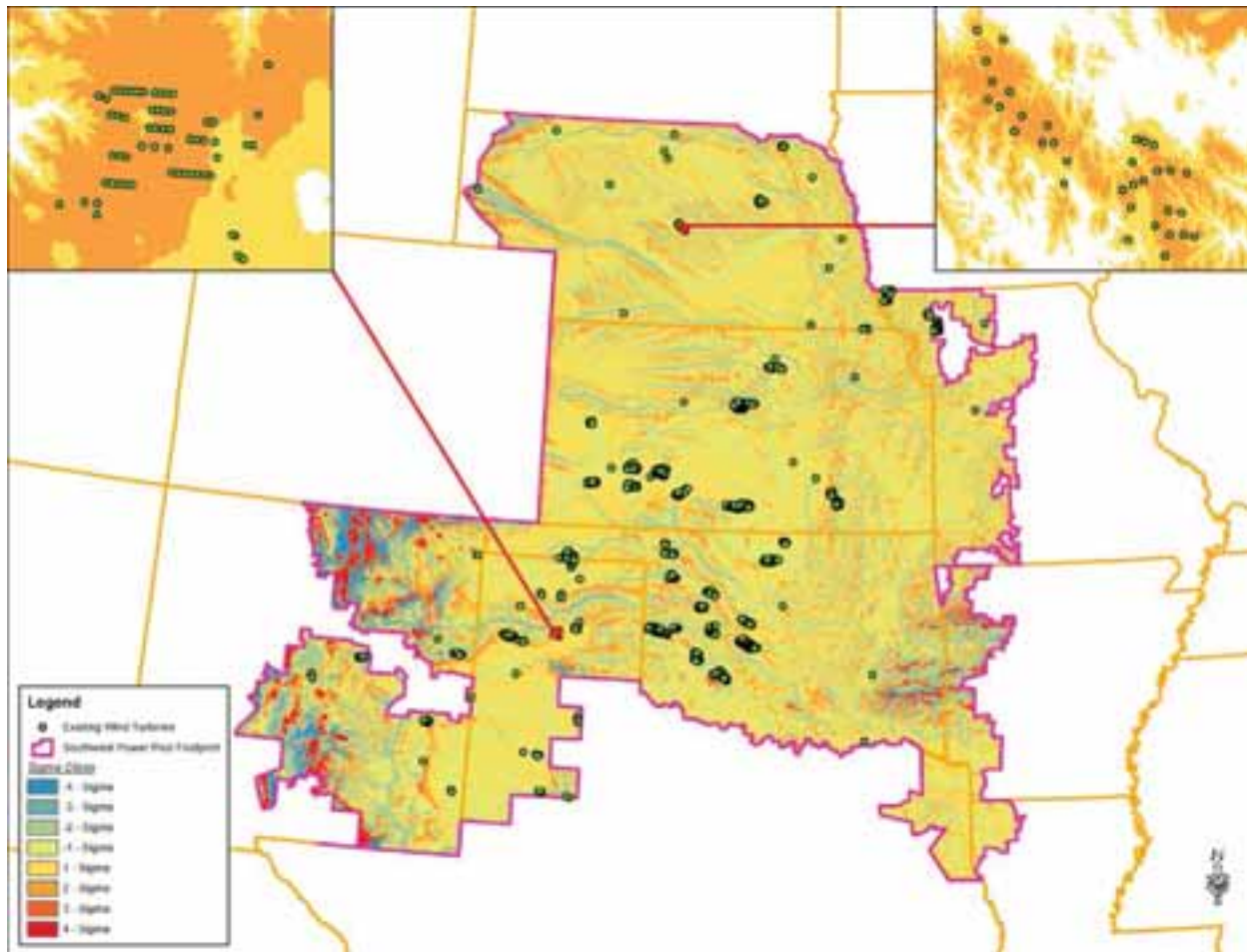


Source: Wind resource estimates developed by AWS Truepower, LLC for windNavigator®. Web: <http://www.windnavigator.com> | <http://www.awstruepower.com>. Spatial resolution of wind resource data: 2.5 km. Projection: Albers Equal Area WGS84.

