



Wind Generation – Subtle Effects?





**Wind energy is
a renewable
energy source.**

It's emission free.

**It provides local
and land owner
revenue.**





**The Nature Conservancy
supports
the development
of wind energy!**





However...
the **siting**
of wind farms
can create significant threats to
wildlife species and
to conservation efforts



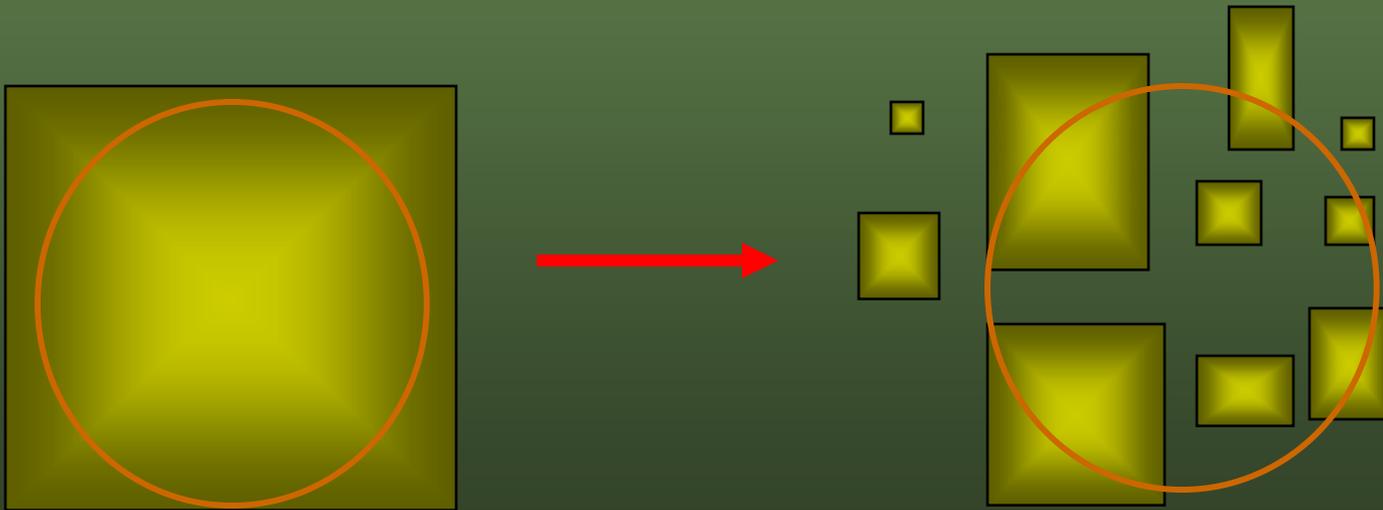


**collisions
with wind
turbines**





A more subtle issue: **Habitat Fragmentation**



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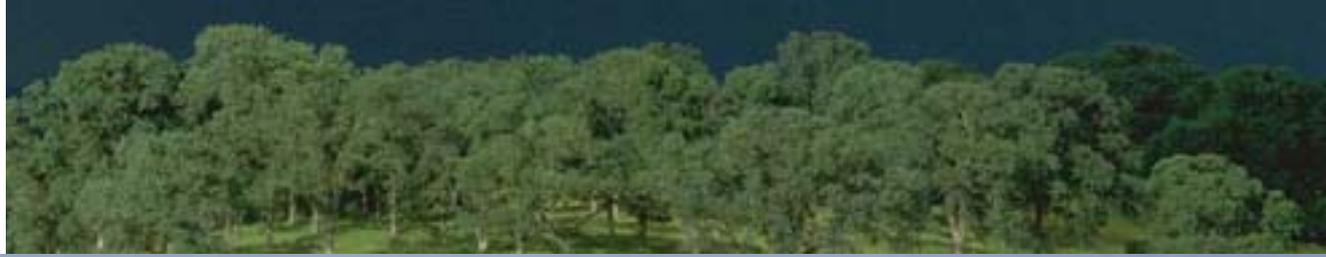
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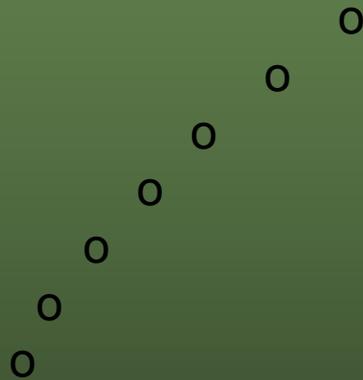


