

ATTACHMENTS:

Attachment A: List of Participants

Attachment B: Agenda

Attachment C: Scientific Tools & Procedures Tier Questions

Attachment D: The Nature Conservancy Responses to Landscape Questions

Attachment E: Scientific Tools & Procedures Revised Purpose Statement

Attachment F: Legal Subcommittee Endangered Species Act Progress Report

Attachment G: Legal Subcommittee Migratory Bird Treaty Act Progress Report

Attachment H: Incentives Matrix

Attachment I: Synthesis Workgroup PowerPoint Summary of Draft

Attachment J: Synthesis Workgroup Draft One-Text

Attachment K: Synthesis Workgroup Synopsis of Tiered Approach

Attachment L: Synthesis Workgroup Policy Questions

Attachment M: FAC Groundrules

Attachment N: USFWS PowerPoint Presentation: “A Landscape Planning Tool to Evaluate Anthropogenic Impacts and Conservation Potential for an Area Sensitive Species: Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) Strategic Habitat Planning and Conservation” by Chris O’Meilia

Attachment O: Energetics PowerPoint Presentation

Attachment P: Energetics White Paper Outline

Attachment Q: Horizon Wind Energy film

Attachment R: American Bird Conservancy Written Comments

WIND TURBINE GUIDELINES ADVISORY COMMITTEE: FEDERAL ADVISORY MEETING # 6

January 27-29, 2009
Washington, DC

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WIND TURBINE GUIDELINES ADVISORY COMMITTEE
FEDERAL ADVISORY COMMITTEE MEETING #6

DRAFT AGENDA

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JANUARY 27-29, 2009

WIND TURBINE GUIDELINES ADVISORY COMMITTEE MEETING

- Review Subcommittee recommendations/reports and develop proposal for moving forward with recommendations.
 - Synthesis Subcommittee Draft one-text Outline of Recommendations
 - Legal Subcommittee update
 - Incentives Subcommittee update
 - Scientific Tools & Procedures Subcommittee update
- Agree on steps to further develop the Synthesis Outline of Recommendations one-text, for the FAC to review and discuss in March 24-26, 2009
- Discuss milestones, timelines, and process steps for any additional items

Comments Protocol for FAC Meeting

If you are a member of the public and would like to submit a comment to the FAC, please sign up on the “Comment Sign-Up Sheet” at the registration desk. Comments will be heard at the designated time on the agenda. Comments may need to be held to three minutes, depending on the number of parties who request time to comment. If time does not allow for all comments, then members of the public will be asked to write their comments down and submit them to the FWS staff at the registration desk. All comments will be part of the public record and will be electronically distributed to all FAC members after the FAC meeting.

Day One: Tuesday, January 27, 2009

- 1:30 – 2:15 **Welcome & Overview of Agenda** D.Stout, DFO/USFWS / A.Arnold, facilitator
- Introductions of all FAC members
 - Opening comments from D.Stout
 - Review and agree on meeting purpose
 - Review and agree on meeting agenda
- 2:15-2:45 **Presentation:** Christopher M. O’Meilia/USFWS Wildlife & Fire Consultation Biologist /GIS Coordinator
- A Landscape Planning Tool to Evaluate Anthropogenic Impacts and Conservation Potential for an Area Sensitive Species: Lesser Prairie-

Chicken (*Tympanuchus pallidicinctus*) Strategic Habitat Planning and Conservation

- 2:45-3:40 **Brief Overview of Subcommittee Progress and Products**
Each Subcommittee will briefly review subcommittee products; if appropriate, the FAC will offer guidance to the Subcommittees
- Scientific Tools & Procedures Subcommittee
 - Legal Subcommittee
 - Incentives Subcommittee
- 3:40-4:00 **Break**
- 4:00-5:30 **Overview Synthesis Workgroup Process and Draft**
Objective of this session: Review Synthesis Workgroup's List of Policy Questions; start to review and discuss Synthesis Draft One-Text
- Overview of Synthesis one-text draft
 - Review of Policy Questions for FAC to address on Feb 28-29.
- 5:30 Next Steps and Adjournment

Day Two: Wednesday, January 28, 2009

- 8:30-8:45 **Review and Approve Agenda**
Agenda is subject to change dependent upon the needs of the FAC
- 8:45-12:00 **Review and Discuss Synthesis Draft, continued**
Objective of this session: Discuss Policy Questions and Synthesis draft . Defer wordsmithing to after this FAC meeting.
- 12:00-1:15 **Lunch**
- 1:15-3:30
(including break) **Review and Discuss Synthesis Draft, continued**
(Note: the Committee may break into caucuses or Subcommittee discussions)
Objective of this session: Discuss Policy Questions and Synthesis draft.

- 3:30-5:00 **Subcommittee Reports**
Objective of this session: Progress reports from Subcommittees; walk through products; obtain FAC direction and next steps.
- 3:30-4:00 • Scientific Tools & Procedures
- 4:00-4:30 • Legal: Report from ESA subgroup and MBTA subgroup
- 4:30-5:00 • Incentives
- 5:00-5:15 **Public Comment**
Members of the public are invited to speak to the FAC. Please sign up on the Public Comment Form. Each party will be asked to keep their comments to three minutes each, time permitting. Written comments will be accepted by the Committee.
- 5:15-5:45 **Reflections on Discussion, What Do We Need To do Tomorrow, Review Next Steps** *A.Arnold, facilitator*
- Based on conversation regarding the Synthesis Draft, what is our guidance to the Scientific Tools & Procedures, Legal, and Incentives Subcommittees?
- Review agenda for Day III in light of progress made on Day II; decide if need to meet in subcommittees tomorrow morning
- 5:45 **Adjourn for evening**

Day Three: Thursday, January 29, 2009

- 8:00 **Review Day's Agenda**
- 8:15-10:15 **Plenary or Subcommittees Meet in Person**
- *Continue with discussion from prior day, as needed*
- *What is missing? What do we need to work on?*
- 10:15 – 12:00 **Plenary: Return to Discussion of Synthesis Draft**
(including break)
- *What is missing? What do we need to work on?*
- 12:00-1:30 **Lunch**
(on your own)

- 1:30-2:15 **Plenary: Return to Discussion of Draft Synthesis Recommendations**
- *What is missing? What do we need to work on?*
- 2:15-2:45 **Review Outstanding Items and Today’s Reflections from Chairman/DFO**
Objective of this session: clarify outstanding issues, direction, and next steps for FAC.
- Review list of outstanding items; what are the next steps for those items?
 - Hear from DFO on reflections of the meeting and next steps....
- 2:45–3:00 **Review of Next Steps**
- Confirm March and June Meeting Dates: Mar. 24 – 26 and June 30 – July 2
 - Review next steps and activities between now and March
 - Agenda items for March
- 3:00-3:15 **Public Comment**
- 3:15 **Adjourn FAC Meeting**

Question/Problem Formulation Recommendations
 USFWS Wind Turbine Advisory Committee
 Scientific Tools & Procedures/Landscape Subcommittee

Tier 1. Preliminary wildlife/landscape evaluations of site(s)

1. Does the native landscape affected directly and indirectly by the proposed wind energy project contain ecological communities in a continuous block that would be fragmented by the proposed project, with respect to species with needs for large contiguous blocks of habitat?
2. Does the landscape contain any areas of special designation, including, but not limited to, 'area of scientific importance'; 'of significant value'; federally-designated critical habitat; high-priority area for non-government organization; or other local, state, regional, federal, tribal, or international categorization that may preclude energy development?
3. Is there habitat available for 'area or large-landscape sensitive species', which may be sensitive to anthropogenic activity'?
4. Are there any threatened, endangered, federal "sensitive" or state-listed or other species of concern present on the proposed site, and/or is habitat available for these species?
5. Are there known critical areas of wildlife congregation, including, but not limited to, maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance, that would be directly lost or indirectly affected resulting from construction of a facility and can these impacts be avoided, minimized, or mitigated?
6. Are adequate and current data available to answer the above questions, or is additional data collection necessary?

Comment: Define "ecological communities" and include in glossary – be sure to include habitats, /biotic and abiotic components in definition

Tier 2. Site characterization(s) from available data and site visits

1. Are there any threatened, endangered, federal "sensitive", state listed species, or other species of concern present on or likely to use the proposed site?
2. Which species of birds and bats are likely to use a proposed site based on an assessment of site attributes?
3. Are areas of congregation, including, but not limited to, maternity roosts, hibernacula, staging areas, migration stopovers and corridors, winter ranges, nesting sites, or leks, located on the proposed site(s)?
4. Are flora and fauna data current, complete, relevant, and adequate to evaluate risk of the proposed project to wildlife, including, but not limited to, temporal and spatial variability, presence and abundance data available for all bird species during all seasons, existing data on impacts to the same or similar species from an existing facility or is more detailed data collection necessary?
5. What are the potential risks of impacts to individuals, local populations, metapopulations, or entire species, and their habitats, and can the impacts be avoided, minimized, or mitigated?

Tier 3. Field studies required for pre-construction risk assessment

1. Are there any threatened, endangered, federal "sensitive", state listed species, or other species of concern present on or likely to use the proposed site?
2. Is the vegetative community at the site continuous or fragmented, widespread or unique, or have any special designation?
3. What is the distribution and relative abundance of avian and bat species within the area potentially affected by the proposed wind energy project site and how is their use of the site related to site characteristics?
4. How do the distribution, relative abundance, and behavior of birds and bats using the site expose them to risk from the proposed wind power project?
5. Are flora and fauna data current, complete, relevant, and adequate to evaluate risk of the proposed project to wildlife, including, but not limited to, temporal and spatial variability, presence and abundance data available for all bird species during all seasons, existing data on impacts to the same or similar species from an existing facility or is more detailed data collection necessary?
6. What are the potential risks of impacts to individuals, local populations, metapopulations, or entire species, and their habitats, and can the impacts be avoided, minimized, or mitigated?
7. Are there studies that should be initiated in Tier 3 that would be continued in either Tier 4 or Tier 5?

Comment: Need to explain in narrative why question is repeated in multiple tiers.

Comment: DS/AD: Are there studies that should be undertaken in Tier 3 that would be continued in Tier 4/5?

Tier 4. Post-Construction Fatality Studies

1. What is the bird and bat fatality rate for the project? Have data been collected to assess:
 - a. Measurement bias (including, but not limited to, carcass detection and removal);
 - b. Variation in fatality rate amongst turbines;
 - c. Whether fatality rates vary with facility and site characteristics; and
 - d. Ratio of migrating birds and bats to local resident populations?
2. Estimates of fatality levels and rates should be publicly accessible and enable evaluation of the following questions (TA: note this wording has been modified in the Synthesis document to clarify that we do not expect a developer to answer these questions, but we encourage developers to collect the fatality data to studies conducted by others that would answer these questions):
 - a. Do fatality rates differ among regions of the country and among land cover types (forest, grasslands, agricultural lands) within and among a region?
 - b. What are the specific conditions that result in different fatality rates and can fatality rates be used to predict potential impacts at future proposed sites and/or suggest ways that potential impacts can be avoided, minimized or mitigated?

Comment: Additional impact studies included under tier 5?

Comment: What is the proper metric? – to be answered by NWCC m&m team

- c. What is the relationship between bat and bird fatalities and climatic variables (including, but not limited to, wind speed, temperature, weather events, and wake turbulence), and can high risk periods be predicted?

Tier 5. Post-construction studies intended to estimate habitat-based impacts not covered under fatality studies

NOTE: These are sample Tier 5 questions, and have not been discussed by the Scientific Tools and Procedures subcommittee.

1. What are the avoidance/habitat loss level effects?
2. Does abundance of birds (e.g. grassland species) or bats differ between pre- and post construction or between this and control sites?
3. Does reproduction or mortality differ between pre-and post construction (other than direct mortality caused by turbine impacts)
4. Has habitat been impacted or fragmented? e.g. does the wind facility prevent movement between populations, have large habitat blocks been divided, or has habitat been altered (e.g. forest clearing)?

Tier 6. Research Questions – Questions which are not necessarily project specific, but topics for which focused study would improve risk assessment and/or risk reduction of wind projects.

1. Does presence and use of a site by birds and bats predict fatality risk?
2. Can indices of bird or bat activity gathered with diurnal surveys at a site predict fatality risk?
3. Can indices of bird and bat activity gathered with radar (marine and NEXRAD) at a site predict fatality risk (recognizing that these groups are not readily distinguishable by radar)?
4. Can indices of bird and bat activity gathered with acoustic detectors at a site predict fatality risk?
5. What is the exposure risk of bats at a site (e.g., what proportion of animals are killed relative to the total number present at turbines at a point in time)?
6. Can the spatial distribution (spatial selection) of bird and bat use (diurnal and or nocturnal) at a site be predicted and can correlations between use and environmental variables (including, but not limited to, vegetation, topography, or weather) be used to predict and reduce fatality risk?
7. How do bird species or bat species vary in their avoidance, sensitivity, or tolerance to wind project sites?
 - a. Which species are most sensitive?
 - b. Does avoidance behavior affect vital population attributes including mortality, survival, and productivity?
 - c. Do (some) bird and bat species habituate to the presence of the wind project?

Comment: Think about kinds of questions we're asking at other tiers that would be appropriate for tier 5; review research questions, is list complete?

Comment: Monitoring questions v. research questions? Is there anything else we need? Who is responsible for conducting these studies?

Need to clarify difference b/w monitoring and research questions. Monitoring: observational study, measuring what's occurring in environment, drawing conclusions. Not determining cause & effect. Less complicated, less expensive. Research: study design with control and treatments to determine cause & effect relationship. (dale)

Comment: Narrative language is being developed by Taber and Dale.

Comment: TA: Need to get suggestions/examples of Tier 5 questions – Elana/Rachel will send revised version, with e-mail request for Tier 5 Qs.

Comment: AD: Perhaps revisit Tiers 2/3 to be sure Tier 5 Qs related appropriately.

Comment: I've gone with Ed's wording and we can discuss on our next term

- d. What are the long-term impacts of wind projects on bird and bat populations [reference Steward *et al.* 2007 European meta-analysis of long-term impacts to birds]
8. Are species-specific losses of habitat due to wind project development short-lived or longer-term, e.g., permanent?
9. What is the cumulative (population) effect of fatalities at a wind project on local populations of birds and bats, e.g., do fatality levels at a site result in biologically significant impacts on local populations or species?
10. How effective are the existing tools at predicting and/or estimating impacts to birds and bats, and what new tools have promise?
11. Can facilities management such as operational curtailment, change in cut-in speed, and removal of high risk turbines, reduce bird and bat fatalities?
12. Do acoustic, visual, or other types of deterrents reduce bird and bat fatalities? What specific evidence is available?
13. Do offsite habitat mitigation measures offset onsite impacts to bird populations?
14. Do avoidance and habitat loss-level effects affect the population (e.g. population size, viability, age structure) ?
15. Does fragmentation affect subpopulation viability, genetic exchange between populations or metapopulation stability?

DRAFT

**WIND ENERGY DEVELOPMENT HABITAT USE AND
FRAGMENTATION CONCERNS**

Summary from staff of The Nature Conservancy comments, December 2008

1. What species exist in your area of responsibility that may be displaced from quality habitat by the presence of wind turbines and associated infrastructure?

This is difficult to be absolutely sure about. Based on general information regarding fragmentation, we would expect grizzly bear to be significantly impacted on the Rocky Mountain Front. These include grassland and riparian habitats. It would most likely negatively impact sage grouse, in sagebrush grassland, and perhaps sharp-tailed grouse, in grasslands. Effects are unknown for species that do not disperse well, such as short-horned lizard. Grassland birds of concern include mountain plover, long-billed curlew, burrowing owl, ferruginous hawk, Sprague's pipit, Baird's sparrow, chestnut-collared longspur, McCown's longspur.

In Eastern Oregon (sage brush-steppe and grasslands, bunchgrass prairie), species of concern include, sage grouse, various raptors (but especially ferruginous hawks), grasshopper sparrows are at the top of the list. Effects on migratory mammals (elk, etc.), and small mammals (Washington ground squirrels and pygmy rabbits) are unclear. In western Oregon there are no wind facilities at this writing; but towers placed in conifer forest and coastal habitats, could potentially cause problems for marbled murrelets, bald eagles, and various Douglas fir/hemlock nesting species.

It is important that analyses of wind energy facility effects focus on nesting and nesting success. Other measures (lekking, presence) may provide false indications. Fragmentation effects of the turbines, roads, and associated structures should all be considered.

Lesser prairie chicken, grasshopper sparrow, and other obligate grassland birds will be affected. Mammals such as mule deer, Mexican free-tailed bat, and cave myotis are also likely to be negatively affected. Grassland birds are found in well-managed prairie and shrubland habitats composed of native plant species. Mule deer are found in isolated areas of unfragmented mixed- and short-grass prairie, areas with little anthropogenic activity. Bats utilize gypsum caverns, rock crevices, and abandoned buildings for roosting and may also be negatively affected.

Area-sensitive species are most likely to be displaced. In forested and prairie regions of the Upper Midwest that would include many species of long-distance migrant birds (e.g., ovenbird, wood thrush) in forested systems and resident and short-distance migrants (grasshopper sparrow, Henslow's sparrow, bobolink) in grasslands. Because there are likely many species that would be affected (lower density, lower productivity near habitat edges, changes in behavior resulting in lower productivity) by this type of fragmentation,

almost any large tract of forest or grassland (several hundred acres or more in size) that has turbines placed in it could result in those tracts having lower densities of breeding birds or lower productivity. A secondary consequence could be higher densities of deer, resulting in higher browse levels, followed by reduction of nesting and foraging habitat for birds and perhaps other taxa as well. Increased browse is also associated with reduction in frequency of native plant species.

Other species that could be displaced by wind turbines include threatened and endangered species, such as Kirtland's warbler (jack pine barrens); piping plover, dwarf lake iris, pitcher's thistle, Houghton's goldenrod, ram's head orchid and other species whose distribution is centered along Great Lakes shorelines. Habitat descriptions are somewhat different for each species – detailed information is available from Michigan Natural Features Inventory. Areas of particular concern include the Lake Michigan shoreline of Door County, WI and then east along the northern shore of Lake Michigan and Lake Huron through Manitoulin Island, Ontario to the Bruce Peninsula, Ontario and areas with extensive sand dunes (scattered throughout the Great Lakes, including such places as Pictured Rocks National Lakeshore, Sleeping Bear National Lakeshore, Indiana Dunes National Lakeshore, and many other federal, state and local government sites, and privately held lands).

Other areas of particular concern would be the western basin of Lake Erie, and associated islands, of Ontario, Michigan and Ohio due to the presence of some herp species (e.g. Lake Erie water snake and eastern fox snake) and stopover sites for migratory birds (e.g. a large proportion of some species, or populations of some species, use this landscape: tundra swan, canvasback, American black duck, bufflehead, red-breasted merganser, perhaps Kirtland's warbler). The landbirds could be displaced by clearing of the few remaining forests, and for all migrants there is potential for collisions. given the large number of birds using this landscape, especially as they ascend and descend to stopover sites after flying across the lake.

Great Lakes islands may be especially sensitive to wind turbine placement if they are nesting sites for colonial nesting waterbirds (e.g., Caspian Tern, Ring-billed Gull, Common Tern and others), are particularly important stopover sites, support important populations of threatened or endangered species or high quality natural communities, or where invasive species are infrequent.