Deriving Wind Exposure from Elevation

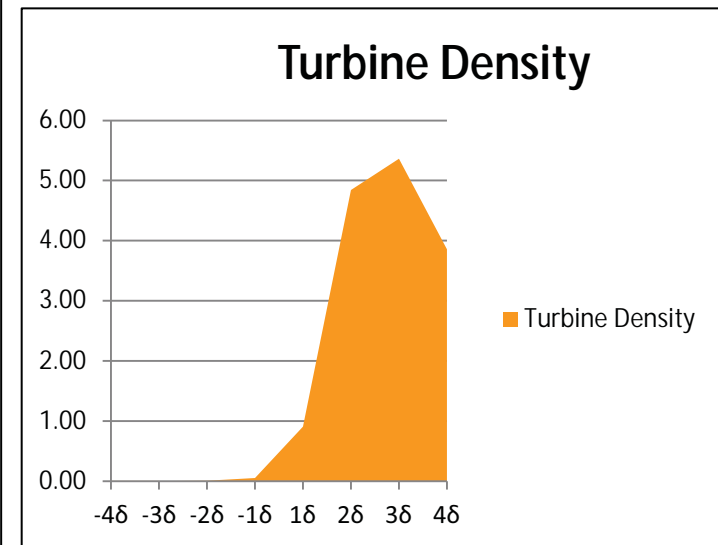
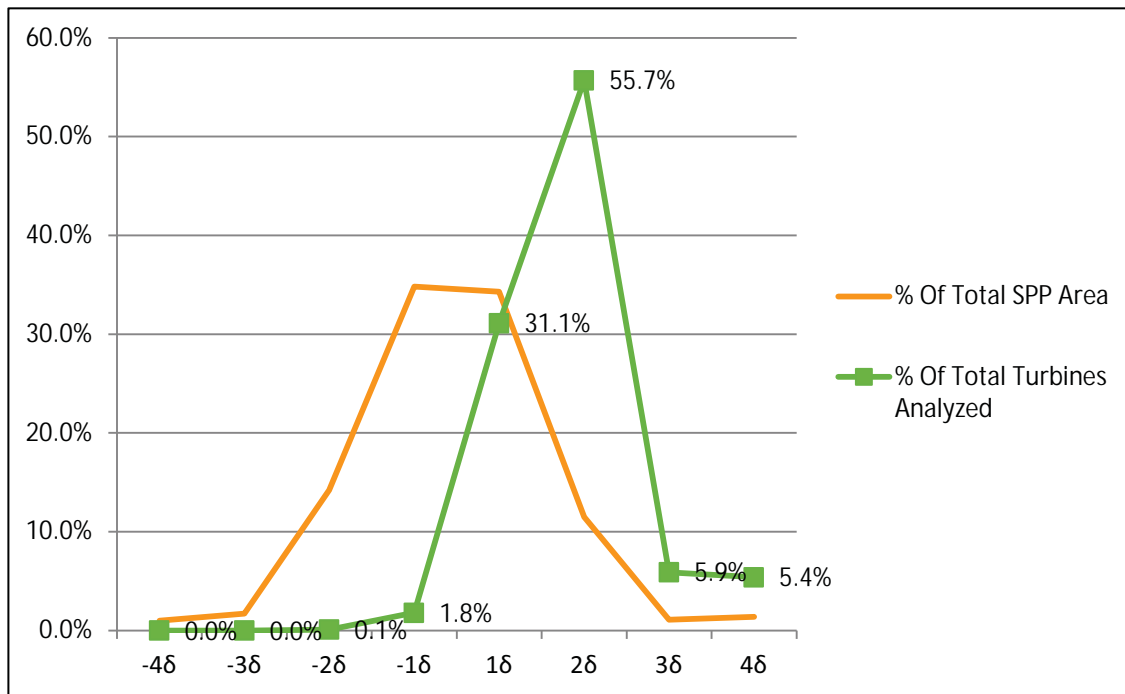