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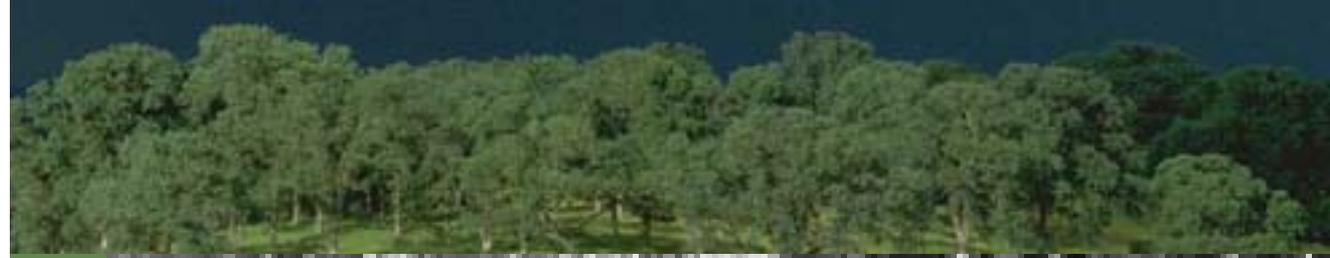
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DEATH!

Structures







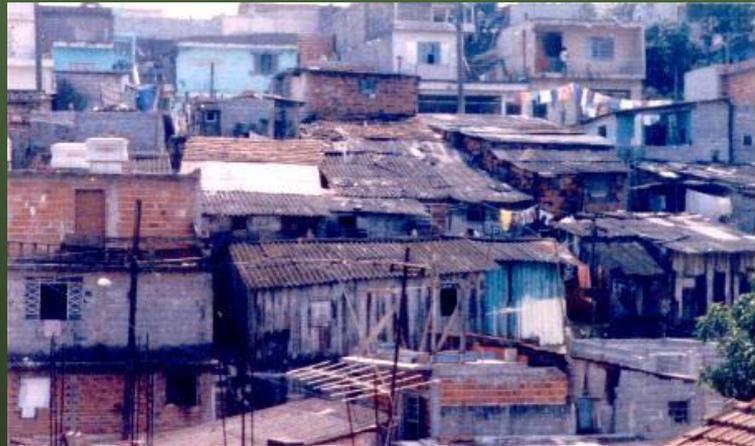
**Your neighborhood
or home town**



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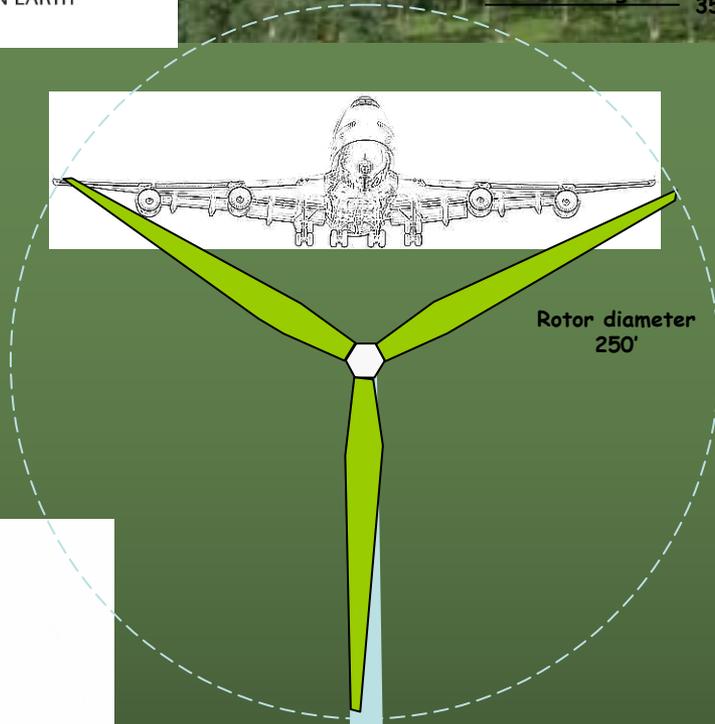
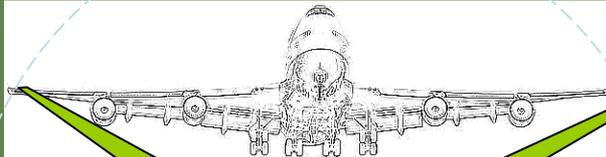