Lake basin-wide assessments, building on the Great Lakes ecoregion assessments of The Nature Conservancy and Nature Conservancy in Canada, will further inform which species are most likely to be displaced by wind turbines. David Klein of the central and western chapter of New York TNC chapter recently completed a Lake Ontario assessment. There are ongoing assessments for the entire lower Great Lakes (Lake Erie, connecting waters coupled with Lake Ontario) and Lake Huron (Patrick Doran).

2. *What are the large, ecologically intact landscapes in your area that need to be protected from fragmentation in order to prevent detriments to fragmentation-sensitive species (are these reflected in TNC's wind-wildlife maps)?*

Perhaps the most sensitive areas would be large tracts of habitat (again, 100s of acres or more) in the southern Great Lakes region. Relatively few large areas of intact habitat remain in southern parts of Minnesota, Wisconsin, Michigan and northern and central parts of Illinois, Indiana, and Ohio. Some of these areas (such as Baraboo Hills, WI; Allegan State Game Area, MI; Pigeon River, IN, and others) support populations of area-sensitive bird species that would likely be negatively affected by any additional fragmentation. For example, in Allegan State Game Area, some of the largest populations of wood thrush, Cerulean warbler and prothonotary warbler southern Michigan can be found. Smaller populations of some of these species occur in other state-owned lands that are reasonably large.

In addition, minimizing fragmentation of Great Lakes shorelines is important to protect coastal processes (sediment and sand transport by currents and wind), at different water levels, that maintain species noted under #1 above. Here the fragmentation issue is interruption of these processes in a narrow band of habitat (coastline) that parallels the coastline. This type of fragmentation is likely to be especially underappreciated by those unfamiliar with ecological dynamics of the Great Lakes.

Fragmentation of large tracts of forest is also of concern as a number of studies have shown that populations of many species of breeding birds are viable or source populations in contrast to populations of these same species in fragmented portions of the Midwest (a good overview of this relationship is described by Robinson et al. 1995. *Science* 267:1987-1990). The upper Midwest is generally considered an important area for long-distance migrants, because a relatively high proportion of the landscape has natural cover, fragmentation is relatively low compared to the southern Midwest, and the diversity of forest and wetland types is especially rich in avian species richness (and other taxa and plant community types).

Surface waters of the Great Lakes constitute a huge scape that is virtually unfragmented by anthropogenic structures. Many species (especially birds and presumably bats) migrate over the Great Lakes, and waterbirds use these waters as stopover and refueling sites. We have virtually no data to provide guidance regarding the potential fragmenting effects of wind turbines on the surface waters of Great Lakes.

Zumwalt Prairie, Boardman Grasslands, Steens and Pueblo Mountains, Abert Lake are key areas where sensitivity to wind energy development is expected. These are portfolio sites. In addition to those species listed above, shorebirds (snowy plovers) for Abert Lake, and various migratory birds from Malheur and other Wildlife Refuges and wetlands may be negatively impacted.

Most of these landscapes are depicted as part of TNC's portfolio of conservation areas in the Central Mixed-grass, Central Short-grass, and Southern Short-grass Prairie ecoregions.

This covers a large number of portfolio sites. TNC wind-wildlife maps do not include recent revisions. The list of species of concern is expected to be very long.

3. What potential habitat use detriments need to be further researched in order to develop effective wind energy siting guidelines?

Information is needed to accurately describe the effects of all aspects of wind development on Sage Grouse ecology. Effects of roads on fire, invasives, and genetic dispersal of plants in grasslands and shrub steppe. Most of the efforts to date have examined wind turbines (as apposed to roads and transmission lines) either those on wind energy project areas or lines and roads required to link projects to the grid.

More information is needed regarding avoidance distances for grassland birds, specifically those activities associated with wind energy development. Information is also needed to assist the assessments of potential mortality impacts on bats and migrating birds.

I don't know if we really know much about wind energy impacts. Of special interest are riparian habitats within grasslands that support a variety of breeding bat species.

More information is needed regarding: a) fragmentation effects in isolated, relatively large habitat patches (100s of acres+); b) invasive species dispersal, colonization and establishment as a function of increased fragmentation and soil disturbance, including corridors; c) use of the air space (height above ground, frequency of use, seasonal use) by bats and birds (considering air space as habitat) – within patches, as a function of distance from a habitat patch or lake shore, over land and over the Great Lakes themselves; and d) the relative importance of both near shore and offshore shoals as spawning and nursery areas for fish, inverts, and other species.

4. What are the species in your area that should be considered as indicators of fragmentation effects from wind energy development (different from those in #1 above)?

Perhaps ovenbird is a good indicator for forest breeding birds as the species is widely distributed in deciduous and mixed forests of the Great Lakes region. It is relatively well studied and relatively easy to monitor (based on song). For grassland species, perhaps grasshopper sparrows would be good indicator species for short- and mixed-grass species, and bobolink for tall, denser grassland habitats in the Great Lakes region. Both species are widely distributed regionally, and more broadly, and of conservation concern due to population declines.

We may have concerns regarding elk. Wolves are reestablishing themselves as well as Columbian sharp-tailed grouse.

5. Are there other key research questions related to wind energy development and associated indirect wildlife losses, such as metapopulation dynamics, that you feel should be addressed?

Total direct mortality numbers are being used to say there are no population effects throughout the range of a species; but they do not consider the life span of species affects (such as raptors) and effects on future offspring, etc. Very little bat research in this realm has been done in the Pacific Northwest to date. We need maps of migratory routes for birds.

The cumulative effects of wind development throughout the range of the lesser prairie chicken are likely to create a significant threat to the long-term survival of the species. Even if currently populated areas are avoided, potential for development of future habitat corridors between now isolated populations may be lost.

We need to understand the degradation issue (e.g. species remaining but at lower numbers or lower productivity). Cumulative impacts are not well understood and of major importance. Alteration of migration patterns and mortality during migration are significant concerns as well, especially for bats.

There is a dearth of information on bats, particularly for migratory species. We need information on migratory routes, magnitude and timing of migration, height above ground bats migrate (including stratification as a function of distance from shoreline) across the basin. Similarly, avian patterns of distribution, relative abundance and height about surface waters of the Great Lakes are virtually unknown.

6. Which wildlife species in your region of responsibility do you feel would most likely be negatively impacted by wind power development?

See #1 above. Sage grouse and sage-steppe habitats are key concerns. Likewise, lesser prairie chicken are likely to experience significant adverse impacts from wind energy development.

Other grassland obligate birds, migratory waterfowl, and cave-dwelling bats are likely to be negatively impacted also.

Breeding bats (riparian and ponderosa pine woodlands), other species with poor dispersal abilities and susceptible to road mortality are likely to experience major detriments.

Many species of migratory birds and bats are likely to be negatively affected, but especially those where the Great Lakes shorelines – both terrestrial and near shore aquatic habitats – are disproportionately important. Any species that uses aerial (<200 m

above ridge lines, especially) habitat above ridge lines paralleling the Great Lakes is susceptible to mortality from elevated wind turbines (e.g., Lake Superior shoreline of Minnesota and Ontario), and colonial nesting waterbirds are potentially affected as well.

**USFWS Wind Turbine Advisory Committee
Scientific Tools & Procedures Subcommittee**

Original Purpose Statement:

The Committee will provide advice and recommendations to the Secretary of the Interior on the scientific tools and procedures best able to assess pre-development risk or benefits provided to wildlife, measure post-development mortality, assess behavioral modification, and provide compensatory mitigation for unavoidable impacts.

Revised Purpose as of 12-18-08

1. To evaluate scientific tools and procedures to:

- *Assess pre-development risk or benefits provided to wildlife.*
- *Measure post-development mortality of wildlife.*
- *Assess behavioral modifications of wildlife to development.*
- *Address unavoidable impacts on wildlife and their habitats.*

2. Provide recommendations to the FAC on information needs, considering the stage of the project, and including duration and intensity of needed studies for the purpose of making decisions about the development of wind facilities.

**USFWS Wind/Wildlife Federal Advisory Committee
Legal Subcommittee
ESA workgroup**

Draft Progress Report to the Wind Power FAC
January 27, 2009 meeting

The ESA workgroup met with FWS and has developed a list of possible ESA tools that the Wind industry could use as legal incentives. While neither the workgroup nor FWS are *endorsing* any of these options, these are options that they have agreed are worth exploring further.

Conservation Agreements: A basic contract between the FWS and a project proponent through a memorandum of understanding which describes land use activities the proponent intends to take and methods the proponent will use to provide protection for potentially affected listed species. The FWS's signing of a conservation agreement or MOU constitutes an agency action which permits the FWS to issue a biological opinion and Incidental Take Statement (ITS) which provides incidental take authority to the proponent, as well as the FWS.

Strengths:

- Could potentially help project proponents obtain incidental take authority without having to obtain a permit through the HCP Section 10 process.

Potential Weaknesses

- A FWS Region (8) has tried this mostly with small-scale projects (not wind power) that do not have much impact on endangered species. When attempted at a larger scale with more potential impacts on endangered species, it may be that use of Section 10 HCP is more effective. FWS views Conservation Agreements as being more useful for tailoring critical habitat designations than for ITS authorizations.
- Agency practice has not yet been established yet for use of Conservation Agreements.
- Would not include "No Surprises" assurances.

General Conservation Plan (GCP): Otherwise known as "Template HCPs," A GCP allows the FWS to develop a Section 10(a)(1)(B) conservation plan suitable for the needs of a local area, complete all NEPA requirements for a Section 10(a)(1)(B) Incidental Take Permit (ITP) issuance, and then issue individual permits to landowners who wish to apply for an ITP and demonstrate compliance with the terms and conditions of the GCP. The development of a GCP is undertaken by the FWS, rather than an individual applicant, and is ideally based upon a conservation strategy for the species and addresses the economic and other development needs of the local community.

Strengths:

- Basically, the GCP has everything that is contained in a traditional HCP, including No-Surprises assurances, except the names of the applicant and future permittees.
- FWS views this approach as more suitable for the Wind Industry than the Conservation Agreement approach.
- When a project proponent fills in the template, the proponent becomes an individual permit holder, and is not tied to the actions of other permittees. This addresses the problem of one actor's noncompliance affecting the rest of the permittees.
- Permittees receive "No Surprises" assurances with their permit.

Potential Weaknesses:

- Because these template HCPs are semi-generic, it may not work in areas where there is likely to be a lot of variation in projects, species affected, or nature of the impacts.
- As FWS, and not project proponents, prepare GCPs, the documents may reflect more the FWS's interests and perspectives than the proponents.
- Also as FWS, not project proponents, prepare GCPs, the process is particularly costly for the FWS in terms of both funding and staffing and may not be an attractive or realistic alternative for many regional or ecological services some smaller FWS offices.
- GCPs are potentially more costly for FWS to administer than an Umbrella HCP if there are not many applicants.

Umbrella HCP with certificates of inclusion: Useful for when a state or other local jurisdiction is interested in holding a master permit and project proponents join the permit through certificates of inclusion. The ITP will allow a specified amount of incidental take (stated either in number of species members or in acreage or other measurement of occupied or suitable habitat) over a specified term, if all the permittees continues to comply with the ITP.

Strengths:

- This can be an efficient process when a county or state jurisdiction has many project proponents because everyone is included on the same permit.
- Permittees receive "No Surprises" assurances with their permit.

Potential Weaknesses:

- Since all the project proponents are part of the same permit, if one certificate holder fails to comply, then all the other certificate holders are affected. It is possible, however, to have clauses about severability, so this may not always be the case.
- There may not be an appropriate master permit holder available or willing in certain areas.

Authority under section 4(d) under ESA: This only applies to threatened species, but could be used creatively, such as with the Natural Community Conservation Plans in

California, the scrub jay in Florida, the Preble's meadow jumping mouse in Colorado, and the tiger salamander in California.

Strengths:

- Could borrow authorities. For instance, a local government with zoning authority could exercise it in a way that benefits species conservation, and a rule would specify that incidental taking is not prohibited so long as the person causing it is in compliance with local zoning rules.

Potential Weaknesses:

- The broad discretion granted the FWS in crafting a 4(d) rule can make it difficult to settle on precisely what prohibitions should be enforced or relaxed.
- Section 4(d) rules are usually done at the time of listing, and it is not clear that FWS would consider subsequent development of a Section 4(d) rule worth the significant administrative cost involved.
- "No Surprises" assurances are not available.

Section 6 agreements: Even though Section 6 agreements have been traditionally used to qualify States for funding, there may be a possibility to do more such as create something that looks like an Umbrella HCP where the State is the master permit holder, and project proponents could obtain certificates of inclusion. The State could possibly also take on enforcement responsibilities.

Strengths:

- This could be an attractive possibility for States that do not have significant wildlife/wind guidelines.
- There is also an incentive for surrounding States to become involved.

Potential Weaknesses:

- Section 6 agreements are typically re-negotiated every two years.
- The language in Section 6 is viewed, by some, as confusing and difficult to use.
- "No Surprises" assurances are not available.

IPaC (Information Planning and Consultation system): The Service is developing a web-based information, planning, and consultation system that can be used to screen out projects that will not affect listed resources, complete the requirements of informal section 7 consultation, expedite formal section 7 consultation, and better integrate section 7 consultation with action agencies' environmental review processes, including NEPA. Project proponents will be able to go on-line, specify a project location and type, and receive information regarding potential natural resources (including listed resources) that may be affected by proposed activities, obtain "best management practices" that can be incorporated into their project designs to address anticipated impacts, identify appropriate agency contacts, and submit information that will be needed to complete section 7

consultation. This system could be used for section 10 permitting processing and administration as well. The FWS also plans to link the IPaC system to the 10(a)(1)(A) (Recovery Permits) permitting process to allow research results to be geographically linked to the landscape, thus increasing the ability of the FWS to utilize this information when making management decisions and recommendations. FWS has offered to hold a demonstration session for anyone on the FAC who is interested.

Other questions that the subcommittee is interested in pursuing:

Could there be ESA incentives for advancing wind technology (using any of the above tools or would there need to be new statutory authority)?

Could there be legal incentive for reducing the risk of adaptive management operating costs?

**FWS Wind/Wildlife Federal Advisory Committee
Legal Subcommittee
MBTA workgroup**

Progress Report to the Wind Power FAC
January 27, 2009 meeting

The legal subcommittee MBTA workgroup has been exploring the options for legal incentives through the MBTA and has narrowed the options to two possible approaches. At the January meeting, the Subcommittee would like to discuss these options with the FAC and whether or not the FAC would like the legal subcommittee to work out the details of either or both options.

Options that the MBTA workgroup eliminated:

- *Unconditionally authorizing incidental take*, and other general types of permits without conditions: This approach would be too open-ended and potentially meaningless, as well as arguably inconsistent with the charter of the FAC.
- *Case-by-case permits*: FWS would not have sufficient resources to implement case-by-case permits. In addition, setting thresholds for number of birds killed by an individual project site would be very difficult. Setting thresholds requires the FWS to review the future impacts of take on the species, and the state of science does not yet allow certain predictions of mortality rates. The sheer number of species (800+) that could potentially be impacted is part of the problem.

Options still under consideration:

Option 1

- Using an approach that would look something like a “*programmatic permit with conditions*,” the FWS could authorize take for a region or group of facilities through a new regulation. One way to implement this approach would be to encourage companies to agree to implement a set of industry best practices. These best practices would be based on substantive guidelines from the FAC. This approach may require a conservation and mitigation plan and/or appropriate reporting. The company may choose to develop a document that might be similar to an Avian Bat Protection Plan, but could take a different form, that describes how they will incorporate appropriate conservation measures into their business practices. Such an approach would not need specific thresholds of take but would need enough specificity about the potential take that will occur, such that the new regulation is defensible.

Strength: Companies would hold a document in the nature of a permit that could give more assurance compared to Option 2. Legal protections would serve as an incentive to follow conservation practices identified in the federal guidelines.

Potential weakness: FWS's legal authority to authorize take without specific thresholds could be challenged.

Option 2

- Another option would look something like a Bird Letter, but would be backed by a new FWS regulation. Specifically, the regulation would authorize the FWS to officially endorse a project proponent's plan, thereby establishing a written record of FWS's offer of enforcement discretion and FWS's willingness not to recommend prosecution for MBTA takings if a project proponent follows certain "best management practices." "best management practices," which would be drawn from the federal guidelines.

Strength: Because this approach would be implemented through a written regulation – unlike previous "Bird Letters" – there might be a greater incentive to use it.

Potential Weakness: It is unclear if this would provide enough legal assurance for industry, since it is not a take permit.

Other considerations

Importance of Conservation Value of Guidelines

- Conservation benefits of both potential options for implementation of an MBTA approach rely on the conservation value of the process and best practices identified in the federal guidelines.

Avian and Bat Protection Plans

- ABPPs can potentially fit within either of these two options. ABPPs could be the instrument that a company uses to demonstrate it is following best management practices or following the federal guidelines.

USFWS Wind Turbine Advisory Committee
Incentives Subcommittee Matrix for FAC Review
January 27-29, 2009

NOTES:

- The Legal Subcommittee is working on incentives in the category of regulatory relief (under the MBTA and ESA for now). Therefore, the Incentives Subcommittee is *not* reviewing these.
- The Subcommittee would like to discuss with the FAC the goals of these incentives (should they both help protect wildlife as well as encourage implementation of the guidelines?)
- We are considering “Incentives” for successful implementation of recommendations.

Potential criteria to be included:

- Universality of the incentive – applicable across regions/types of companies (could universality be a separate evaluation criteria?). Two parts – ease of getting the incentive up and running, and then later the operation of it (on a case by case basis). These are not necessarily correlated.
- The extent to which confidentiality is jeopardized by the incentive process? Could be part of ease of implementation. May be hard to come up with a universal judgment. Many developers are more or less sensitive to confidentiality.
- Should the FAC consider criteria for landowner incentives?

The following ideas were thought to be ineffective as incentives *for the developer*. However, these can still be discussed.

- Conservation easements
- Ecotourism
- Mitigation banking/property rights
- Conservation banking
- Education, information, and technical assistance (e.g., staff training)

Draft Matrix of Incentives - Table 1: Within Current Regulations

Options to Consider <u>Within Current Laws and Regulations</u> ➤ Legal, Regulatory, Financial, Market, Recognition, Other	Evaluation Criteria			
	Strength of Incentive for the Developer ¹	Ease of Implementation ²	Cost to Developer & Fed Gov't ³	Wildlife/Habitat Protection ⁴
Eco-labeling				
Formal federal recognition and endorsement of a project (eg. ABPP; “assurance letter”) Joint federal approval or recognition.				
Education, information, and technical assistance: <ul style="list-style-type: none"> • Well-trained field office staff • Written technical advice • Reasonable, appropriate, and consistent response from FWS when asked for technical advice or assistance 				
Streamlined permitting process (faster response)				
Improved interagency coordination				
Mitigation credit for externalities				
Favorable terms in private financing (?)				
FWS Award Program				
Financial Incentives				
Red-flag/blacklist abandoned sites (federal or public lands: regulatory; financial; business)				

¹ Strength of incentive for developer: reduced cost, reduced time, reduced risk/increased certainty; also – increased likelihood of guidance use

² Includes level of complexity, and length of time; and includes ease of FWS

Draft Matrix of Incentives
Table 2: Requiring New Laws or Regulations

Options to Consider Requiring New Laws or Regulations	Evaluation Criteria			
	Strength of Incentive for the Developer	Ease of Implementation	Cost to Developer & Fed Gov't	Wildlife/Habitat Protection
➤ Legal, Regulatory, Financial, Market, Recognition, Other				
Compensation Programs				
Insurance				
Tax incentives/PTC				
RPS additional credits (federal or state)				
Utility purchasing preferences				
Mitigation credit for externalities				
NEPA Regulation changes (e.g. categorical exclusions)				
FERC streamlining				
Increased Federal funding for wind/wildlife research				

implementation of incentive AND ease of developer implementation on-the-ground.