Regression Analysis

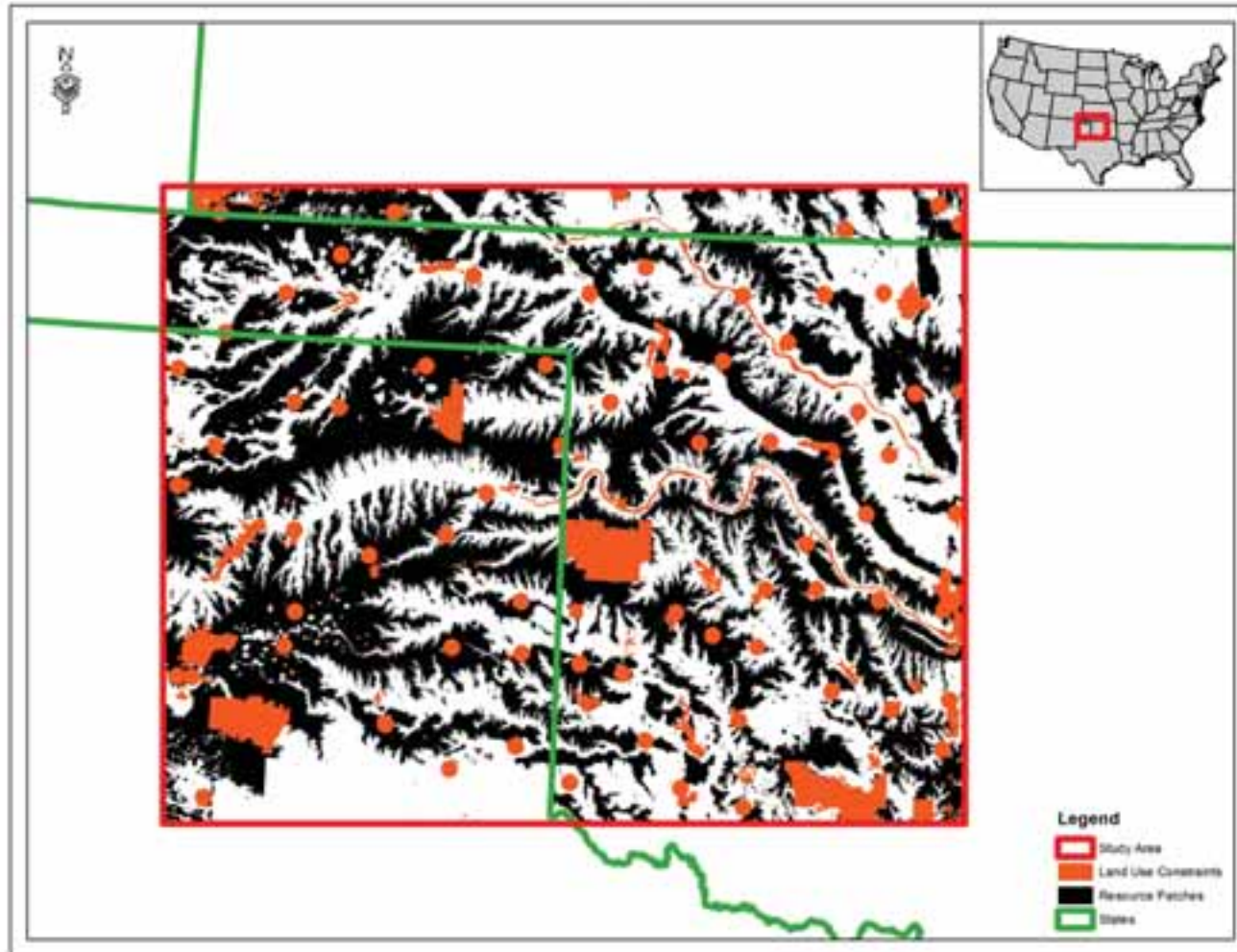


Regression Analysis (cont'd)

Raster Class	% Of Total SPP Area	Total Turbines in Class	% Of Total Turbines Analyzed	Turbine Density
-46	1.0%	0	0.0%	0.00
-36	1.7%	0	0.0%	0.00
-26	14.2%	5	0.1%	0.01
-16	34.8%	75	1.8%	0.05
16	34.3%	1278	31.1%	0.91
26	11.5%	2285	55.7%	4.84
36	1.1%	244	5.9%	5.36
46	1.4%	220	5.4%	3.86