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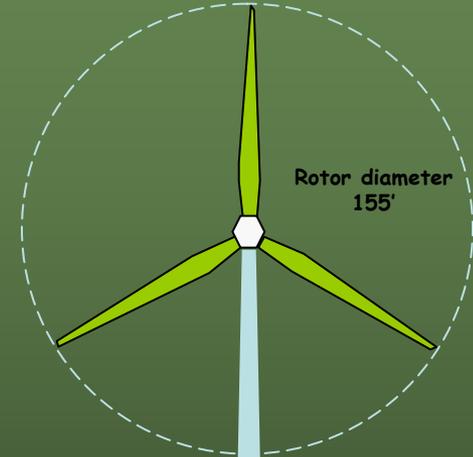
Total height 350 to 400'



Rotor diameter
250'

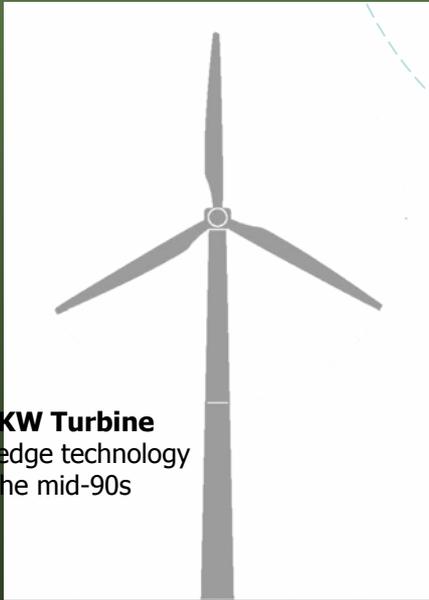
1.5 to 1.8 MW Turbine

Total height 300'



Rotor diameter
155'

660 KW Turbine



500 KW Turbine

Cutting edge technology
in the mid-90s



Farm Windmill



Wind turbine fragmentation can be caused by:

the footprint...



the road





and it's traffic





the transmission line





the pad







Wind turbine fragmentation can be caused by:

the footprint...

the presence of the facilities...