³ Does this include the degree to which the incentive requires new programs etc? Includes time, monetary commitment, etc.

⁴ To what extent does this incentive motivate stakeholders to use the guidelines and increase their protection of wildlife (might be helpful to compare the corollary benefits of one incentive versus another)?

USFWS Wind Turbine FAC Recommendations
January 27-29, 2009

Executive Summary: (to be written)

Chapter 1: Introduction

A. Background

1. Statement of U.S. Fish and Wildlife Service (the Service) mission:

“Working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.”

2. Purpose of the document and recommendations for its use by the Secretary

The Wind Turbine Guidelines Advisory Committee (the Committee) transmits to the Secretary in this document our advice and recommendations on effective measures to avoid or minimize impacts to wildlife and their habitats related to land-based wind energy facilities. The purpose of this document is to present the results of our deliberations and judgments regarding assessment, mitigation, and monitoring of wind energy and wildlife interactions; the most effective, feasible and appropriate approaches that are available to the Department of the Interior to address impacts that a wind energy project may have on wildlife based upon our deliberations and experience; and the Committee’s recommendations to the Secretary of the Interior on how to design and establish a national protocol to address the Service’s responsibilities to protect wildlife resources while encouraging the responsible siting of wind energy projects.

3. Description of context and need for Recommendations

As of the end of 2007, the United States has the second highest cumulative wind capacity globally. Wind development in the United States was expected to increase by 25-30% in 2007; it increased by 46%. (NREL – add citation) This rate of development is expected to continue, and perhaps to accelerate, as United States energy policy emphasizes independence from foreign oil. The Service recognizes that wind-generated electrical energy is renewable, produces no emissions, and is considered to be generally environmentally-friendly technology. At the same time, the Service is aware of the potential for wind energy facilities to adversely impact wildlife, especially birds and bats, and their habitats. The potential harm to wildlife populations from direct mortality and from habitat disturbance and fragmentation makes careful evaluation of proposed facilities essential.

The Service released voluntary, interim guidelines in July of 2003. The interim guidelines were opened to public comment to help inform the revision process. In March of 2007, the Service published a notice in the *Federal Register* to announce the establishment of a Wind Turbine Guidelines Advisory Committee to provide advice and recommendations on developing effective measures to avoid or minimize impacts to wildlife and their habitats related to land-based wind energy facilities. The Committee’s advice and recommendations will be used by the Secretary to develop final national recommendations.

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4. Guiding Principles

In its development of these Recommendations, the Committee worked within the spirit of a set of guiding principles written in subcommittee and accepted by consensus of the Committee. In adopting final guidance these are the principles we recommend be incorporated into the final guidance.

B. Statement of Committee Charter

As per the requirements of the Federal Advisory Committee Act (FACA), the Committee Charter was signed by the Secretary on October 24, 2007, and was filed with the Library of Congress; Committee Management Secretariat; General Services Administration; the Committee on Environment and Public Works, United States Senate; and the Committee on Resources, United States House of Representatives on October 26, 2007.

The Charter states the Committee's scope and objective and provides a description of duties, as well as an explanation of Committee membership and ethics responsibilities. The Charter also outlines administrative details such as reporting requirements, Committee support from the bureau, and estimates of operating costs and number of meetings to be held per year. Consistent with FACA, the Charter will expire 2 years from the date it was filed, October 26, 2009, and the Committee will be terminated at that time unless the Charter is renewed.

The Committee Charter is included in Appendix.

C. The Committee Process

1. General description of the process (to be written)
2. Review of existing federal and state guidelines

Existing wind energy siting guidelines were reviewed and catalogued in an effort to benefit from lessons learned by other federal agencies, states, and other federal governments who have developed wind siting guidelines, and also to ensure that any national guidelines developed from this set of recommendations is complementary to existing state and federal agency guidelines.

3. Review of Other Models

The Committee looked beyond existing wind siting guidelines to other models that could potentially be applied to the wind industry, e.g. Avian and Bat Protection Plans and the Clean Air Act's New Source Review program (See Appendix A: Department of the Interior (DoI) Wind Turbine Guidelines Advisory Committee (WTGAC) Other Models Subcommittee Matrix, October 21-23, 2008 (to be attached); and Appendix F: First Draft Recommended Elements of an Avian and Bat Protection Plan, October 21-23, 2008).

- a. Review of applicable existing laws See Appendix B: DoI WTGAC Legal Subcommittee White Paper, October 21-23, 2008 (to be attached)

Existing federal legislation and regulation that is applicable to the wind energy industry was explained in summary in a white paper. The laws reviewed include the Endangered Species Act,

89 the Migratory Bird Treaty Act, the National Environmental Policy Act, and the Bald and Golden
90 Eagle Protection Act.

91 4. Review of Landscape Background Analysis

92 In order to capture the concern for potential landscape-level impacts, such as intact landscapes
93 and cumulative effects, the Committee created a catalogue of tools available to project
94 proponents to evaluate proposed wind energy sites on a local and regional scales (See Appendix
95 C: DoI WTGAC Landscape/Habitat Subcommittee, "Mapping Tools Case Studies" October 21-
96 23, 2008 (to be attached) and Appendix D: DoI WTGAC Landscape/Habitat Subcommittee
97 Summary of Metadata for Data Layers Mapped, October 21-23, 2008)

98 5. Review of Science and Tools

99 The Committee reviewed existing methods and metrics available for assessing risk, and
100 estimating and measuring impacts. It identified appropriate questions and methods for wind
101 energy developers to research and answer at the site assessment, pre-construction, construction
102

103 D. Timeline of activities (to be written)

104 E. Members of FAC/signatures

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107 **Chapter 2: Preamble to Recommendations**

108 A. Intended use of these recommendations

109 The recommendations described in this report are intended to be used by all prospective
110 developers of wind energy projects. The recommendations also are intended to provide a useful,
111 suggested approach for local and state officials.
112

113 The primary purpose of these Recommendations is to outline the nature of information typically
114 needed to identify, assess, mitigate and monitor the potential adverse effects of wind energy projects
115 on birds and bats, especially migratory birds, bats and species at risk, in order to:

- 116 • Guide the wind energy industry to make the best possible choices on wind energy installation
117 location, design, and operation to minimize the risks to birds and wildlife.
- 118 • Ensure that the responsible regulatory agency or advisory agency for any wind energy installation is
119 aware of and can consider the factors that present risks to birds in order to ensure that the best
120 possible advice can be given and the optimal mitigation suggested.
- 121 • Specify the types and amount of baseline information that is required for adequate review of a wind
122 project; and describe the likely extent of follow-up that would be necessary after construction.
123
124
125
126

127 Other purposes include:

- 128 • To promote responsible development of wind facilities across the country;
- 129
130 • To enable states, USFWS, developers and stakeholders to share information and
131 data regarding avian and bat studies, mitigation and siting practices, and
132 monitoring of habitat/species impacts to increase understanding of risks and the
133 effectiveness of siting decision-making;

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- To develop effective, consistent, cost-effective methods and protocols to guide project-specific studies to improve assessment of risk and impacts by producing comparable data; and
- To allow for comparison among field studies from around the country

The Recommendations have been written to be as specific as possible with regard to the expectations, requirements, and assessment need for developing a wind energy project. The Recommendations, however, must apply to a large diversity of projects in many different habitats. The Recommendations are intended to provide flexibility in their application and not be rigidly applied in every situation, but rather applied in a way that is appropriate to the context for project specific factors.

B. Mitigation policies and principles

These Recommendations contain scientifically valid, economic and technically feasible and effective methods and metrics intended to evaluate risk and estimate impacts to wildlife, inform permitting decisions, and satisfy environmental assessment processes. The objectives of mitigation are to avoid or minimize impacts to fish, wildlife and their habitats, and, if necessary, to compensate for those impacts not avoided or minimized. Wind projects should be planned, developed, and operated with consideration of the overall mitigation policy of the USFWS (USFWS Mitigation Policy, 46 FR 7656 (1981)). The policy preamble describes the effect of the policy as not dictating actions or positions that wind developers must accept. However, the USFWS policy provides a common basis for mitigation decision-making and facilitates earlier consideration of wildlife values in wind project planning. The fundamental principles that will guide mitigation sequencing and recommendations by the USFWS are reflected in Chapter 4. Wind developers also should consult with appropriate state agencies to ensure compliance with state mitigation requirements.

C. Introduction to the decision-framework using a tiered approach

See Appendix E: DoI WTGAC Scientific Tools & Procedures Subcommittee -- General Framework for Minimizing Impact of Wind Development on Wildlife in the Context of the Siting and Development of Wind Power, October 21-23, 2008.

To evaluate and minimize the risk of potential wind projects to wildlife the FAC recommends a decision framework utilizing a tiered approach. The tiered approach is a framework for collecting information in increasing detail to minimize risk and make siting decisions. The tiered approach provides opportunity for evaluation and decision-making at each tier enabling a developer to abandon or proceed with project development, or to collect additional information if required. This approach does not require that every tier, or every element within each tier, be implemented for every project. Instead, a tiered approach allows an efficient utilization of developer and wildlife agency resources with increasing levels of effort until sufficient information and the desired precision is acquired for the risk assessment.

1. Application of the tiered approach and possible outcomes

179

180 We have defined five tiers that comprise the preconstruction risk assessment and post-
181 construction impact assessment phases of a wind project. Tiers 1-3 would occur as pre-
182 construction activities and are typically sequential investigations. Tiers 4-5 occur as post-
183 construction activities and may occur simultaneously.

184

185 The tiered approach is an iterative process for quantifying the risks to wildlife of a potential wind
186 energy project. At each tier, problem formulation guides the decision process. This formulation
187 includes the need for additional data collection and identification of potential problems
188 associated with developing or operating a project. If sufficient data are available as a result of
189 the analysis at a tier, the following outcomes are possible based on the analysis of information
190 gathered: 1) the project is abandoned because the risk is considered unacceptable, 2) the project
191 proceeds in the development process without additional data collection, or 3) an action or
192 combination of actions such as project modification, mitigation, compensation, or specific post-
193 construction monitoring is indicated. If sufficient data aren't available at a tier, more intensive
194 study is conducted in the subsequent tier until sufficient data are available to make a decision to
195 proceed or abandon the project, modify a project, or expand a project.

196

197 2. Defining the tiers – detailed description of each tier

198

199 Questions to be answered and methods and metrics appropriate to the questions at each of the
200 tiers are described in more detail in subsequent sections of the Recommendations, but we define
201 each Tier below.

202

203 Tier 1 - Preliminary evaluation or screening of potential sites

204

205 The first stage in the assessment of potential risk to wildlife from wind energy development in a
206 region is to conduct a preliminary regional evaluation of potential site(s) for the purposes of
207 identifying sites to avoid, and sites to review further. Project developers conduct a regional
208 evaluation of potential sites, using information in the public domain. Developers are encouraged
209 to use the list of questions noted below and are encouraged to contact and consult local wildlife
210 experts, including local conservation organizations and government agencies. The questions are
211 suggested as a guide to the kinds of studies developers may want to pursue. Through reviewing
212 the publicly available data developers may determine whether suitable sites are available in the
213 region and they can then decide whether to proceed to further tiers (See Tier 2-5 below). The
214 analysis of site suitability at this tier would be based on a blend of the information available.

215

216 Tier 2 - Site characterization

217

218 At this stage the developer has narrowed consideration down to one or more sites within a
219 region, and additional data may be necessary to conduct a more detailed site characterization for
220 a sufficient risk assessment. A distinguishing feature of Tier 2 studies is that site
221 characterization involves one or more visits to the prospective sites. It is expected that the
222 developer will make contact with federal, state, tribal, and/or local agencies that have jurisdiction
223 over the project, and this contact provides an opportunity to review the adequacy of data
224 gathered during the Tier 1 assessment. In addition, because key non-governmental organizations

225 (NGOs) are often valuable sources of relevant local environmental information, we recommend
226 that developers contact NGOs, even if the developer is not able to identify specific project
227 location information at this stage due to confidentiality concerns.
228

229 Because site characterization occurs early in the development process, when land or other
230 competitive issues limit developers' willingness to share information on the project with the
231 public and competitors, any consultation may include confidentiality agreements as described
232 earlier in the Recommendations.
233

234 Tier 3 – Field studies to document site wildlife conditions and predict project impacts
235

236 The need for Tier 3 studies should be determined from the results of site characterization at Tier
237 2. The primary purpose of Tier 3 studies is to provide quantitative data useful in designing a
238 project to avoid and/or minimize risk. They may also allow a pre-construction prediction of risk,
239 and may provide data useful in evaluating predictions of impact and risk through post-
240 construction comparisons of estimated impacts to predicted impacts and risk (i.e., Tier 4 and 5
241 studies). Tier 3 studies provide information useful in the development of mitigation measures, if
242 needed. The results of these particular Tier 3 studies also may determine that post-construction
243 studies are unnecessary.
244

245 Tier 4 – Post-construction fatality studies
246

247 Tier 4 studies estimate collision fatalities of birds and bats from an operating wind project.
248 Many, but not all, projects will have Tier 4 studies, at least until the knowledge base for
249 estimating fatalities in a specific area or landscape type is sufficient that such studies are
250 determined to be no longer necessary. The objectives of fatality studies are to: 1) compare avian
251 and bat fatality rates to rates published for other projects – are fatalities relatively low, moderate,
252 or high; 2) determine whether raptor mortality, in particular, is low or high; and 3) determine
253 whether pre-construction predictions have provided reasonable estimates of mortality. As
254 described earlier, fatality studies will be most useful if they are designed to confirm predictions
255 of collision fatalities based on bat and avian activity estimated during Tier 3 studies.
256

257 Consistency in the methods used in Tier 4 studies at all wind projects will improve the
258 predictability of pre-construction risk assessments by allowing broader analyses leading to more
259 efficient and cost-effective estimates in future projects. These broader analyses are considered
260 outside of the financial responsibility of the developer of any one individual project.
261 Improvements in predictability will result from analyses of risk and impact in relation to
262 environmental features (e.g. vegetation, topography, climate) by combining data from multiple
263 studies. Examples of questions that can be addressed include estimating the influence of weather
264 on fatality levels, estimating the effect of lighting, or comparing rates to exposure or activity
265 levels to fatality.
266

267 Tier 5 – Other Post-construction Studies
268

269 At some wind projects, other post-construction studies may be advisable. Tier 5 studies may
270 include: 1) estimating the impacts of habitat alteration, habitat loss, or habitat fragmentation on

271 particular species, including birds, bats, and Federally or state-listed species; and 2) determining
272 whether the avoidance, minimization, and mitigation measures implemented for a project were
273 adequate or whether additional action is warranted. For example, a developer may wish to
274 evaluate the effectiveness of a risk reduction measure before deciding to continue the measure
275 permanently and/or use the measure when implementing future phases of a project.
276

277 A variety of designs may be utilized in Tier 5 studies, and the specific designs will depend on the
278 types of questions and the specific project. In some cases, studies conducted under Tier 5 will be
279 a continuation of studies begun under Tier 3. Like Tier 4 studies, results from Tier 5 studies
280 should lead to improved predictability and reduced cost of pre-construction risk assessment.
281

282 Occasionally, additional turbines may be added to a project and the site will be expanded.
283 Results from Tier 4 and Tier 5 studies can inform the assessment of a proposed expansion along
284 with relevant replication of preconstruction studies. A decision-making process similar to that
285 described above can be employed to determine whether the project should be expanded and
286 whether additional mitigation or compensation is necessary.
287

288 3. Research Questions 289

290 Much uncertainty remains about predicting risk and estimating impacts of wind energy
291 development on wildlife. It is in the interests of wind developers and wildlife agencies to
292 improve these assessments to better avoid and minimize the wildlife impacts of wind energy
293 development. The committee recommends research that improves predictions of pre-
294 construction risk and estimates of post-construction impact. One potential purpose of research is
295 to provide data on operational factors (e.g. wind speed, weather conditions) that are likely to
296 result in fatalities. Research would usually result from collaborative efforts involving appropriate
297 stakeholders, and could include studies of cumulative effects of multiple wind projects, or the
298 comparisons of different methods for assessing avian and bat activity relevant to predicting risk.
299 Research projects may occur at the same time as project-specific Tier 4 and Tier 5 studies.
300

301 4. Adaptive Management (AM): definition of active versus passive AM and applicability of
302 AM to the decision framework and tiered approach. Adaptive management is a series of
303 scientifically driven management actions (within economic and resource constraints) that use
304 monitoring and research results to test priority hypotheses related to management decisions and
305 actions, and apply the resulting information to improve management. Adaptive management
306 (AM) can be categorized into two types: "passive" and "active" (Walters and Holling 1990,
307 Murray and Marmorek 2003). In passive AM, alternatives are assessed and the management
308 action deemed best is designed and implemented. Monitoring and evaluation then lead to
309 adjustments as necessary. In active AM, managers explicitly recognize that they do not know
310 which activities are best, and they then select several alternative activities to design and
311 implement. Monitoring and evaluation of each alternative helps in deciding which alternative is
312 more effective in meeting objectives, and adjustments to the next round of management
313 decisions can be made based on those lessons. The Committee is not advocating that active AM
314 be implemented at wind energy projects. Active AM may be appropriate if there is a specific
315 research objective, and the Committee recognizes that accomplishing those objectives is outside
316 the decision framework and would involve multiple stakeholders and funding sources.

317
 318 Passive AM is the typical application of AM to wind energy development, and it can be readily
 319 integrated into the proposed decision-framework because the tiered-approach is an adaptive
 320 process. In the pre-construction environment, analysis and interpretation of information gathered
 321 at a particular tier influences the decision to proceed further with the project or the project
 322 assessment. If the project is constructed, information gathered in the pre-construction
 323 assessment guides possible project modifications, or the need for and design of post-construction
 324 studies. Analysis of the results of post construction studies tests design modifications and
 325 operational activities to determine their effectiveness in avoiding, minimizing, and mitigating
 326 impact.

327
 328 For passive AM to work there must be agreement to adjust management and/or mitigation
 329 measures if the goals are not met. The agreement should include timeline for periodic reviews
 330 and adjustments as well as a mechanism to consider and implement additional mitigation
 331 measures as necessary after the project is developed.

332
 333 5. Confidentiality of site evaluation process as appropriate

334 Some aspects of the initial pre-construction risk assessment including preliminary screening and
 335 site characterization occur early in the development process, when land or other competitive
 336 issues limit developers' willingness to share information on the project with the public and
 337 competitors. Any consultation should include confidentiality agreements as described earlier in
 338 the Recommendations.

339 340 **Chapter 3: Recommendations for Wildlife Assessment and Siting Decisions**

341
 342 The first three tiers describe studies in the pre-construction phase, and at each of the three tiers a
 343 set of questions is listed that we recommend developers attempt to answer for predicting the risk
 344 of a potential project. Some of these questions are repeated at each tier. Given the nature of the
 345 tiered approach, each additional tier represents a greater investment in data collection, which
 346 may be required to answer certain questions. For example, while Tier 1 and 2 investigations may
 347 discover some existing information on federally listed species and their use of the proposed
 348 development site, it may be necessary to collect empirical data in Tier 3 studies to determine the
 349 presence of federally or state-listed species.