Land use constrains available wind sites



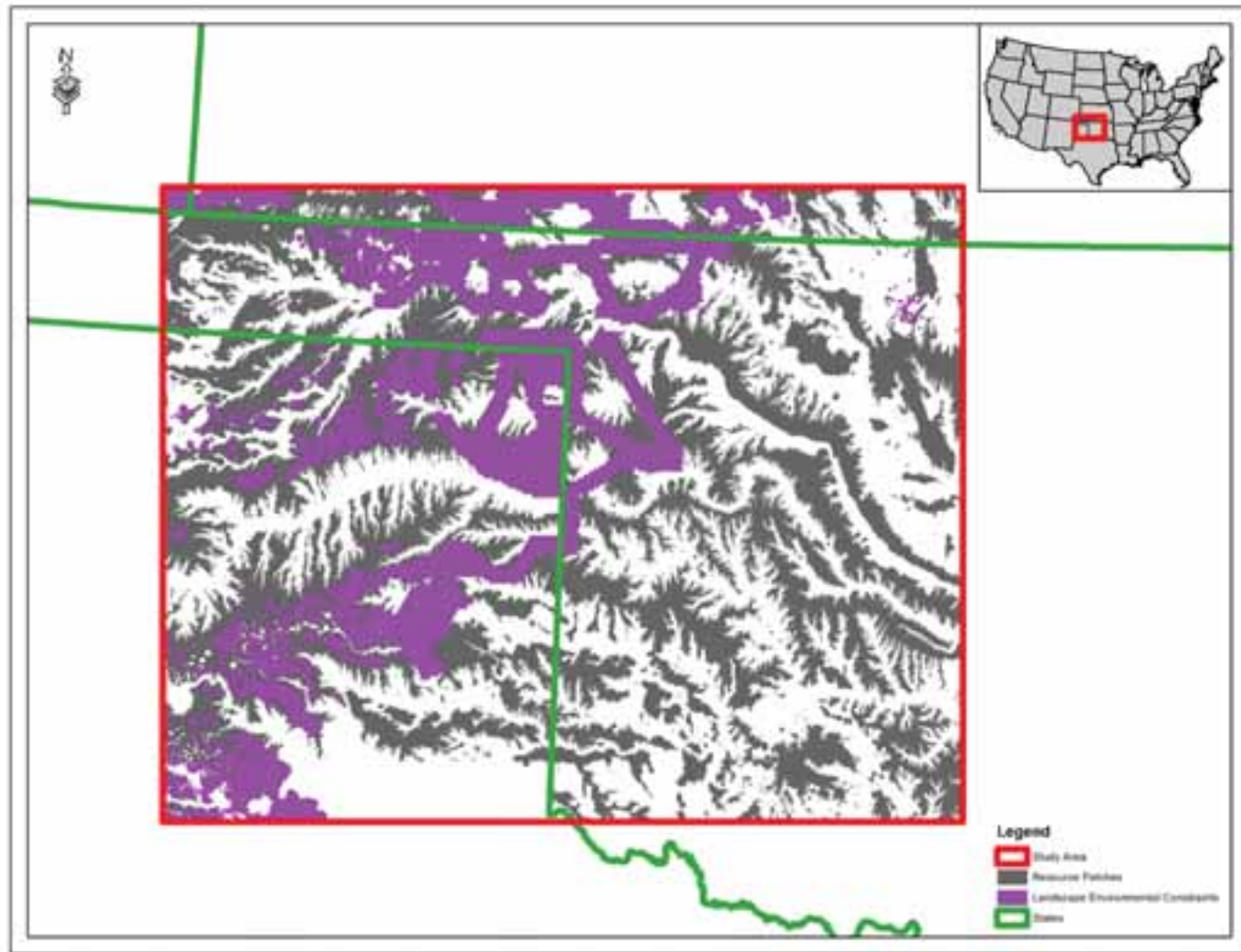
Example Land Use Constraint Features

- Federal Lands
- Tribal Lands
- State Lands
- Parks
- Recreation Areas
- Developed Areas (Population Density)
- Municipalities
- Restricted Air Space
- Other considerations not appropriate for landscape-level analysis