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1.5 MW turbine

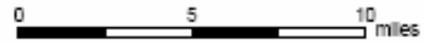
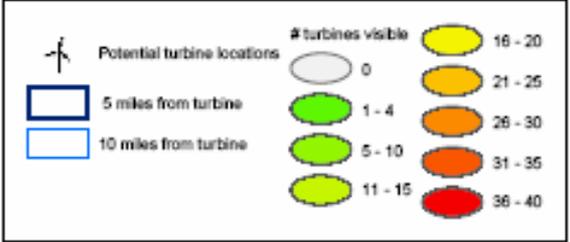
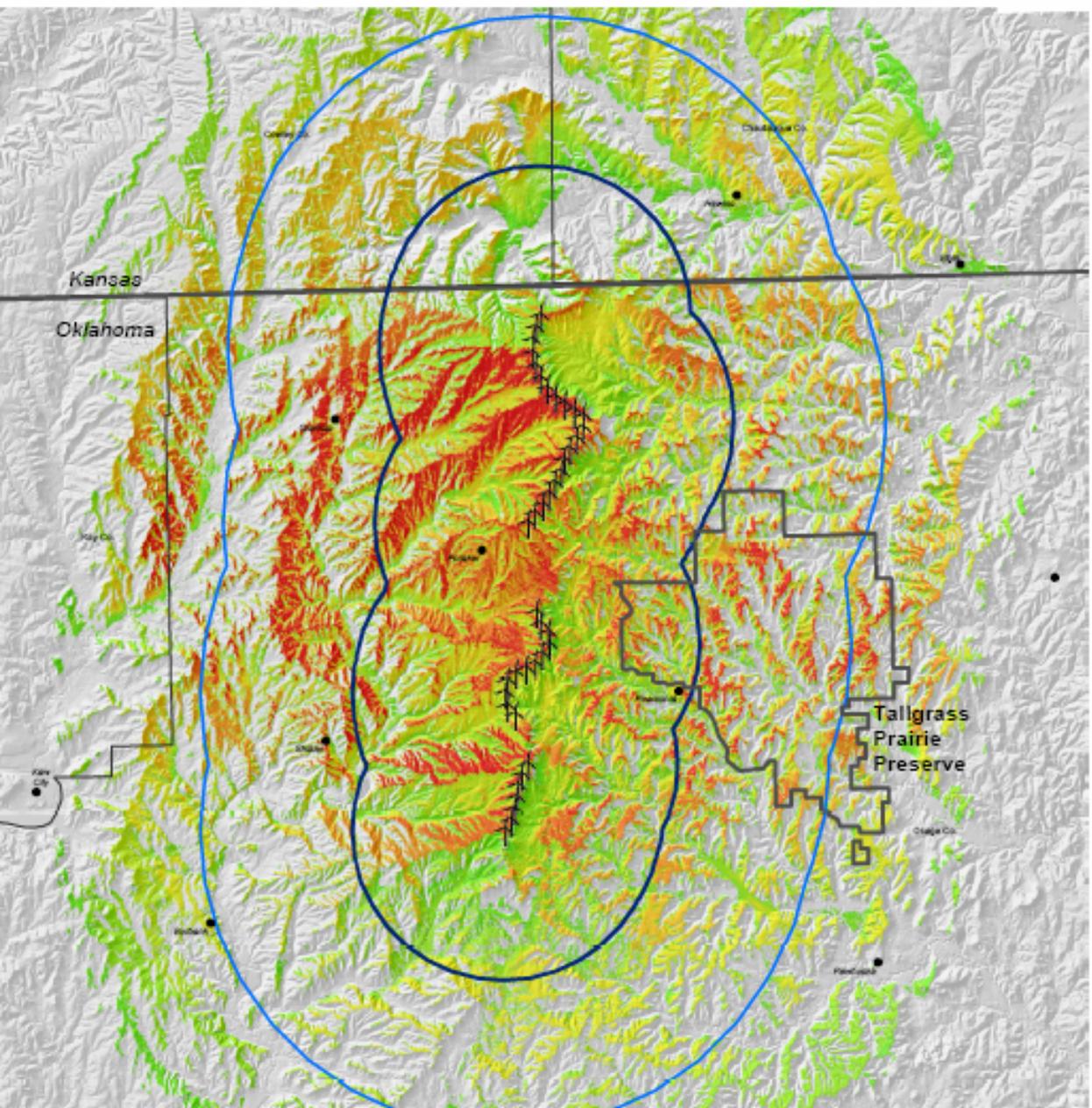
1 mile radius



= ~2000 ac.



Viewshed Analysis Proposed Wind Energy Development Project Osage County, Oklahoma



Background:
 Modified from U.S. Geological Survey Digital Elevation Models
 Turbine locations approximated to areas of interest delineated by
 Zilka Renewable Energy in July 2004 meeting, reproduced from memory
 by Bob Hamilton
 Viewshed analysis performed using ESRI ArcMap 8.2 3D Analyst extension
 Assumed turbine height 101 meters, limit of analysis 15 miles





Wind turbine fragmentation can be caused by:

the footprint...

the presence of the facilities...

the movement of the blades (“flicker” effect)...

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Wind turbine fragmentation can be caused by:

the footprint...

the presence of the facilities...

the movement of the blades (“flicker” effect)...

the noise...

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What do we **know** about **fragmentation effects**
caused by wind turbines on wildlife?

Not that much!

But we have some indications...



Dr. Bob Robel at Kansas State University studied lesser prairie chickens and found:

- nesting success and chick survival were the weak links in the life cycle, not adult mortality**
- adults avoided man-made features by up to a half mile**
- nesting avoided man-made features by up to >1 mile**



Western Ecosystems Technology at Foote Creek Rim studied impacts of wind farm on mountain plovers:

- plovers somewhat avoid the area during construction**
- slow recovery after construction**
- not much effect after operation due to habituation**



Piorkowski and O'Connell at Oklahoma State University studied the distance of various prairie birds from a wind farm

-found 27 of 35 species showed no avoidance of wind turbines



Western Ecosystems Technology studied the effect of gas wells on deer distribution

- found deer displaced to less preferred habitat**



pronghorns





But this isn't a lot of data!

And some of it seems conflicting.