350
 351 A. Tier 1: Preliminary *wildlife and habitat* screening of potential wind development site or
 352 sites

353 1. Questions/Issues Formulation

354
 355 As a first step in this process prospective developers, as well as entities with jurisdiction over the
 356 project area should gather information intended to make decisions on how to proceed:

357
 358 a. Does the native landscape affected directly and indirectly by the proposed wind
 359 energy project contain ecological communities in a continuous block that would
 360 be fragmented by the proposed project, with respect to species with needs for
 361 large contiguous blocks of habitat?

- 362 b. Does the landscape contain any areas of special designation, including, but not
 363 limited to, 'area of scientific importance'; 'of significant value'; federally-
 364 designated critical habitat; high-priority area for non-government organization; or
 365 other local, state, regional, federal, tribal, or international categorization that may
 366 preclude energy development?
- 367 c. Is there habitat available for 'area or large-landscape sensitive species', which
 368 may be sensitive to anthropogenic activity'?
- 369 d. Are there any threatened, endangered, federal "sensitive" or state-listed or other
 370 species of concern present on the proposed site, and/or is habitat available for
 371 these species?
- 372 e. Are there known critical areas of wildlife congregation, including, but not limited
 373 to, maternity roosts, hibernacula, staging areas, winter ranges, nesting sites,
 374 brood-rearing areas, migration stopovers or corridors, leks, or other areas of
 375 seasonal importance, that would be directly lost or indirectly affected resulting
 376 from construction and operation of a facility and can these impacts be avoided,
 377 minimized, or mitigated?
- 378 f. Are adequate and current data available to answer the above questions, or is
 379 additional data collection necessary?
 380
- 381 2. Preliminary regional evaluation of potential site(s):
- 382 a. Places to avoid or places to review further
- 383 b. Use publicly available resources
- 384 c. *May include* contact with local wildlife experts/agencies
 385

386 3. Interpret Tier 1 data and continue with site evaluation as appropriate

387 A prospective developer can determine from the analysis of Tier 1 data that either no suitable
 388 sites are available within the region, that suitable sites are available and have been identified and
 389 no further analysis is needed, or that suitable sites are available and additional information is
 390 needed for more complete risk assessment of the potential sites. If it is the last case, then the
 391 developer would proceed to Tier 2 for additional site assessment and analysis.
 392

393 B. Tier 2: Site evaluation and selection

394 In Tier 2, developers will focus on the one or more sites remaining for potential development
 395 after the Tier 1 assessment is completed. In addition to a thorough review of the existing site-
 396 specific information a site visit will normally be conducted to confirm the presence of habitat
 397 suitable for species of special interest (e.g., Federal and state listed species, species of
 398 conservation concern, species considered at high risk to collisions, etc.). The Tier 2 analysis
 399 should evaluate the existing and new data sufficient to make decisions on how to proceed:
 400

401 1. Question/issue formulation

- 402
- 403 a. Are there any threatened, endangered, federal "sensitive", state listed
 404 species, or other species of concern present on or likely to use the
 405 proposed site?
- 406 b. Which species of birds and bats are likely to use a proposed site based

- 407 on an assessment of site attributes?
- 408 c. Are areas of congregation, including, but not limited to, maternity
- 409 roosts, hibernacula, staging areas, migration stopovers and corridors,
- 410 winter ranges, nesting sites, or leks, located on the proposed site(s)?
- 411 d. Are flora and fauna data current, complete, relevant, and adequate to
- 412 evaluate risk of the proposed project to wildlife, including, but not limited
- 413 to, temporal and spatial variability, presence and abundance data available
- 414 for all bird species during all seasons, existing data on impacts to the same
- 415 or similar species from an existing facility or is more detailed data
- 416 collection necessary?
- 417 e. What are the potential impacts to individuals, local populations,
- 418 metapopulations, or entire species, and their habitats, and can the impacts
- 419 be avoided, minimized, or mitigated?
- 420 i. Determine information needs
- 421 ii. Determine options as outlined in Ch. 2. D. 2.
- 422 iii. Determine whether to proceed to Tier 2 studies
- 423

424 2. Site characterization

425 Site characterization should utilize existing information from wind projects located in proximity

426 to the proposed project when available and in comparable cover types. A site visit should be

427 conducted that includes a basic characterization of cover types and topographic features of the

428 project study area. Presence of shorelines, ridges, wetlands, landfills, caves, mines, and large and

429 intact grasslands or shrublands and other features known to increase wildlife use should also be

430 noted.

431

432 3. Contact will be made with FWS and state wildlife agencies

433 Consult with existing data sources and/or meet with qualified experts, and meet with relevant

434 agencies and tribes, and as possible, NGOs, to identify potential environmental concerns and to

435 determine whether these overlap with the general project study region.

436

437 4. Consult local experts, as appropriate

438 5. Develop project siting alternatives

439 6. Interpret Tier 2 data and continue evaluation and/or project as appropriate

440 Site characterization should utilize existing information from wind projects located in proximity

441 to the proposed project when available and in comparable cover types. A site visit should be

442 conducted that includes a basic characterization of cover types and topographic features of the

443 project study area. Presence of shorelines, ridges, wetlands, landfills, caves, mines and other

444 features known to increase wildlife use should also be noted.

445

446 Consult with existing data sources and/or meet with qualified experts, and meet with relevant

447 agencies and tribes, and as possible, NGOs, to identify potential environmental concerns and to

448 determine whether these overlap with the general project study region.

449

450 As described previously, the information collected should be assessed to determine whether they

451 are sufficient to estimate risk to wildlife if the project were to proceed. If information is

452 sufficient for risk assessment, a decision may be made to abandon the project or if the predicted
 453 risk is considered within acceptable limits, the project may proceed to site design and permitting
 454 (if relevant). If the data are not sufficient to complete a risk assessment then the developer
 455 should proceed to a Tier 3 level of analysis.

456

457 C. Tier 3: Quantitative metrics for predicting risk and estimating impact

458 Tier 3 field studies focus on the site selected for consideration for further development. The
 459 extent of these studies depends on the level of existing information for the site and amount of
 460 uncertainty regarding how the site can be developed to minimize potential impacts. The design
 461 of field studies should consider any post-construction data needs for evaluation of risk and
 462 impact prediction (Tier 5 studies).

463

464 1. Questions/issue formulation

465 Field studies required for pre-construction risk assessment at Tier 3 should be designed to answer
 466 the following questions:

- 467 a. Are there any threatened, endangered, federal "sensitive", state listed
 468 species, or other species of concern present on or likely to use the
 469 proposed site?
 470 b. Is the vegetative community at the site continuous or fragmented,
 471 widespread or unique, or have any special designation?
 472 c. What is the distribution and relative abundance of avian and bat species
 473 within the area potentially affected by the proposed wind energy project
 474 site and how is their use of the site related to site characteristics?
 475 d. How do the distribution, relative abundance, and behavior of birds and
 476 bats using the site expose them to risk from the proposed wind power
 477 project?
 478 e. Are flora and fauna data current, relevant, and adequate to evaluate risk
 479 of the proposed project to wildlife, including, but not limited to, temporal
 480 and spatial variability, presence and abundance data available for all bird
 481 species during all seasons, existing data on impacts to the same or similar
 482 species from an existing facility or is more detailed data collection
 483 necessary?
 484 f. What are the potential risks of impacts to individuals, local populations,
 485 metapopulations, or entire species, and their habitats, and can the impacts
 486 be avoided, minimized, or mitigated?
 487 g. Are there studies that should be initiated in Tier 3 that would be
 488 continued in either Tier 4 or Tier 5?
 489 i. Determine information needs
 490 ii. Determine options as outlined in Ch. 2. D. 2.
 491 iii. Determine whether to proceed to Tier 3 studies

492

493 2. Conduct field surveys/models for prediction/estimation of risk or impact

494 a Tier 3 studies should collect data enabling an assessment of the potential for direct and indirect
 495 effects for those species likely to be present at the site at any time of the year. Direct impacts

496 include loss of habitat or collision strikes for birds and bats. Indirect effects include
 497 displacement due to disturbance from the project or effects of habitat fragmentation.

498
 499 A variety of methods exist for measuring avian and bat activity, and those chosen should have
 500 reasonable expectation of accurately estimating avian and bat use of the site according to the
 501 expected type of activity (e.g., nocturnal activity, migration, nesting, lekking, etc.) or species
 502 presence. Techniques for sampling nocturnal distribution, abundance, and behavior of birds and
 503 bats for purposes of estimating risk exposure are detailed in Kunz et al. 2007. Additional
 504 techniques can be found in a recent report from the National Academy of Sciences (NRC 2007).
 505 A detailed description of Methods and Metrics for evaluating wildlife impacts of wind energy
 506 development (Anderson, et al. 1999) is under revision and expected completion of this revision is
 507 in 2009. All of these sources should be consulted. We strongly encourage the use of consistent
 508 methods and metrics as described in these resources recognizing that methods and metrics will
 509 evolve over time.

510 Sampling at the proposed site should occur in all seasons of the year where avian and bat
 511 activity are expected unless sufficient data are available from other studies for other projects in
 512 comparable, nearby areas. One year of sampling should be adequate, but sampling at least one
 513 additional year may be necessary if: 1) the preliminary assessment (Tier 1 or 2) or first year of
 514 Tier 3 data collection shows the potential risk to individuals or populations as moderate to high
 515 compared to other sites, and there is likely to be moderate to high variation in year to year
 516 activity at the site; 2) the species is believed to be particularly at risk from the project; or, 3)
 517 activity is low and there is biological justification for predicting that activity may vary
 518 significantly and the species is listed or otherwise of concern. Decisions to sample for more than
 519 one year should be based on a well-supported rationale.

520 Information about vegetation and land cover types, wildlife habitat, extent of noxious weeds, and
 521 physical characteristics within and surrounding the project site should be collected and compiled.
 522 All cover types within the project site should be mapped into specific, clearly defined area, such
 523 as forested ridge, native prairie, grassland, shrub-steppe, cultivated agriculture, and USDA
 524 Conservation Reserve Program areas.

525
 526 Displacement of wildlife may occur because the wind project reduces the functionality or
 527 suitability of a species' habitat. Displacement may affect both resident and/or migratory species,
 528 and may be temporary or permanent. Displacement effects should be considered when
 529 quantifying habitat loss resulting from the proposed project.

530

531 D. Analysis and siting decision

532

- 533 1. Interpretation of data collected at all Tiers as appropriate
 534 2. Determine options as outlined in Ch.2.D.2 (no text has been drafted yet)
 535 3. If proceeding with project
 536 a. Design modifications (site specific/project specific considerations) to
 537 avoid or minimize predicted impacts as necessary
 538 b. Mitigation/compensation considerations

539 c. Continue to site construction, if appropriate

540

541 E. Site construction - site development and construction best management practices (BMP)

542

543 During site development, significant attention should be given to reducing risk of adverse
 544 impacts to wildlife from turbines and associated infrastructure through careful site selection and
 545 facility design. The following best management practices can assist a developer in the planning
 546 process to reduce potential wildlife impacts. Use of these BMPs should ensure that the potential
 547 adverse impacts to most wildlife and habitat present at many wind development sites would be
 548 reduced, although additional mitigation often will be required as defined at a project level to
 549 address site-specific concerns and pre-construction study results.

550

551 The BMPs will evolve over time as additional experience, learning, monitoring and research
 552 becomes available on how to best minimize wildlife and habitat impacts from wind facilities.
 553 The Service will work with the industry, stakeholders, and the states to evaluate, revise, and
 554 update these best management practices on a continual basis and maintain a readily available
 555 publication of recommended, generally accepted best practices.

556

- 557 1. Minimize, to the extent practicable, the area disturbed by pre-construction site
 558 monitoring and testing activities and installations.
- 559 2. Avoid locations identified to have the potential for high risk to birds and bats
- 560 3. Avoid using or degrading high value or large intact habitat areas, as identified in state
 561 wildlife action plans, etc..
- 562 4. Use maps that show the location of sensitive resources and the results of Tier 3
 563 studies to establish the layout of roads, fences, and other infrastructure. Avoid using
 564 invasive species to the area for seeding or planting.
- 565 5. To reduce avian collisions, place low and medium voltage connecting power lines
 566 associated with the wind energy development underground, to the extent possible,
 567 unless burial of the lines is prohibitively expensive (i.e., where shallow bedrock
 568 exists), or where greater impacts to biological resources would result.
 - 574 a. Overhead lines may be acceptable if sited away from high bird crossing
 575 locations such as between roosting and feeding areas, or between lakes, rivers
 576 and nesting areas.
 - 577 b. Overhead lines may be used when they parallel tree lines, employ bird flight
 578 diverters, or are otherwise screened so that collision risk is reduced.
 - 579 c. Above-ground low and medium voltage lines, transformers and conductors
 580 should comply with the Avian Power Line Interaction Committee (APLIC)
 581 "Suggested Practices for Avian Protection on Power Lines."

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6. Communication towers and permanent meteorological towers should not be guyed at turbine sites. If guy wires are necessary, bird flight diverters or high visibility marking devices should be used.
 7. Use construction and management practices to minimize activities that may attract prey and predators to the wind turbine site.
 8. FAA visibility lighting of wind turbines should employ only red or dual red and white flashing lights, not steady burning lights.
 9. Keep lighting at both operation and maintenance facilities and substations located within ½ mile of the turbines to the minimum required to meet FAA guidelines and safety and security needs.
 - a. Use lights with sensors and switches to keep lights off when not required.
 - b. Lights should be hooded and directed to minimize horizontal and skyward illumination.
 - c. Minimize use of high intensity lighting, steady-burning, or bright lights such as sodium vapor or spotlights.
 10. Establish non-disturbance buffer zones to protect raptor nests, bat roosts, areas of high bird or bat use, or special-status species habitat identified in pre-construction studies. Determine the extent of the buffer zone in consultation with USFWS and state, local and tribal wildlife biologists, and land management agencies (e.g., BLM).
 11. Locate turbines to avoid separating birds and bats from their daily roosting, feeding, or nesting sites if documented that the turbines' presence poses a risk to species.
 12. Use tubular towers (as opposed to lattice towers) or best available technology to reduce ability of birds to perch and to reduce risk of collision.
 13. Minimize the number and length of access roads, use existing roads when feasible..
 14. Where high impacts are expected or sensitive species will be impacted beyond a level of significance, develop a project-specific habitat conservation or restoration plan to avoid or minimize negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species.
- F. Site operation - conduct Tier 4 and Tier 5 studies, as appropriate
1. Tier 4 studies – fatality studies: Question/issue formulation. Fatality assessments should be designed as follows:
 - a. What is the bird and bat fatality rate for the project? Have data been collected to assess:
 - i. Measurement bias (including, but not limited to, searcher efficiency and carcass removal);
 - ii. Variation in fatality rate among turbines searched;

- 629 iii. Whether fatality rates vary with facility and site characteristics; and
 630
 631 b. Fatality data should be gathered in a consistent manner across projects and
 632 regions and should be publicly available to enable evaluation of the following
 633 questions. This is not a project specific requirement.
 634 i. Do fatality rates differ among regions of the country and among land
 635 cover types (forest, grasslands, agricultural lands) within and among a
 636 region?
 637 ii. What are the specific conditions that result in different fatality rates and
 638 can fatality rates be used to predict potential impacts at future proposed
 639 sites and/or suggest ways that potential impacts can be avoided,
 640 minimized or mitigated?
 641 iii. What is the relationship between bat and bird fatalities and climatic
 642 variables (including, but not limited to, wind speed, temperature, weather
 643 events, and wake turbulence), and can high risk periods be predicted?
 644
 645 c. Determine methods
 646 d. Data management and evaluation/interpretation
 647 The project developer should again refer to NRC (2007) and Anderson, et al 1999. (*in revision*)
 648 for the appropriate techniques for estimating collision mortality.
 649
 650 2. Tier 5 studies will not be conducted at most projects, but when applicable would
 651 include continuation of studies begun in Tier 3 using appropriate designs and new studies
 652 that test predictions of impact or effects of mitigation measures.
 653
 654 a. Question/issue formulation
 655 b. Do preconstruction or Tier 4 studies indicate need for Tier 5 studies?
 656 c. Determine methods
 657 d. Data management and evaluation/interpretation
 658 e. Sample Tier 5 questions (will be fleshed out in subsequent draft)
 659
 660 The establishment and use of a Technical Advisory Committee may be useful in some
 661 circumstances to review results of monitoring data and making suggestions to the federal, state,
 662 local agencies and tribes regarding the need to adjust mitigation and monitoring requirements
 663 based on results of monitoring data and available data from other projects. The range of possible
 664 adjustments to the monitoring and mitigation requirements should be clearly stated in the pre and
 665 post-construction study designs and the mitigation plan. Adjustments should be made if
 666 unanticipated impacts become apparent from monitoring data. Examples of such changes may
 667 include additional monitoring or research focused to understand the identified impacts.
 668
 669 G. Modification or expansion of wind facility
 670 1. Questions/Issue Formulation
 671 2. Evaluate Tier 4 and Tier 5 studies as relevant
 672 3. Repeat pre-construction tiered process if deemed appropriate

- 673
674 H. Retrofit and Repowering – Retrofitting is defined as replacing portions of existing wind
675 turbines or project facilities so that at least part of the original turbine, tower, electrical
676 infrastructure or foundation is being utilized.
- 677 1. Retrofitting of turbines should use installation techniques that minimize new site
678 disturbance, soil erosion, and removal of vegetation of habitat value
 - 679 2. Retrofits should employ shielded, separated or insulated electrical conductors that
680 minimize electrocution risk to avian wildlife
 - 681 3. Retrofit designs should prevent nests or bird perches from being established in or on
682 the wind turbine or tower
 - 683 4. FAA visibility lighting of wind turbines should employ only red or dual red and white
684 flashing lights, not steady burning lights.
 - 685 5. Lighting at operation and maintenance facilities and substations located within ½ mile
686 of the turbines should be kept to the minimum required to meet FAA guidelines and
687 safety and security needs. Use lights with sensors and switches to keep lights off
688 when not required. Lights should be hooded and directed to minimize horizontal and
689 skyward illumination. Minimize use of high intensity lighting, steady-burning, or
690 bright lights such as sodium vapor or spotlights.
 - 691 6. Remove wind turbines when they are no longer cost effective to retrofit so they
692 cannot present a collision hazard to birds and bats.
- 693
- 694 I. Repowering Existing Wind Projects
- 695 1. To the greatest extent practicable, existing roads, disturbed areas and turbine strings
696 should be re-used in re-power layouts.
 - 697 2. Roads and facilities that are no longer needed should be stabilized and re-seeded with
698 native plants appropriate for the soil conditions and adjacent habitat and of local seed
699 sources where feasible, per landowner requirements and commitments.
 - 700 3. Existing substations and ancillary facilities should be re-used in repowering projects
701 to the extent practicable.
 - 702 4. Existing overhead lines may be acceptable if located away from high bird crossing
703 locations such as between roosting and feeding areas, or between lakes, rivers and
704 nesting areas. Overhead lines may be used when they parallel tree lines, employ bird
705 flight diverters, or are otherwise screened so that collision risk is reduced.
 - 706 5. Above-ground low and medium voltage lines, transformers and conductors should
707 comply with the Avian Power Line Interaction Committee (APLIC) “Suggested
708 Practices for Avian Protection on Power Lines.”
 - 709 6. Guyed structures should be avoided unless guy wires are treated with bird flight
710 diverters or high visibility marking devices, or are located where known low bird use
711 will occur.
 - 712 7. FAA visibility lighting of wind turbines should employ only red or dual red and white
713 flashing lights, not steady burning lights.
 - 714 8. Lighting at operation and maintenance facilities and substations located within ½ mile
715 of the turbines should be kept to the minimum required to meet FAA guidelines and
716 safety and security needs. Use lights with sensors and switches to keep lights off
717 when not required. Lights should be hooded and directed to minimize horizontal and

718 skyward illumination. Minimize use of high intensity lighting, steady-burning, or
 719 bright lights such as sodium vapor or spotlights.
 720

721 J. Decommissioning

- 722 1. Decommissioning methods should minimize new site disturbance and removal of
 723 native vegetation, to the greatest extent practicable.
- 724 2. Foundations should be removed to a depth of 2 feet below surrounding grade or
 725 covered with soil, stabilized and re-vegetated with native plants appropriate for the
 726 soil conditions and adjacent habitat and of local seed sources where feasible, per
 727 landowner requirements and commitments.
- 728 3. Overhead pole lines that are no longer needed should be removed.
- 729 4. After decommissioning erosion control measures should be installed in all
 730 disturbance areas where potential for erosion exists.
- 731 5. Fencing should be removed unless the land owner will be utilizing the fence
- 732 6. Petroleum product leaks and chemical releases that constitute a Recognized
 733 Environmental Condition should be remediated prior to completion of
 734 decommissioning.