Environmental effects are alleviated by proper siting

- Regulatory compliance
 - Endangered Species Act
 - Migratory Bird Treaty Act
- Guidance documents
 - US Fish and Wildlife Wind Energy Siting Guidelines
 - Avian and Bat Protection Plan
 - AWEA Wind Energy Siting Handbook
 - Wind Siting Handbook for Kansas
 - Oklahoma Lesser Prairie Chicken Spatial Planning Tool
 - States issuing best management practices
- White papers, studies, and initiatives
- Local (municipal) permitting

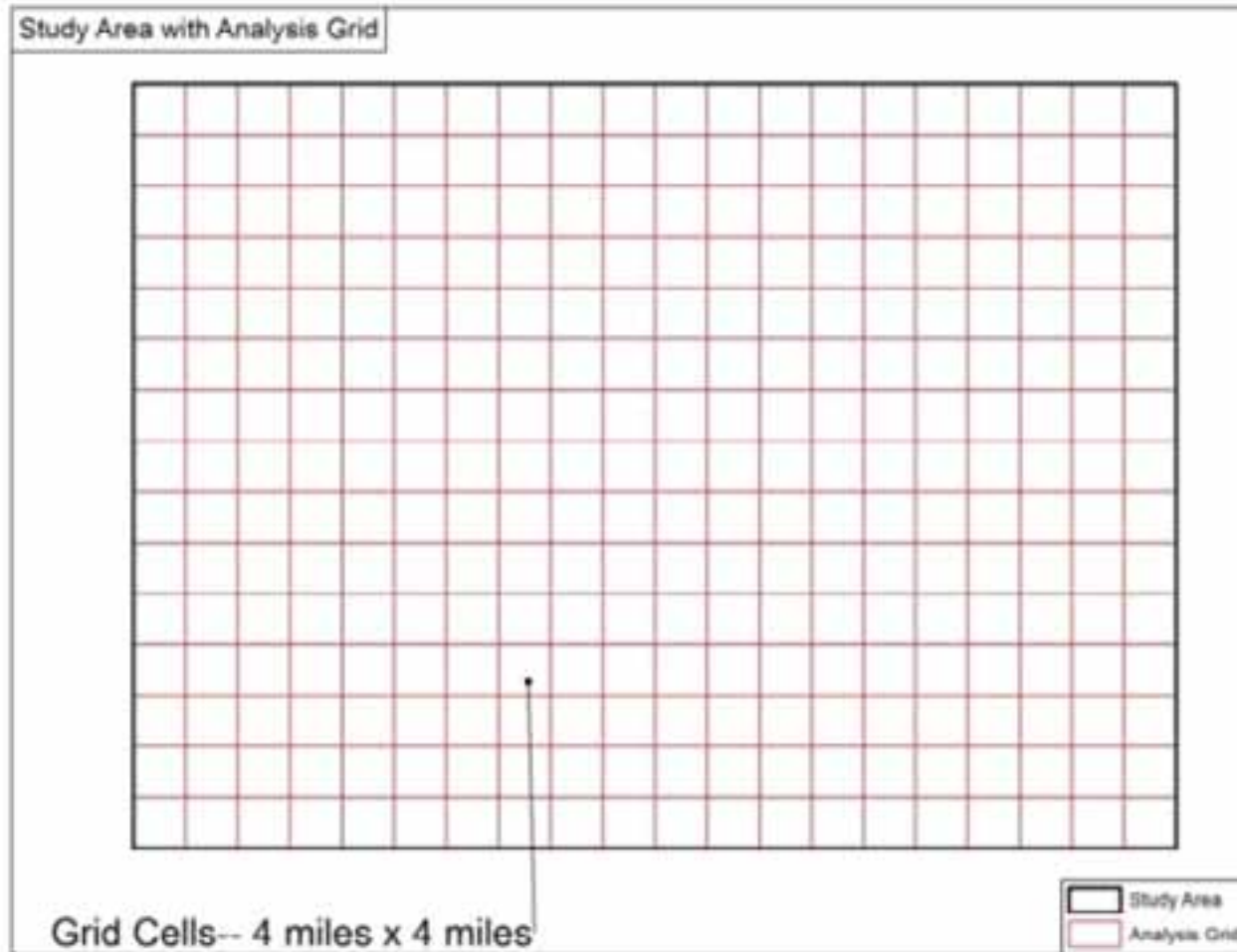