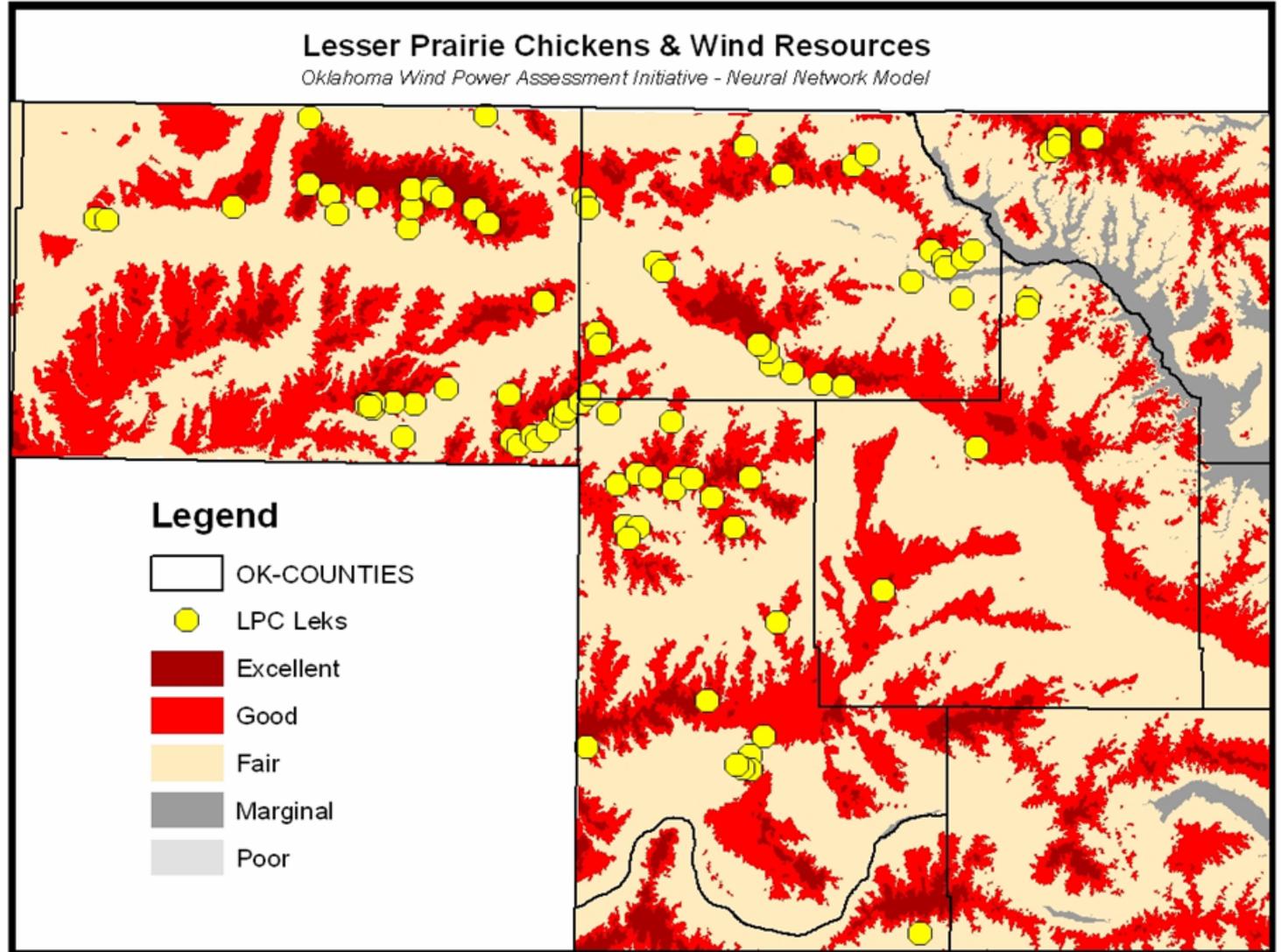
More studies are under way

Much more is needed.