735
 736 **Chapter 4: Mitigation**

737 The objectives of mitigation are to avoid or minimize impacts to fish, wildlife and their habitats,
 738 and, if necessary, to compensate for those impacts not avoided or minimized.

739 A. Impact Avoidance and Minimization

740 State and federal wildlife laws and policies focus on avoidance and minimization of project
 741 impacts. Impact avoidance and minimization is often best achieved early in the project planning
 742 and design process, during pre-site selection planning (macro-siting) and during site layout
 743 planning (micro-siting). However, if these measures are demonstrated to be insufficient in
 744 avoiding or minimizing impacts, then additional measures such as adaptive management or
 745 compensation may be needed.

746
 747 B. Compensation

748 A project developer should ensure that appropriate measures are incorporated into the planning
 749 and construction, and operation of a project to avoid and minimize impacts as much as possible.
 750 If these measures are insufficient to avoid or minimize estimated impacts to birds, bats and
 751 habitat, however, compensation may be one of the appropriate strategies to mitigate or offset
 752 such impacts, including cumulative impacts.

753
 754 Development of effective compensation measures and recommendations should consider
 755 USFWS recommendations under its mitigation policy and involve consultation with the
 756 appropriate state agencies. Because a project's operational fatalities cannot be forecast with
 757 precision, it may not be feasible to make compensation decisions until monitoring data is
 758 collected. However, the application, general terms, and commitments for potential future
 759 compensatory mitigation and the triggers or thresholds for implementing such compensation
 760 should be determined before a project goes forward. If operational impacts exceed the expected
 761 levels, adaptive management strategies or additional compensatory mitigation may be necessary.
 762 However, additional compensatory mitigation and potential adaptive management strategies

763 beyond that recommended prior to project construction should be well defined and feasible to
764 implement, so that the developer will have an understanding of any potential future mitigation
765 requirements.

766 The following potential compensation options may appropriate for consideration:

- 768 • Offsite and on-site conservation and protection of habitat
- 769 • Offsite and on-site conservation and habitat restoration
- 770 • Offsite and on-site habitat enhancement

771
772 Regardless of the form of compensatory mitigation, there should be a nexus between the level of
773 impact and the amount of compensation. Any compensation should be biologically based and
774 reasonable.

775 776 C. Mitigation Plans

777 Development of a formal mitigation plan should be an integral part of a wind energy facility
778 project and completed prior to project construction. Mitigation plans are not necessary for low-
779 risk projects or common species. A mitigation plan should include some or all of the following
780 elements: mitigation measures, goals and objectives, implementation plan, performance
781 standards, operation and maintenance plans, monitoring and evaluation plans, and plans for
782 adaptive management. Mitigation plans directed at birds and bats may be in the form of an Avian
783 and Bat Protection Plan (ABPP) designed to address project impacts to birds, bats, and their
784 habitats. A sample ABPP can be found in Appendix.

785 786 **Chapter 5. Advancing Cooperation, Use, and Effective Implementation of the** 787 **Recommendations**

788 The Committee recommends that the Service, in coordination with the appropriate federal action
789 agencies, establish agreements and guidance as is appropriate to create consistency and certainty
790 in the federal permitting process, to apply consistent and complementary guidance in the siting
791 of wind energy projects across agencies, to develop and adopt an interagency repository of best
792 management practices, and to ensure that data collection requirements are consistent in
793 methodology and reporting. This guidance should also be capable of being stepped-down and
794 applicable to the state and local government levels.

795 796 A. Federal-federal coordination and cooperation (*e.g.*, FWS and BLM)

797 In order to provide the wind industry with a level of certainty in regard to the federal permitting
798 process to aid in planning an efficient timeline for the development of wind energy projects, and
799 also to allow for greater benefits to fish and wildlife by assuring sufficient time to provide input,
800 the Committee makes the following recommendations to streamline the federal permitting
801 process:

- 802 • Identify redundancies, points in the process where delays occur, and other inefficiencies
803 in the federal permitting process
- 804 • Establish a working group or advisory committee to provide recommendations on
805 addressing these inefficiencies

806 807 1. Providing Consistent and Complementary Guidance

808

809 The Committee recommends that the USFWS work with its federal partners to ensure that its
 810 guidance is consistent with other federal regulation and guidance across geographic regions, and
 811 that its guidance complements other guidance, regulations, and other processes currently in
 812 practice.

- 813
- 814 • Provide incentives for adoption and use of FWS Guidance.
- 815 • Encourage early coordination with FWS for projects that may potentially impact fish and
 816 wildlife resources.
- 817 • Continue interagency meetings to encourage open communication between agencies on
 818 guidelines and practices and promote consistency between approaches.
- 819

820 2, Developing and Adopting Interagency Best Management Practices

821

822 Currently, several federal agencies may have developed best management practices for the same
 823 type of activity, with varying recommendations according to the priorities of the agency. The
 824 Committee recommends the development, and continued maintenance and updating in
 825 accordance with the state of the science, of a national repository of best management practices.
 826 This repository may potentially include individual BMPs for a specific activity, or a single
 827 location or resource of multiple BMPs addressing certain aspects of a specific activity. A single
 828 repository where this information could reliably be accessed would help to increase efficiency
 829 and interagency coordination, would and could serve as a useful and compact resource for wind
 830 energy developers.

831

832 3. Consistency in Data Collection and Sharing of Relevant Data

833

834 The Committee recommends that the USFWS coordinate with other agencies that require
 835 collection of data at a wind energy site to promote consistency methodology and reporting
 836 requirements. (not sure which agencies may require data collection, what type of data,
 837 etc...placeholder?)

838

839

840 B. Federal-state coordination and cooperation

841 To successfully implement the national guidance, the Service should proactively seek to enlist
 842 local and state governments in partnerships to advance the objective of minimizing wildlife
 843 impacts from wind projects.

844

845 Given the relative roles and responsibilities of the state, local governments, and the USFWS in
 846 protecting wildlife and their habitats from the risks posed by wind power facilities, it is important
 847 that the Service coordinate and collaborate with willing state and local governments to clearly
 848 communicate program management responsibilities to address wind/wildlife issues. To that end,
 849 the Service should reach out to and work with state and local governments in advancing the
 850 development of guidance, policies, protocols, and programs at the state and local level that are
 851 consistent with the Service's national policy and obligations under federal wildlife laws.

852

853 The USFWS has a limited regulatory role in addressing wind power development, with its
 854 regulatory role applying only to projects that occur on federal lands or those that have some form

855 of federal involvement. However, the USFWS has a significant non-regulatory role under the
856 Fish and Wildlife Coordination Act. Since most wind power development to date has occurred
857 on non-federal lands, regulating wind power is largely a state and local government
858 responsibility. Therefore, the Service should work with states as much as possible to implement
859 the national guidance as the states are the primary actors in regulating wind projects.

860
861 The Service also should recognize, however, that state and local regulations and guidelines
862 relating to wind power are still quite limited and rapidly evolving as local governments and
863 states realize that their existing provisions are often not applicable to wind power. Many state
864 and local regulatory agencies have little experience in addressing wildlife impacts from wind
865 power. Therefore, the USFWS also should strive to use the national program to encourage more
866 states to proactively address potential conflicts between wind projects and wildlife, through
867 establishment of clear and predictable local guidance, rules, programs, and policies that are
868 consistent with the federal policy.

869
870 The ESA, MBTA, and BGEPA do not require the USFWS to pursue formal consultation with
871 state and local agencies. However, state or local entities that regulate wind power sometimes
872 consult with FWS staff for information on protected species or advice on how to ensure that
873 wind projects will not harm wildlife. This type of state/federal consultation should be
874 encouraged and formalized, when possible, by USFWS. If state and local regulators do not
875 consult with FWS, it will be difficult for the Service to encourage actions that could reduce
876 wildlife mortality and habitat loss before wind facilities are sited. Therefore, the USFWS should
877 work to create formal consultation arrangements with interested states to ensure use of the
878 national guidance and of Service expertise.

879
880 Finally, given the Service's resource constraints, the USFWS should enlist states and local
881 agencies to assist as appropriate in implementing the national guidance (or equivalent state
882 approaches) to leverage limited federal staffing resources. The USFWS has limited staff, given
883 other workload responsibilities and the much greater threats to migratory species posed by other
884 activities, to implement a comprehensive compliance program to review wind power projects for
885 potential wildlife impacts. Since USFWS staff is able to spend relatively limited time assessing
886 wildlife impacts from wind power, the Service should work with the states whenever possible.

887
888 For all these reasons, the Committee recommends as one option that the USFWS establish a
889 cooperative agreement program to advance working partnerships between USFWS and states for
890 cooperative review of wind projects under both federal and state wildlife laws and regulations.
891 The following are the primary objectives of this state/USFWS partnership:

- 892
893 1. Establish joint communication and cooperation arrangements with states to ensure wind
894 project compliance with state and federal wildlife laws.
895 2. Foster uniformity between state and federal policies and guidelines to address
896 wind/wildlife interactions.
897 3. Coordinate with states and local governments on review and compliance actions to
898 address wind/wildlife issues.
899 4. Improve coordination between federal and state regulatory and enforcement programs
900 addressing wind projects and wildlife interactions.

- 901 5. Work together to resolve major problems that may arise at wind projects.
 902 6. Advance cooperative state/federal/industry research relating to wind project-wildlife
 903 interactions.
 904 7. Improve targeting of state/federal roles and resources by tailoring the federal program to
 905 meet the local needs and concerns of each State to the maximum extent feasible in
 906 consideration of national program consistency.
 907 8. Provide more efficient use of resources through coordination with State offices and
 908 personnel.

909
 910 Both the USFWS and the State would perform different roles in this partnership framework:

911
 912 USFWS Role

- 913 • Provide funding to assist states through cooperative agreements
 914 • Provide national guidance and strategies to address wind/wildlife issues with a particular
 915 national focus on cumulative effects, adaptive management strategies, and priority
 916 national research
 917 • Provide training to states
 918 • Support and manage a national database for reporting of mortality data on a consistent
 919 basis
 920 • Establish and revise national “best management practices” for wind project siting and
 921 operation based on project experience and learning
 922 • Establish and revise recommended guidance on study protocols, study techniques, and
 923 measures and metrics for use by all jurisdictions
 924 • Allow states to take primary responsibility for reviewing and ensuring wind project
 925 compliance with wildlife laws
 926

927 States (and Local Government) Role

- 928 • Take the lead to implement and ensure compliance with national guidance and/or
 929 equivalent state-specific guidance addressing wind/wildlife issues
 930 • Initiate state compliance actions for significant violations of wildlife laws at wind
 931 projects
 932 • Facilitate communication and cooperation with USFWS and other federal agencies to
 933 identify and address significant wind/wildlife issues and knowledge gaps
 934 • Report project monitoring data and results to national database at USFWS
 935 • Refer significant, unresolved violations of wildlife laws to USFWS
 936

937 Recommended Actions:

938

939 The following recommended actions and measures are designed to foster state/federal
 940 partnerships and to advance coordination and consultation between federal, state, and local
 941 jurisdictions:

942

943 The USFWS program should be implemented to complement rather than duplicate state-level
 944 programs in addressing wind/wildlife issues. To that end, USFWS should use early notification
 945 protocols, joint agency reviews, coordination activities, memoranda of understanding, and other

946 appropriate measures to reduce duplication and increase coordination between state and local
 947 agencies and USFWS in reviewing wind projects.

948
 949 The Service should pursue agreements with state and local agencies to establish complementary
 950 roles and coordinated review of wind energy projects by the state and USFWS.

951
 952 In each state, the USFWS should seek to identify a lead state agency designee responsible to
 953 work with the USFWS regional office to coordinate review of proposed wind activities under
 954 wildlife laws.

955
 956 The USFWS should seek to establish state-federal cooperative arrangements for early
 957 consultation and coordination in resolving wind/wildlife issues.

958
 959 The Service should pursue agreements with state and local agencies to advance establishment of
 960 uniform and consistent guidance and best practices on how best to avoid, minimize, and/or
 961 mitigate adverse impacts to wildlife resources.

962
 963 The USFWS should establish communication protocols with interested States to ensure that the
 964 party first obtaining the information about a prospective wind project will notify the other party
 965 to enable joint planning on how to coordinate review of the project.

966
 967 The USFWS should work with states to establish consistent and predictable protocols and study
 968 requirements that can be used by all agencies to satisfy statutory and regulatory requirements.

969
 970 The USFWS should designate a management contact in each regional office (or nationally) to
 971 work with states and local agencies to resolve significant wildlife-related issues that may arise at
 972 wind energy projects.

973
 974 The USFWS should establish a “step-down” process to allow interested states to coordinate
 975 effectively in review and compliance activities for ensuring wind project compatibility with
 976 wildlife laws. Under this voluntary, negotiated framework, the Service would agree to defer to
 977 the State as the lead or “front line” agency to review and ensure wind energy compliance with
 978 wildlife laws, upon a finding that (1) a State’s wind/wildlife guidance or program is consistent
 979 with or more stringent than the USFWS national guidance and sets forth reasonable measures to
 980 achieve the avoidance, minimization and mitigation of potential adverse wildlife impacts from
 981 wind energy projects, and (2) the State agrees to implement the state program with a good faith
 982 effort and adequate resources. However, the USFWS would still retain the full authority to
 983 initiate review and/or enforcement actions, as appropriate.

984
 985 POSSIBLE PLACEHOLDER: (From Mark Sinclair), “Memorandum of Understanding Between
 986 USFWS and State”

- 987
 988 C. Federal-tribal coordination and cooperation
 989
 990 D. Agency (federal state and/or local)-developer coordination and cooperation (*e.g.*, ABPP,
 991 HCP, MOUs)

992 The Committee recommends that the Service establish several specific mechanisms to promote
993 developer and industry use of the voluntary Wind Turbine Recommendations, wherein
994 assurances would be provided by the USFWS to a developer that diligent actions to implement
995 the Wind Turbine Recommendations, and minimize wildlife impacts from wind projects, will
996 reduce the likelihood of enforcement under the ESA, BGEPA, and MBTA. see footnote 51 The
997 USFWS therefore should develop and implement a multi-faceted strategy to encourage
998 developers to increase their efforts to follow the recommendations in the Wind Turbine
999 Recommendations. The following strategies are recommended and described:

1000 1. Promote Developer Agreements

1001 Developers should be provided the opportunity to enter into voluntary agreements with the
1002 USFWS under certain terms that ensure implementation of appropriate and reasonable measures
1003 to prevent injury and harm to birds and bats. The purpose of such agreements are to (a) provide
1004 a timely, stable, and predictable means for developers to seek review by and consultation with
1005 the USFWS to ensure good faith compliance with the ESA, BGEPA and MBTA, and (b) provide
1006 the developer with some assurances that compliance with the Wind Turbine Recommendations
1007 will result in reduced threat of enforcement under wildlife laws. Promoting coordination and
1008 cooperation between the Service and a developer – through the use of project-specific
1009 agreements – is critical to ensuring that the national guidance is used and endorsed by the
1010 industry.

1011
1012 While each agreement should be tailored to the particular project, situation, and developer's
1013 commitments, an agreement should include the following elements:

- 1014
- 1015 • A USFWS commitment to provide timely review of the site and any relevant wildlife and
1016 habitat information to the developer, upon notification of a proposed project.
 - 1017
 - 1018 • A developer commitment to share all relevant information concerning the wildlife
1019 resources under the jurisdiction of the USFWS in the project area and the potential
1020 impacts to these wildlife resources. Shared information should include all known,
1021 publicly available data and pre- and post construction study results related to the
1022 proposed project.
 - 1023
 - 1024 • A developer commitment to use due diligence to comply with the suggested
1025 requirements, protocols, and best practices of the Wind Turbine Recommendations (or
1026 equivalent state or local requirements or guidance), subject to appropriate modification
1027 and flexible application based on the characteristics of the proposed project site, and
1028 based upon technical feedback from, or formal consultation with, the USFWS, as
1029 appropriate.
 - 1030
 - 1031 • A developer commitment to employ feasible, effective and applicable best management
1032 practices for siting of wind energy projects relevant to protection of wildlife and habitat
1033 resources, as identified by the USFWS. The applicable BMPs would be established in the
1034 Wind Turbine Recommendations, and revised from time to time in consultation with
1035 wind industry, state, USFWS and NGO representatives, and based on project experience.
 - 1036

- 1037
- 1038
- 1039
- 1040
- 1041
- 1042
- 1043
- 1044
- 1045
- (Needs FWS input) A USFWS commitment from the Office of Law Enforcement to use its enforcement discretion and focus on those individuals, companies, or agencies that take migratory birds without regard for their actions and the law, especially when conservation measures have been developed but not implemented, provided that the developer remains in compliance with the terms and conditions of the agreement, and the developer has made a good faith effort to avoid and minimize potential adverse impacts by way of implementing best management practices and complying with the Wind Turbine Recommendations (or state or local equivalent guidance).
 - A developer commitment to provide coordinated access, upon prior notice, to the wind energy project as requested by USFWS staff in order to ensure compliance with the agreement, provided that such access was coordinated in advance as much as possible and subject to normal safety precautions implemented by the developer/project owner.

1050

1051 2. Use of Avian and Bat Protection Plan

1052 The Committee also recommends that the USFWS encourage the use of an Avian and Bat Protection Plans (ABPP). An ABPP is defined as a voluntary project or company-specific program of best management practices designed to protect and conserve birds and bats.

1055

1056 A company's ABPP should include a suite of practices and processes intended to minimize impacts to birds and bats from wind projects. The goal of an ABPP is to implement a series of best practices that ensure project siting and operation occurs in a manner designed to avoid or minimize risk to birds, bats, and their habitats.

1060

1061 The concept of an ABPP recognizes that the Enforcement Branch of the USFWS has MBTA enforcement discretion. Therefore, a company or developer operating under an ABPP should be allowed to implement its wind project or program without the need for a formal agreement by USFWS on every project or action that has potential to affect migratory birds and bats.

1065

1066 The ABPP would not constitute an incidental take permit, nor would it result in a permit. Rather, an approved ABPP would represent a wind developer's commitment and demonstration that it is doing its best to fulfill the intent of the MBTA and to minimize impacts to migratory birds and bats. As a condition of compliance with an approved ABPP, the Service will use its enforcement discretion and focus on those individuals, companies, or agencies that take migratory birds without regard for their actions and the law, especially when conservation measures have been developed but not implemented.