Landscape Environmental Constraints



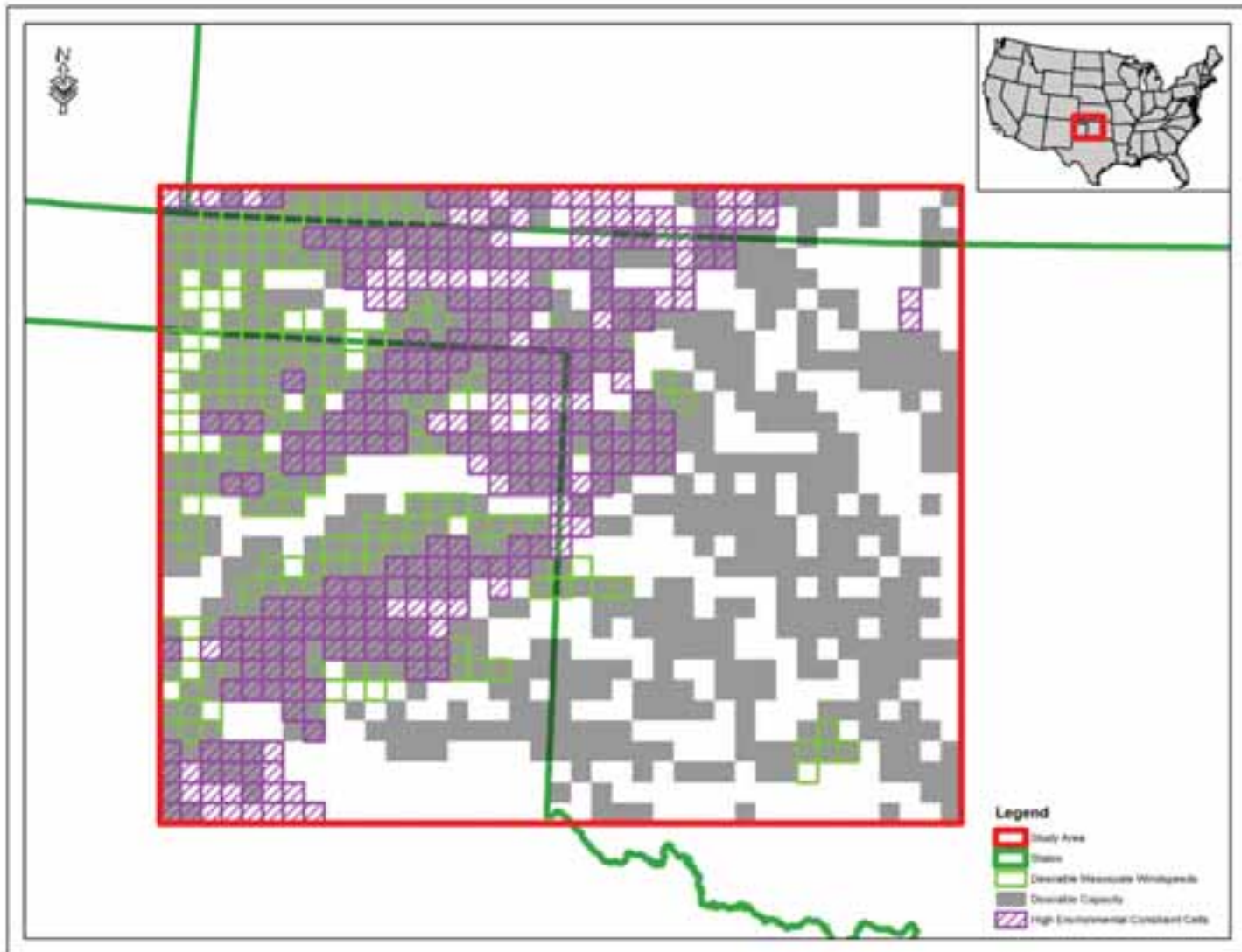
Regional environmental issues influence siting

- Whooping crane migration corridor
- Lesser prairie-chicken
 - Habitat and lek locations
 - Focal areas designed for habitat protection
 - Connectivity zones between focal areas
- Native prairie
- Conservation areas or easements
- Playa lakes and prairie pothole wetlands

Analysis Grid



Resource Zone Evaluation



Resource Zone Evaluation & Transmission Planning