Wind energy facility siting, with regard to wildlife impacts,
is all about...

location... location... **location!**



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Things we can do until we know more:

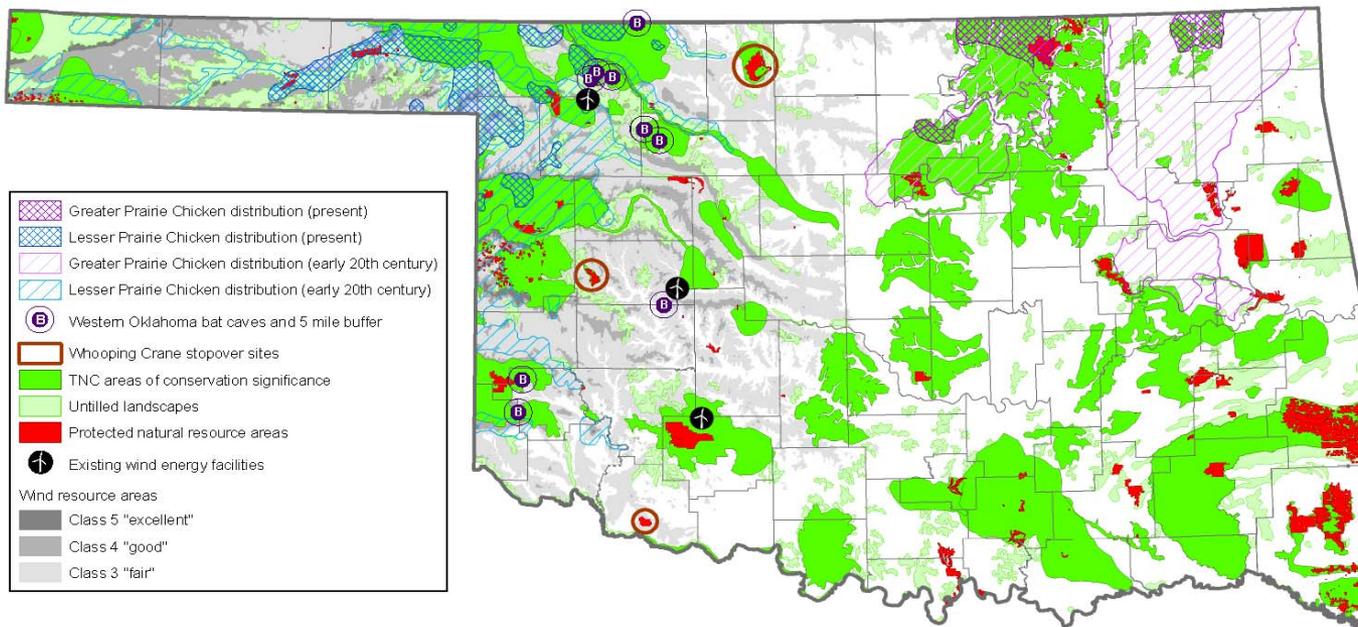
- encourage the siting of wind generators away from sensitive wildlife habitat areas



- discuss the fragmentation issue with:
 - wind energy developers
 - transmission line planning agencies
 - utility companies who might buy the power
 - regulatory agencies that might play a role in development of a project



Oklahoma Natural Resources: Wind, Wildlife, Untilled Landscapes, and Protected Areas



Present Greater and Lesser Prairie Chicken distributions:
The Nature Conservancy, Oklahoma Chapter GIS,
with comments from the Sutton Arrian Research Center and
the Oklahoma Department of Wildlife Conservation,
January 2005

Early 20th century prairie chicken distributions:
Digitized from Duck, L.G. and J.B. Fletcher. 1943.
Lesser and Greater Prairie Chicken distribution and densities.
in A Survey of the Game and Furbearing Animals of Oklahoma.
Oklahoma Game and Fish Commission.

Protected natural resource areas:
State parks, wildlife management areas,
National parks, grasslands/forests, wildlife refuges,
and Nature Conservancy preserves.
The Nature Conservancy, Oklahoma Chapter GIS,
February 2005

Untilled landscapes:
Central and Western Oklahoma -
Ostlie, Wayne. 2003. Untilled Landscapes of the Great Plains.
The Nature Conservancy, Midwest Science Center.
Eastern Oklahoma -
The Nature Conservancy, Oklahoma Chapter GIS,
January 2005

Western Oklahoma bat caves:
The Nature Conservancy, Oklahoma Chapter GIS,
January 2005

Whooping Crane stopover sites
Modified from U.S. Fish and Wildlife Service
Whooping Crane sightings, 1947-1999
The Nature Conservancy, Oklahoma Chapter GIS,
February 2005

Wind resource areas:
Oklahoma Wind Power Initiative
<http://www.seic.okstate.edu/owpi/WindReshneuralnetwork.htm>
August 2005



- support further research on the effects of wind farms on wildlife species



As with everything, wind energy development has pluses and minuses.



**We should maximize the positives...and
manage the negatives.**

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