1073

1074 An ABPP can be either a company-specific or project-specific document. In either context, the ABPP delineates a program designed to reduce the risks that result from avian interactions with proposed and existing wind facilities.

1077

1078 A company-wide ABPP provides an opportunity for a company to address migratory bird and bat issues on a broader scale than afforded by a project by project approach. It would establish company policies and processes that will help the company ensure compliance with federal and state wildlife statutes.

1082

1083 A project ABPP, on the other hand, provides more site-specific measures to minimize impacts to
 1084 wildlife resources. A project-specific ABPP may or may not tier off a company ABPP.
 1085 Recommended elements for a ABBP and a sample ABBP can be found in Appendix D.
 1086

1087 There are a variety of non-governmental organizations that have an interest in improving siting
 1088 procedures for wind energy projects. Some groups, such as industry trade organizations, support
 1089 expanded wind energy development, and other groups have primary interest in reducing wildlife
 1090 impacts of wind energy development – these groups are not mutually exclusive
 1091

1092 3. Other (to be written)
 1093

1094 E. NGO Actions (to be written)

1095 1. Industry/AWEA

1096 2. Conservation organizations

1097 3. AWWI

1098 4. NWCC

1099 5. Others
 1100

1101 F. Other Incentives (to be written)
 1102

1103 **Chapter 6: Benefits** (to be written)

1104 A. Reduced ecological impacts

1105 B. Increased compliance

1106 C. Reduced regulatory risk

1107 D. Improved predictability of wildlife and habitat impact

1108 E. Cost savings

1109 F. Improved likelihood of project financing
 1110

1111 **Chapter 7: Revisions to Recommendations** (to be written)

1112 A. Incorporating feedback

1113 B. Design and schedule mechanisms for revision
 1114

1115 **Chapter 8: Recommendations for Effective USFWS Administration of**
 1116 **Recommendations** (to be written)

1117 A. Training

1118 B. Staff support

1119 C. Consistent application
 1120
 1121
 1122

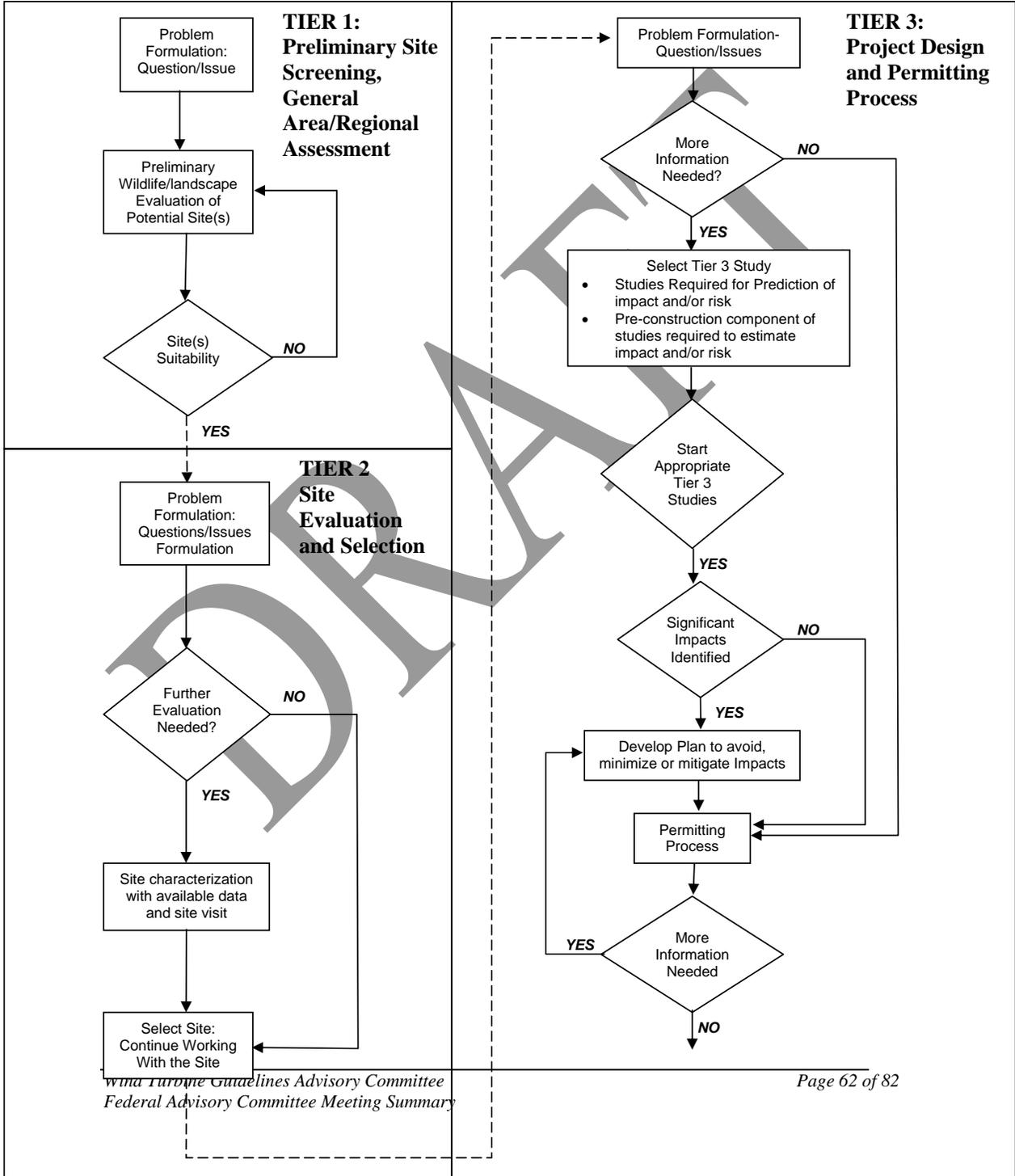
List of Appendices

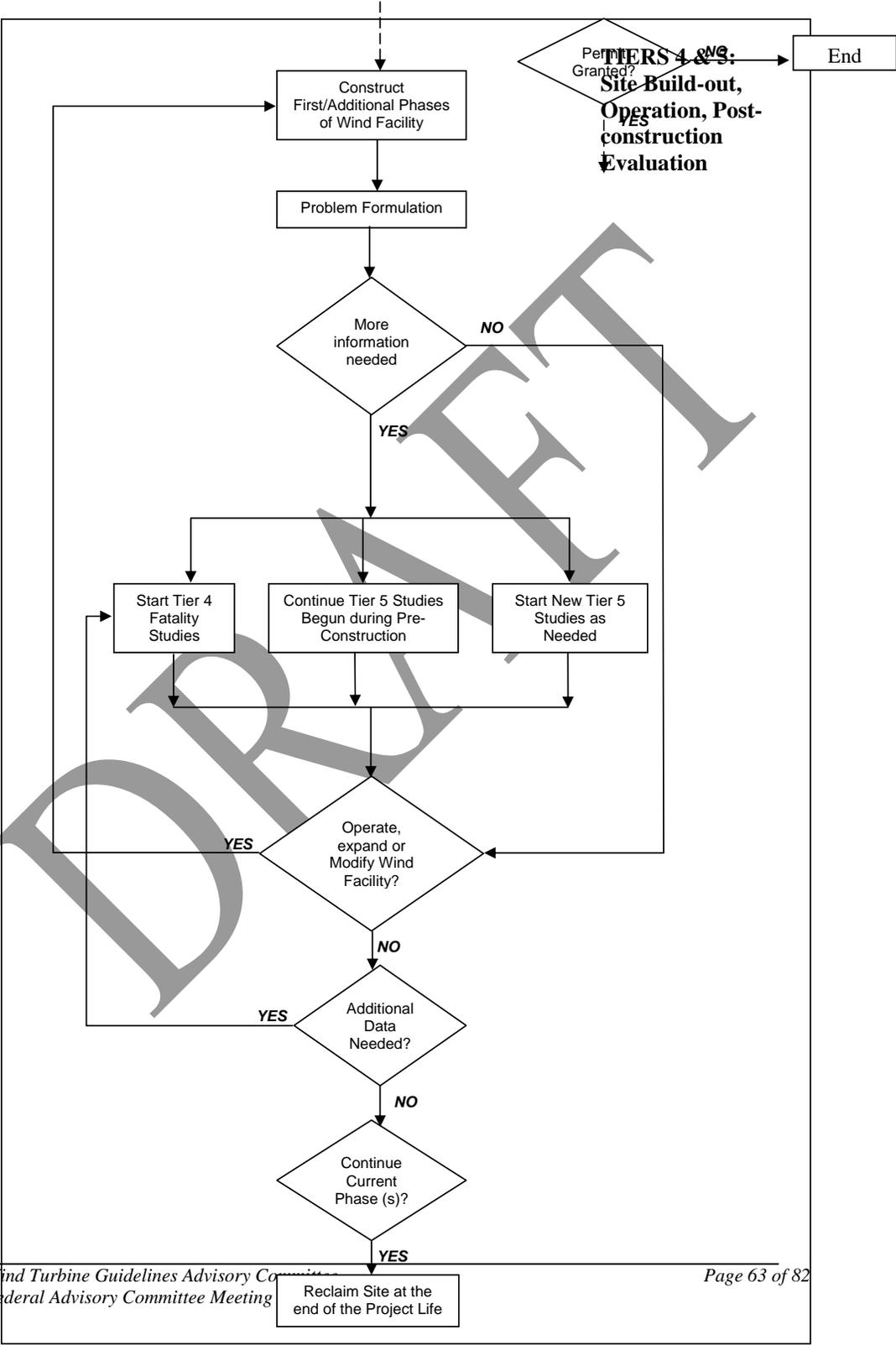
- A. Department of the Interior (DoI) Wind Turbine Guidelines Advisory Committee (WTGAC) Other Models Subcommittee Matrix October 21-23, 2008 (will be attached)
- B. WTGAC Legal Subcommittee White Paper October 21-23, 2008(will be attached)
- C. WTGAC Landscape/Habitat Subcommittee, "Mapping Tools Case Studies" October 21-23, 2008 (will be attached)
- D. WTGAC Landscape/Habitat Subcommittee, Summary of Metadata for Data Layers Mapped, October 21-23, 2008
- E. WTGAC Scientific Tools & Procedures Subcommittee, General Framework for Minimizing Impact of Wind Development on Wildlife in the Context of the Siting and Development of Wind Power, October 21-23, 2008
- F. First Draft Recommended Elements of an Avian and Bat Protection Plan, October 21-23, 2008
- G. Glossary (to be written)

Appendix D. WTGAC Landscape/Habitat Subcommittee, Summary of Metadata for Data Layers Mapped, October 21-23, 2008

Organization Managing File(s)	Map/Database Title
Existing information	
The Nature Conservancy	Portfolio Sites
The Nature Conservancy	Great Plains Untilled Landscapes
Platt/DOE/Local transmission councils	Current and Proposed Transmission
Unknown	Current and Proposed Wind Farms
National Atlas	Bat Distributions
National Audubon Society	Important Bird Areas
Natural Resources Conservation Service	Natural Resources Inventory (NRI)
Fish and Wildlife Service	Environmental Conservation Online System (ECOS)
Fish and Wildlife Service	Habitat and Population Evaluation Team (HAPET) modeling
Fish and Wildlife Service	Preliminary topographic and wildlife feature GIS screening
The Nature Conservancy	Wind & wildlife resource maps - Great Plains
Forthcoming:	
Western Governors Association	Wind-wildlife transmission maps
Audubon/NRDC	Western resources maps
North American Grouse Partnership	Prairie grouse habitats
The Nature Conservancy	Wind & wildlife resource maps - balance of US
Am. Wind & Wildlife Institute	Wind & wildlife resource maps
Playa Lake Joint Venture	Playas
Prairie Pothole Joint Venture	Prairie Pothole habitats

Appendix E. WTGAC Scientific Tools & Procedures Subcommittee, General Framework for Minimizing Impact of Wind Development on Wildlife in the Context of the Siting and Development of Wind Power, October 21-23, 2008





Appendix F. First Draft Recommended Elements of an Avian and Bat Protection Plan,
October 21-23, 2008

The following are key elements that should be considered in developing an ABPP that are designed to ensure that the plan merits USFWS assurances regarding prosecutorial discretion. Not all of the recommended elements would need to be included in every ABPP because of the specific circumstances of a project or geographical area, and the adequacy of the ABPP should be determined by the site conditions or actual project performance with respect to wildlife impacts.

1. Corporate Policy

In the ABPP, a company should provide a commitment to develop and implement a specific company policy to address wind/wildlife issues. An ABPP should include a statement of company policy confirming a commitment to work cooperatively with state and federal agencies towards the protection of relevant avian species. The ABPP should institute clear and consistent procedures to minimize impacts to relevant avian species and their habitats, and to address impacts where they are identified. The ABPP should include commitments to:

- Implement and comply with the ABPP
- Ensure company actions comply with the Wind Turbine Recommendations and applicable wildlife laws
- Monitor and document bird and bat mortalities and injuries in order to assess project performance and implement adaptive management actions if warranted
- Provide training and information to staff on the ABPP and its implementation
- Take reasonable and appropriate efforts to construct and alter infrastructure and project operations to reduce the incidence of avian and bat mortality.

2. Compliance with Wildlife Laws & Permits

An ABPP should identify and implement a process under which a company will obtain and ensure compliance with applicable federal, state and tribal laws related to wildlife.

a. Risk Assessment Methodology, Site Selection, and Preconstruction Studies

In an ABPP, a company should agree to implement a rigorous method for evaluating avian and bat risks and to use an effective risk assessment methodology in making siting decisions. The risk assessment methodology should be used to identify sites where wind power development would pose high mortality risks or fragmentation of important habitats, and these sites should be avoided. A company should agree to assess risk to birds and bats from development at a wind project site(s) in order to avoid, minimize, and mitigate adverse impacts.

As a general matter, an ABPP should include a method for evaluating the risks posed to birds and bats in a manner that identifies areas and issues of particular concern. A risk assessment study should begin with a preliminary site assessment. The process then should include pre-construction surveys for avian and bat use, according to protocols and time frames recommended by states and national guidance. Finally, an avian and bat

mortality reporting system should be an integral component of the risk assessment methodology.

b. Site Design and Development Practices

In the ABPP, a developer should agree to implement best site design, construction and management practices as identified by states and the USFWS. As appropriate to the project, the company should consider avian and bat interactions in micro-siting, design and installation of new facilities, as well as in the operation and maintenance of existing facilities. The company also should agree to use all reasonable and feasible generally accepted best management practices during construction and operation of the facility.

c. Consultation & Information Sharing

In the ABPP, a company should agree to share relevant non-proprietary site and study data and to work cooperatively with USFWS or relevant state wildlife agencies. Specifically, the company should agree to share relevant, non-proprietary information concerning wildlife resources in and around a wind project area and the potential adverse impacts to those resources. Shared information should include publicly available data from monitoring efforts and pre and post-construction study results relative to the project area. In the ABPP, a company should agree to work cooperatively with the USFWS or relevant state wildlife agencies in the future to avoid and minimize impacts to wildlife resources as new relevant project information becomes available.

d. Post-construction Monitoring and Avian/Bat Reporting System

In the ABPP, a company should commit to establish post-construction monitoring and a mortality reporting system. A company should agree to voluntarily monitor relevant avian and bat interactions, including mortalities, through the development of a formal avian and bat fatality reporting system. For example, the ABPP could identify thresholds of fatalities above which responses to reduce rates of avian fatalities would be implemented. A company also should agree to make the data reasonably available to the USFWS and the states, as much as possible in a compatible format to advance adaptive management, and site/regional comparison. The company also would commit to make specimens collected on site reasonably available to the state and/or USFWS. An ABPP should provide for the development of such a reporting system, which can help a company pinpoint areas of concern by tracking both the specific locations where mortalities may be occurring and the extent of such mortalities. Data collected by company personnel should include avian and bat mortalities or injuries, as well as remedial actions taken.

e. Mortality Reduction Measures and Mitigation

In the ABPP, a company should agree to use the results of a risk assessment to revise siting decisions and identify and undertake appropriate mitigation. A company also should commit to review and provide post-construction mortality monitoring data and to

work cooperatively with the states and the USFWS to take action if the data indicate a significant problem. In an ABPP, a company should commit to identify appropriate adaptive management mortality reduction or mitigation measures when an operating project results in unexpectedly high mortality or unexpected impacts to protected species or their habitats.

f. Quality Control & Adaptive Management

I

In the ABPP, a company should provide for future revisions or updating as new scientific methods and techniques become available. An ABPP should include a mechanism to provide periodic review of existing practices, ensuring quality control and effective management.

g. Sample ABPP

Appendix G. Glossary (to be written)

Synopsis of DRAFT Tiered Approach
Incorporated in Synthesis Subcommittee Draft Recommendations
For Discussion by Wind Turbine Guidelines FACA
January 27-29, 2009

Overview of Tiered Approach

The tiered approach is an iterative process intended to guide site selection and quantify the risks to wildlife of a potential wind project. It involves collecting information in increasing detail as you progress through the tiers, in order to evaluate sites, make siting decisions, assess impacts, construct, and operate the wind project. We have defined five tiers that span from pre-site selection through project operation. This approach does not require that every tier or every element within each tier be implemented for every project, but rather recommends steps appropriate to the project circumstances and requirements, at the current stage in the project life cycle.

Tier 1 - Preliminary evaluation or screening of potential sites

Conduct a preliminary regional evaluation of potential site(s) to identify sites to avoid, and sites to review further, using information in the public domain (detailed site specific studies are not conducted). Developers should consult wildlife experts with knowledge of local wildlife, including conservation organizations and government agencies. By reviewing publicly available data developers may determine whether suitable sites are available in the region and can then decide whether to proceed.

Tier 2 - Site characterization

Here the developer has narrowed consideration down to one or more sites within a region, and conducts a preliminary site characterization and preliminary risk assessment, including a "fatal flaw" evaluation. Typically, one or more visits to the site(s) by environmental specialists, and contact with federal, state, tribal, local agencies, and/or non-governmental organizations (NGOs) is recommended. The final site(s) selected for project design and permitting are identified during this tier. Confidentiality concerns at this stage restrict project location information.

Tier 3 – Field studies to document site wildlife conditions and predict project impacts

Site specific studies are conducted to provide quantitative data in designing a project to avoid and/or minimize risk and satisfy permitting/environmental review requirements. Studies should assess site wildlife conditions, help guide project design, support predictions of risk, and provide information useful in the development of mitigation, if needed. The results of these particular Tier 3 studies may determine whether post-construction studies are necessary. If applicable, mitigation, compensation or adaptive management might be proposed at this tier and implemented in a subsequent tier.

Tier 4 – Post-construction fatality studies

Conduct studies to estimate collision fatalities of birds and bats from an operating wind project. The objectives of studies are to quantify and compare avian and bat fatality rates to other projects. Many, but not all, projects will have Tier 4 studies.

Tier 5 – Other Post-construction Studies

Studies may include: 1) estimating the impacts of habitat alteration, habitat loss, or habitat fragmentation on particular species, 2) determining whether the avoidance, minimization, and mitigation measures implemented for a project were adequate or whether additional action is warranted, or 3) other project specific post-construction studies. A variety of designs may be utilized in Tier 5 studies, and the specific designs will depend on the types of questions and the specific project.

DRAFT

These policy questions are not being listed in order of priority.

Does the FAC want to recommend “guidelines” or “a set of recommendations?”

How to address regulated vs. non regulated species throughout the Recommendations.

Tiers

- Tier 1 and/or Tier 2: what is the appropriate time to consult with states and federal government representatives?
- Tier 1 and 2; Clarification regarding the scope and description of Tier 1; concern that Tier 1 does not currently include consultation (not noted until Tier 2).
- In Tier 3, should field studies be conducted to address local populations, their habitat, meta-populations, or entire species?
- Transition between tiers. Who makes the decision whether enough information is available, and based on information available, when you can move to next tier?

Research

- FAC recommendation regarding research: what is definition of research? When does something become research, when does it remain part of risk assessment?
- Should research be included as a topic in this recommendation at all? How should research priorities and activities be formulated and implemented?

Site Studies

- Tier 3: When are using control sites, BACI appropriate?
- Whether studies for site selection need to focus on listed or all species?
- What species should be addressed; how many species need to be addressed in order to cover displacement?
- What level of detail regarding methods and metrics required at each site does the FAC want to include in the recommendations, and what verges on a research question (draft examples of level of detail that should be provided given the situation and the requirements, and let FAC Members decide)?
- How or whether to address cumulative or population impacts.
- Under what circumstance is more than one year of data needed (reasonableness and adequacy)?

Mitigation/compensation

- What definition will we use (the FWS definition? Avoid, minimize, compensate); policy?
- What is the spectrum of regulatory options: from self-regulation to full regulation?
- Should Compensation include in-kind on-site conservation and on-site habitat restoration?
- Data sufficiency as it applies to each step (avoid, minimize, compensate) in spectrum; who decides what is enough; what are the regulatory options (from self-certification to agency certification)
- When should adaptive Management be used, and when is enough adaptive management being applied? (Mike)
- Project abandonment: determine when there is enough data to decide that a project should not be sited, and under what conditions (significance of habitat and value of site as a wind project).
- Thresholds for fatalities, are there going to be thresholds, who determine what is acceptable – (how to address on site).

Incentives (being worked on in subcommittee, for FAC discussion at this meeting)

State and Federal Coordination in Implementation of National Guidance

Confidentiality of Information

Should the national program and recommendations be updated and revised based on future research, actual experience, and effectiveness at minimizing wildlife/wind adverse reactions and if so, how, at what intervals, and through what process?

Should these recommendations include guidance on FWS management objectives, including clear, objective biological goals, and a requirement to adjust the national program, management approach, guidelines and mitigation measures if these objectives are met?

US Department of the Interior

Wind Turbine Guidelines Advisory Committee

Consensus of Members Present at April 23, 2008 Session Groundrules

1. PURPOSE

The Committee charter describing the scope of the committee states:

“The Committee will provide advice and recommendations to the Secretary of the Interior (Secretary) on developing effective measures to avoid or minimize impacts to wildlife and their habitats related to land-based wind energy facilities.”

More specifically, the duties of the Committee are to provide advice and recommendations to the Secretary on:

- a. the Service’s interim guidelines on how to avoid and minimize wildlife impacts from land-based wind energy facilities;
- b. balancing potential impacts to wildlife with the cost of acquiring the information necessary to assess those impacts prior to selecting sites and designing facilities;
- c. the scientific tools and procedures best able to assess pre-development risk or benefits provided to wildlife, measure post-development mortality, assess behavioral modification, and provide compensatory mitigation for unavoidable impacts; and,
- d. a process for coordinating state, tribal, local, and national review and evaluation of the impacts to wildlife from wind energy facilities to standardize approaches and requirements, and achieve compliance with Tribal, State and Federal laws and international treaties.

2. AUTHORITY

The Secretary has determined that the establishment of the Committee is in the public interest. The Committee is subject to the Federal Advisory Committee Act (FACA) as outlined in its Charter approved by the Secretary.

3. PARTICIPATION

- a. The Wind Turbine Guidelines Advisory Committee. The Secretary will appoint committee members (Members) who can effectively represent the balance of viewpoints that would be substantially affected by the issues. [See attached list]
- b. Membership. Each Member must make a good faith effort to attend each full Federal Advisory Committee meeting (FACA meeting). The Member may be

accompanied by such other individuals as that Member believes is appropriate. Alternate members may be selected and appointed by the Secretary. Alternates will attend FACA meetings as a member of the Committee only in the absence of the primary member. The Secretary may remove a Member of the Committee.

- c. Chairperson/Designated Federal Official (DFO). The Chief of the Division of Habitat and Resource Conservation, Fisheries and Habitat Conservation, shall serve as Chairperson of the Committee and as the DFO. The role of the Chairperson is to establish the Committee priorities. The role of the DFO is to open and close FACA meetings, approve agendas and certify meeting summaries in consultation with the Committee, and other duties identified in the Federal Advisory Committee Act. The Chairperson/DFO represents the Director, U.S. Fish and Wildlife Service, on the Wind Turbine FACA Committee and is the government's agent for all matters related to the Committee's activities.
- d. Constituents Interests. Committee Members are expected to ensure that all significant issues and concerns are fully and clearly articulated during the FACA meetings, and that the agreement developed by the Committee is acceptable to the constituency that the Committee Member represents.

4. MEETINGS

- a. Open Meetings. FACA meetings will be announced in the *Federal Register* prior to the meeting and, consistent with FACA requirements; will be open to the public. The public will be given opportunities at designated times during each meeting to make comments, raise questions, or submit materials for the record. If a committee member believes that a member of the public can provide valuable information to the committee, he/she can request that the DFO provide time outside of the official public comments period for that person to speak.
- b. Communication. Members are encouraged to communicate their opinions, ideas and concerns openly in order to foster a dialogue that will lead to the best possible decisions.
- c. Video or Audio Recordings. The Members respectfully request that the Committee be notified of any audio or video recording of Wind Turbine Advisory Committee discussions.
- d. Minutes. The Chairperson will approve the meeting summary prepared by the facilitator for each FACA meeting. The minutes will include a record of the persons present, including committee members and members of the public who make written or oral presentations, and a description of the matters discussed and conclusions reached, including copies of all reports and other documents received, issued, or approved by the Committee at the FACA meeting. Draft meeting summaries, prepared by the facilitator, will be circulated to Members for accuracy. Final meeting summaries will be made available to the public by

request. Committee information will also be accessible through the U.S. Fish and Wildlife Service Website.

- e. Agenda. Preliminary FACA meeting agendas will be developed by the Chairman/DFO in consultation with the Members.
- f. Caucus. Any Member may request a break at any time subject to the DFO's approval. Members will be asked for an estimate of the time needed for the caucus.

5. DECISIONMAKING

- a. Consensus. The Committee will operate by consensus of all Members present. Consensus is defined as "each Committee member can live with a decision by the Committee". If a Member has a major objection, the Member should make a serious effort to propose a reasonable alternative to the decision. All Members should remain at the table during deliberations to hear the full discussions in order to make informed judgments when decision making occurs. If a member or their alternate is not present when consensus is reached, the Facilitator will contact the absent Member(s) within a few business days to determine if s/he is part of the consensus agreement. If the absent Member can not live with the agreement, the Facilitator will report by electronic mail the concerns to the full Committee. At the end of the process, in the event that consensus is not reached, a summary of the issue(s) will be prepared by the facilitator, in consultation with the Members, and forwarded as part of the full set of recommendations to the Secretary.
- b. Subcommittees. Subcommittees may be formed to address specific issues and to make recommendations to the Committee. Subcommittees can consist of Members and/or their designated alternates. At appropriate times, technical experts will be invited to participate in and offer advice to Subcommittees. Before participating in Subcommittee meetings or conference calls, technical experts will be reviewed and agreed on by the Subcommittee Members. Members will make subcommittee recommendations to the FAC. Subcommittees are not authorized to make decisions for the Committee as a whole. All Members will be notified of all Subcommittee meetings. Subcommittees will be asked to provide reports to the Committee through an oral briefing and in writing when possible.
- c. Discontinue Committee Discussions. Through a consensus decision, the Committee may discontinue discussions at any time if they do not appear productive. In this event, the Secretary will continue to develop the guidance in the traditional manner.

6. AGREEMENT

- a. Product. The Committee will report to the Secretary through the Director, U.S. Fish and Wildlife Service, and will function solely as an advisory body. The Committee will provide recommendations and advice to the Department and the Service consistent with the Committee's Charter. The product will include a list of the issues addressed by the Committee, what the Committee learned about the issues, and recommendations that address the issues. The Agreement of the Committee or any written document or other product(s) of the Committee intended for delivery to the Secretary will include a list of names and signatures of all Wind Turbine Advisory Committee Members.
- b. Use of Product. The Secretary, through the Director of the U.S. Fish and Wildlife Service, anticipates using the Committee's written agreement as the basis of his or her guidance to the maximum extent possible consistent with the Agency's legal obligations.
- c. Final Guidance. So long as it is consistent with federal law, the Secretary anticipates promulgating final guidance consistent with the Committee's written recommendations, unless new information or comments submitted in response to the Notice of Proposed guidance require changes.
- d. Support for the Agreement. If a consensus agreement is reached, all Members represented on the Committee agree that once the Committee's final consensus recommendation is submitted to the Secretary, each Member will honor that agreement by taking positions in other forums that are consistent with the agreement.

7. SAFEGUARDS FOR THE PARTIES

- a. Good Faith. All parties agree to act in a good faith effort to reach agreement in all aspects of these discussions. Specific offers, positions, or statements made during the discussions may not be used by other parties for any purpose outside the discussions or as a basis for future or in support for current litigation. This is intended to support the Wind Turbine Advisory Committee process by encouraging the free and open exchange of ideas, views, and information prior to achieving consensus. Personal attacks and prejudiced statements will not be tolerated.
- b. Right to Withdraw. Any party may withdraw from the Committee at any time. However, prior to withdrawing the Member will communicate to the Committee the reasons for withdrawal in person, if practical. In the event a Member withdraws, their designated alternate will become the Member.
- c. Other's Positions. No party will characterize the position of any other party in public statements or in discussions with the press, even if that party withdraws

from the Committee. To the extent feasible, parties will refer others to the meeting summaries for information about the Committee's deliberations.

d. Information.

- (1) All parties agree to share all relevant information to the maximum extent possible. If a party believes it cannot or should not release relevant information (e.g. because of its confidential or proprietary nature), it will provide the substance of the information in some form (such as by aggregating data, by deleting non-relevant confidential information, by providing summaries, or by furnishing it to a neutral consultant to use or abstract) or it will provide a general description of it and the reason for not providing it directly.
- (2) Parties will provide information called for by this paragraph as much in advance of the FACA meeting at which such information is used as possible.

8. SCHEDULE

FACA meetings will be held approximately four – six times/year, as determined by the Committee. Unless extended by the Secretary through the Director, U.S. Fish and Wildlife Service, the deadline for the discussions is _____. The Committee is chartered until October 26, 2009.

9. FACILITATOR(S)

- a. Facilitator. The Facilitator will work to ensure that the process runs smoothly. The role of Facilitator usually includes developing draft agendas, facilitating Committee and Subcommittee discussions, working to resolve any impasses that may arise, preparing meetings summaries, assisting in the location and circulation of background materials the Committee develops, and other functions the Committee requests. The Facilitator will take no positions on the issues before the Committee.

USFWS PowerPoint Presentation:

A Landscape Planning Tool to Evaluate Anthropogenic Impacts and Conservation Potential for an Area Sensitive Species: Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) Strategic Habitat Planning and Conservation

Presented by Chris O'Meilia, *USFWS Wildlife Biologist and Fire Ecologist*



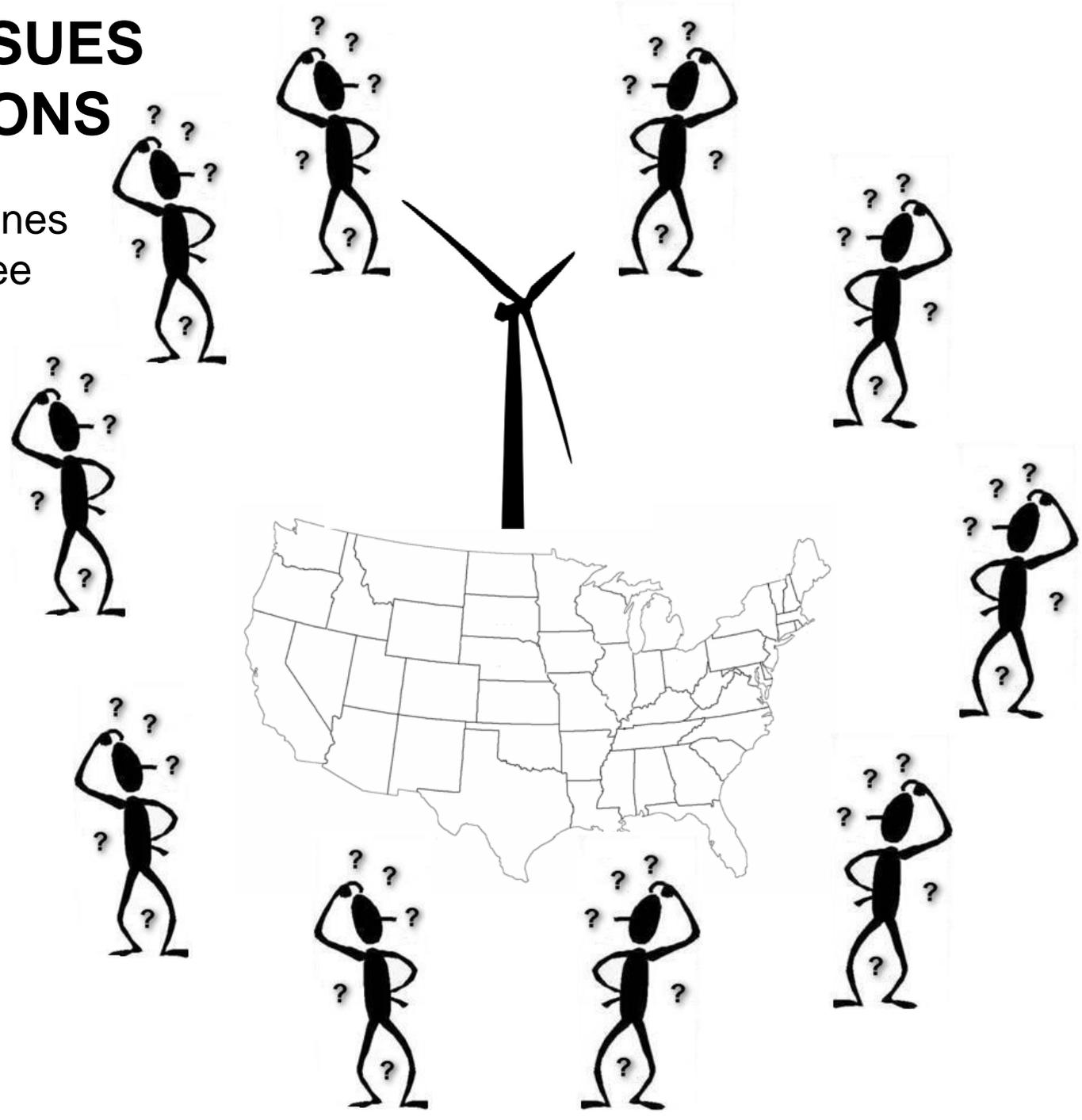
A Landscape Planning Tool to Evaluate Anthropogenic Impacts and Conservation Potential for an Area Sensitive Species:

Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) Strategic Habitat Planning and Conservation



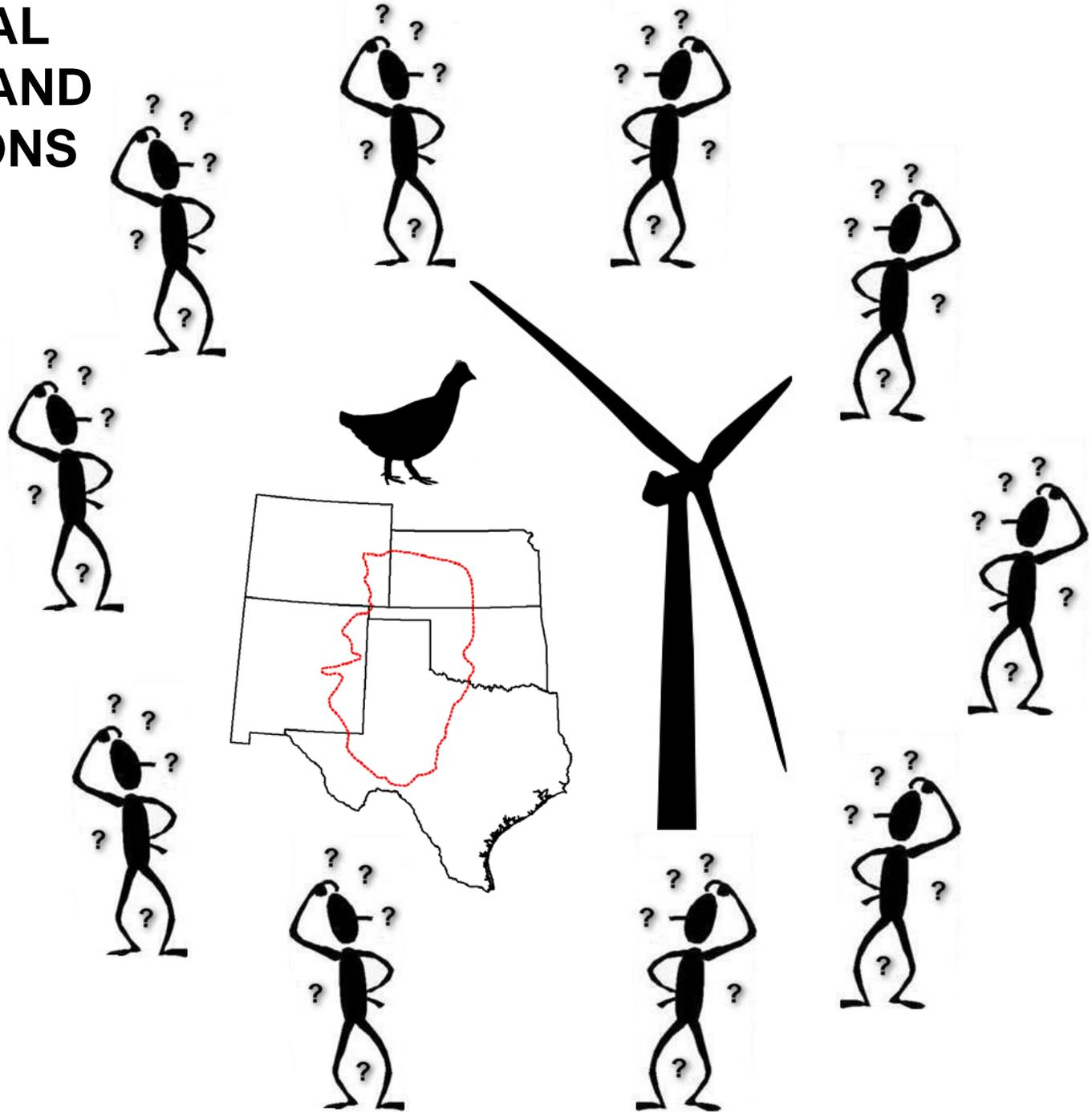
NATIONAL ISSUES AND SOLUTIONS

Wind Turbine Guidelines
Advisory Committee





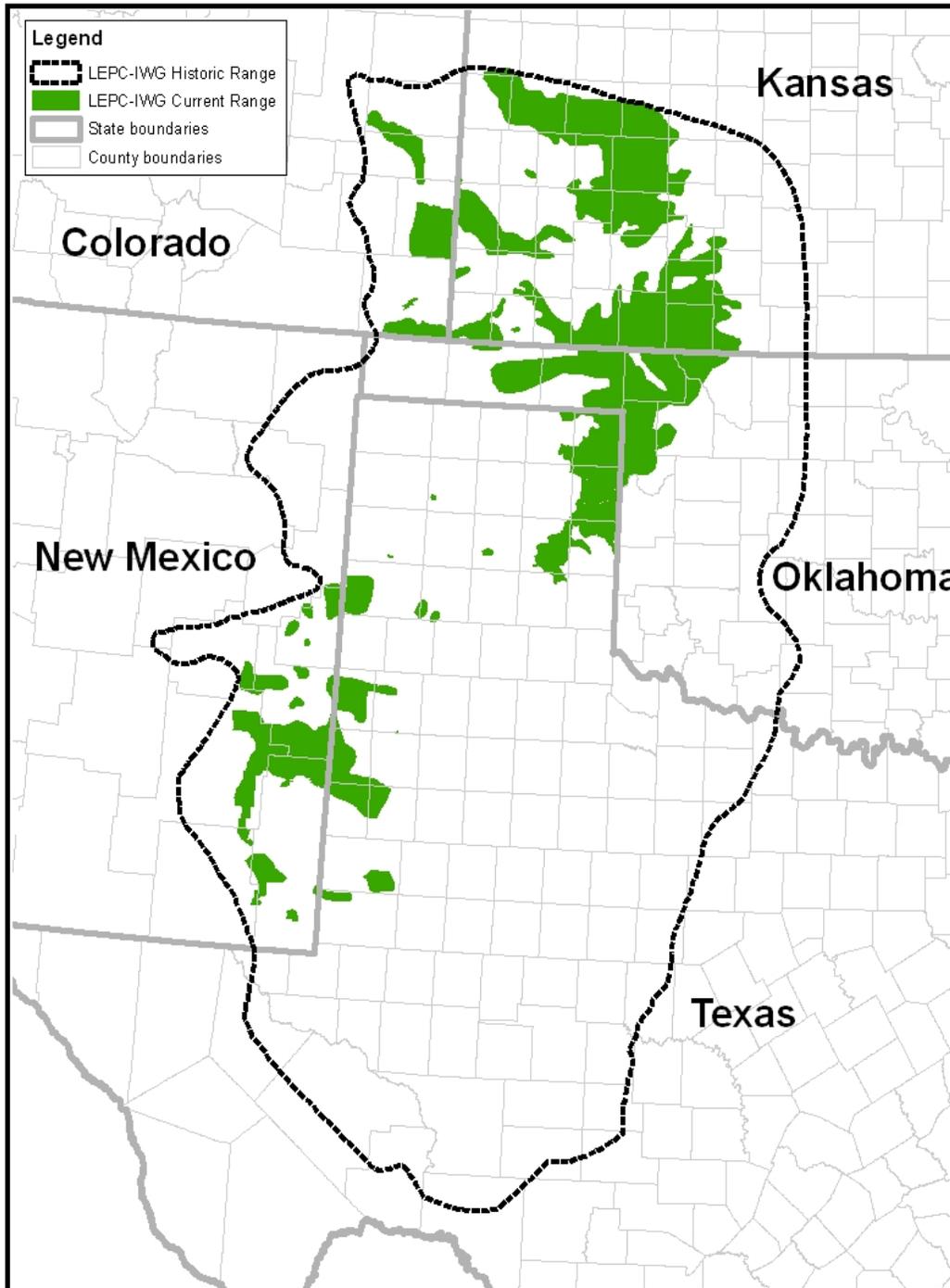
REGIONAL ISSUES AND SOLUTIONS





Lesser prairie-chicken (LEPC)

- Candidate species for Federal listing under the Endangered Species Act
- Listing Priority Number recently changed from 8 to 2
- Candidate Assessment Form used to inform the decision to change the LPN can be found at: http://ecos.fws.gov/docs/candforms_pdf/r2/B0AZ_V01.pdf
- High degree of overlap between high wind development potential and remaining LEPC habitat.
- Other significant threats in addition to wind energy



• Range maps:

Landscape scale planning utility, limited site specific utility

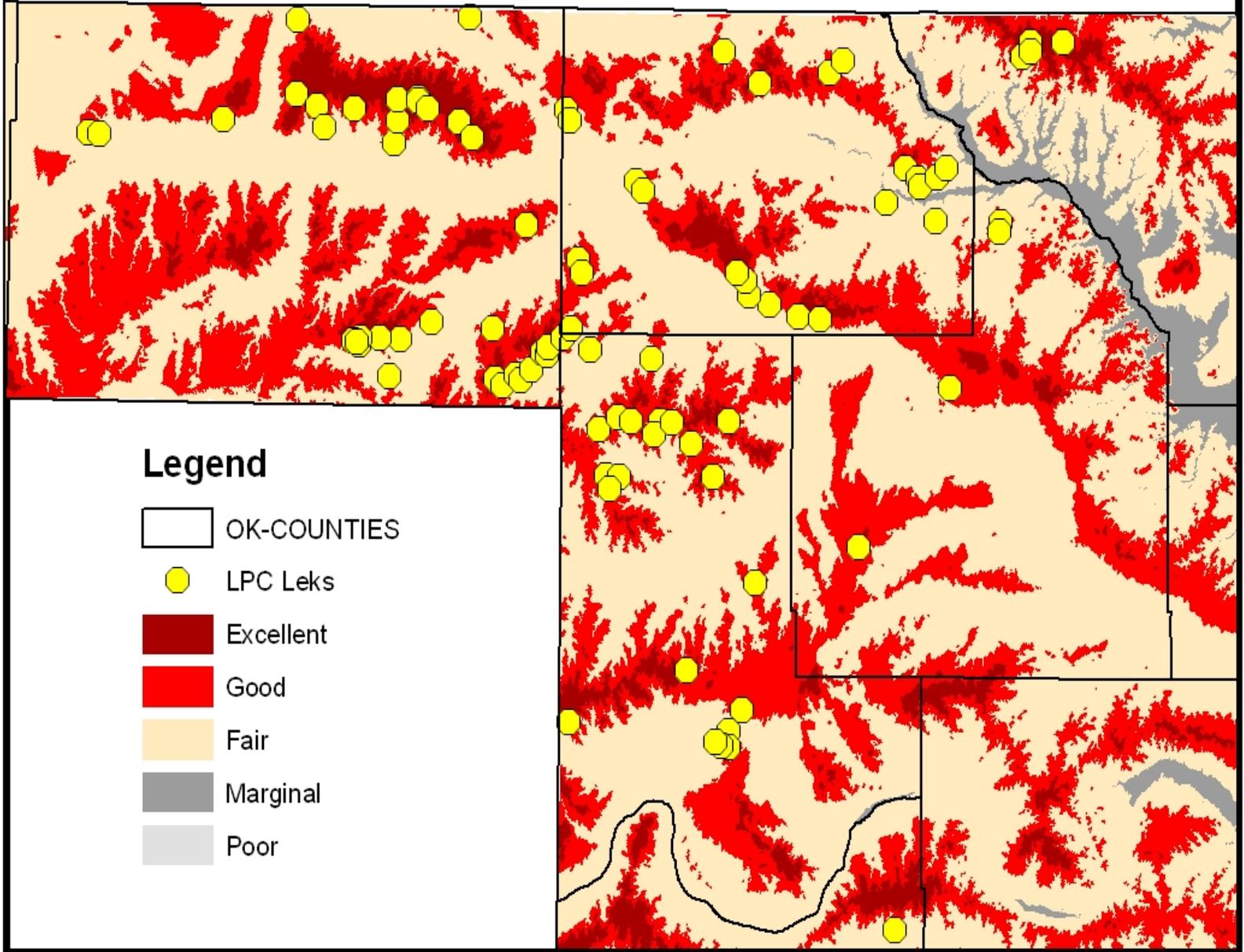
- not everything within polygon is habitat
- being outside the polygon doesn't necessarily avoid effects to the species (e.g., the LEPC likely needs more habitat than currently exists to preclude detrimental population declines)

• Uncertainty in best management practices beyond avoidance; what are the minimization and mitigation options?



Lesser Prairie Chickens & Wind Resources

Oklahoma Wind Power Assessment Initiative - Neural Network Model





High Quality Habitat





Low Quality Habitat



USFWS, C. M. O'Meilia



Low Quality Habitat





No Habitat

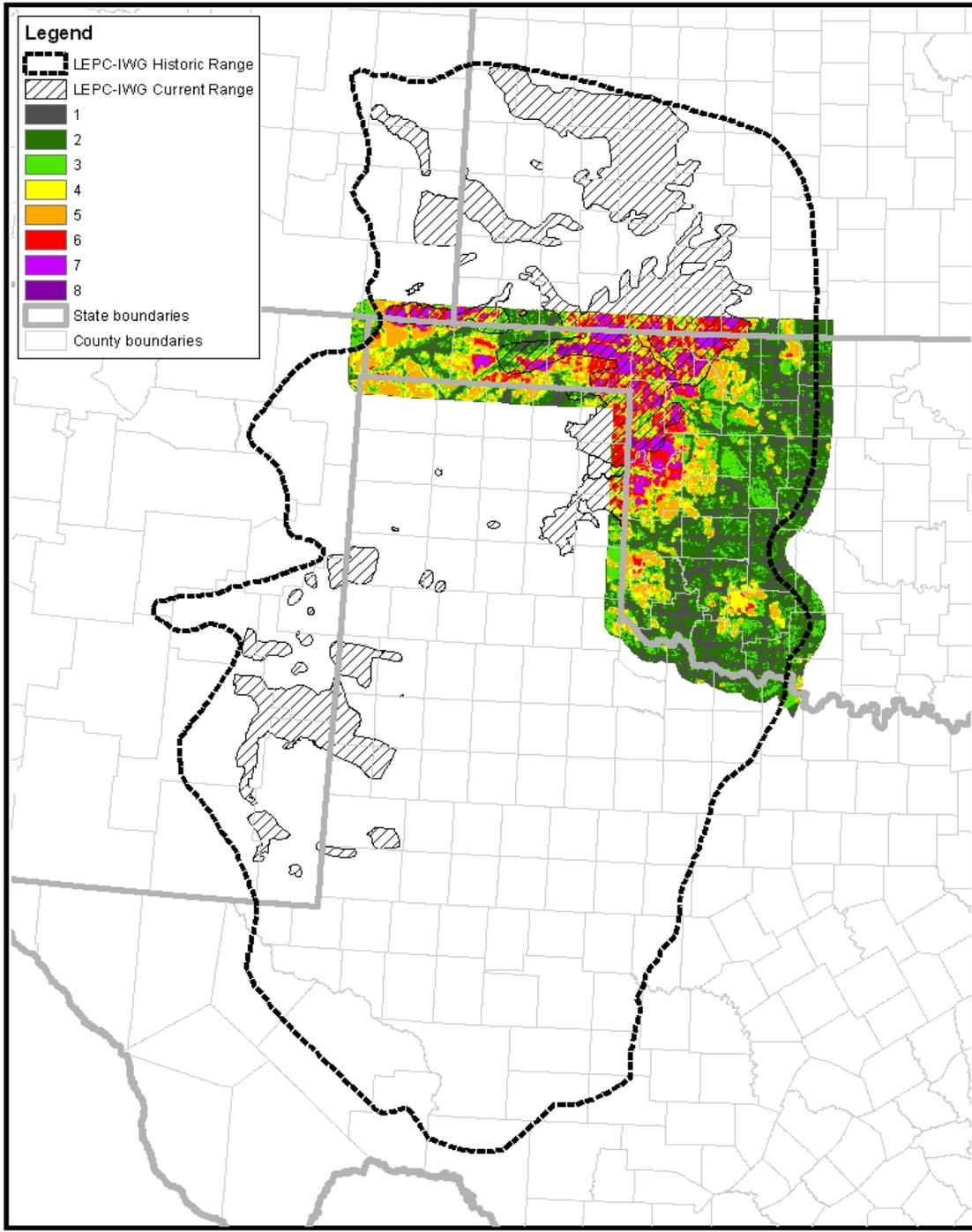


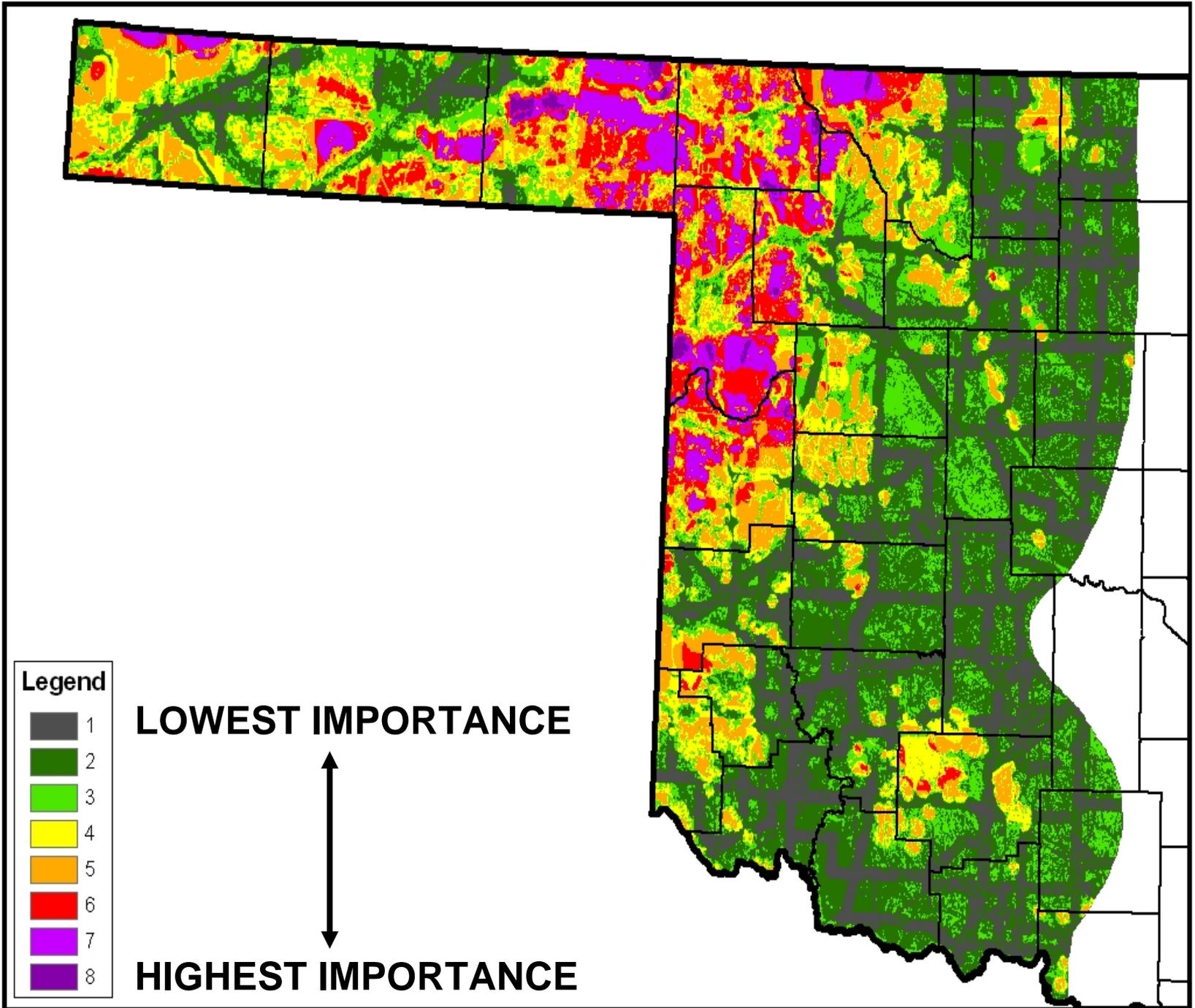


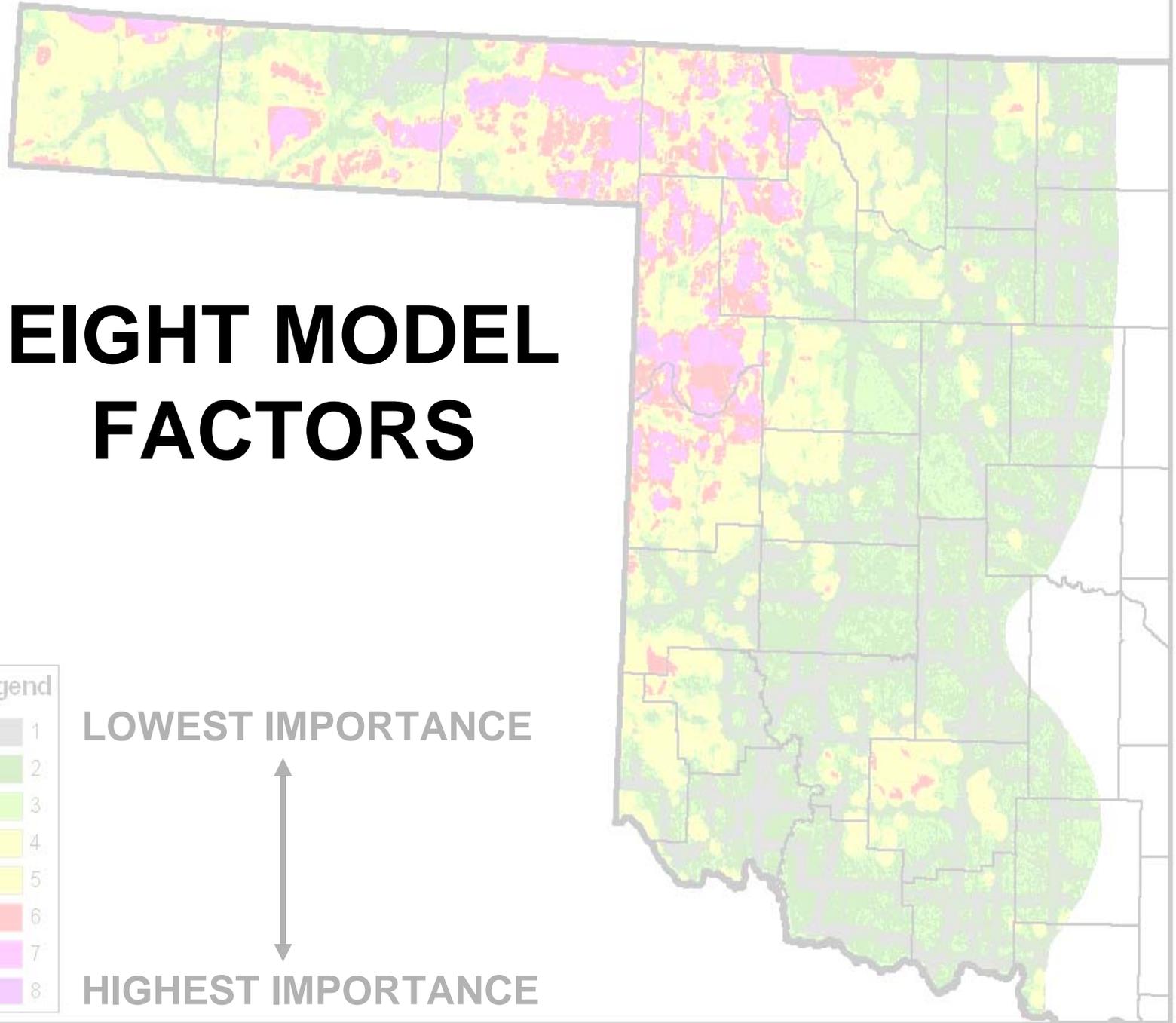
LOWEST
IMPORTANCE

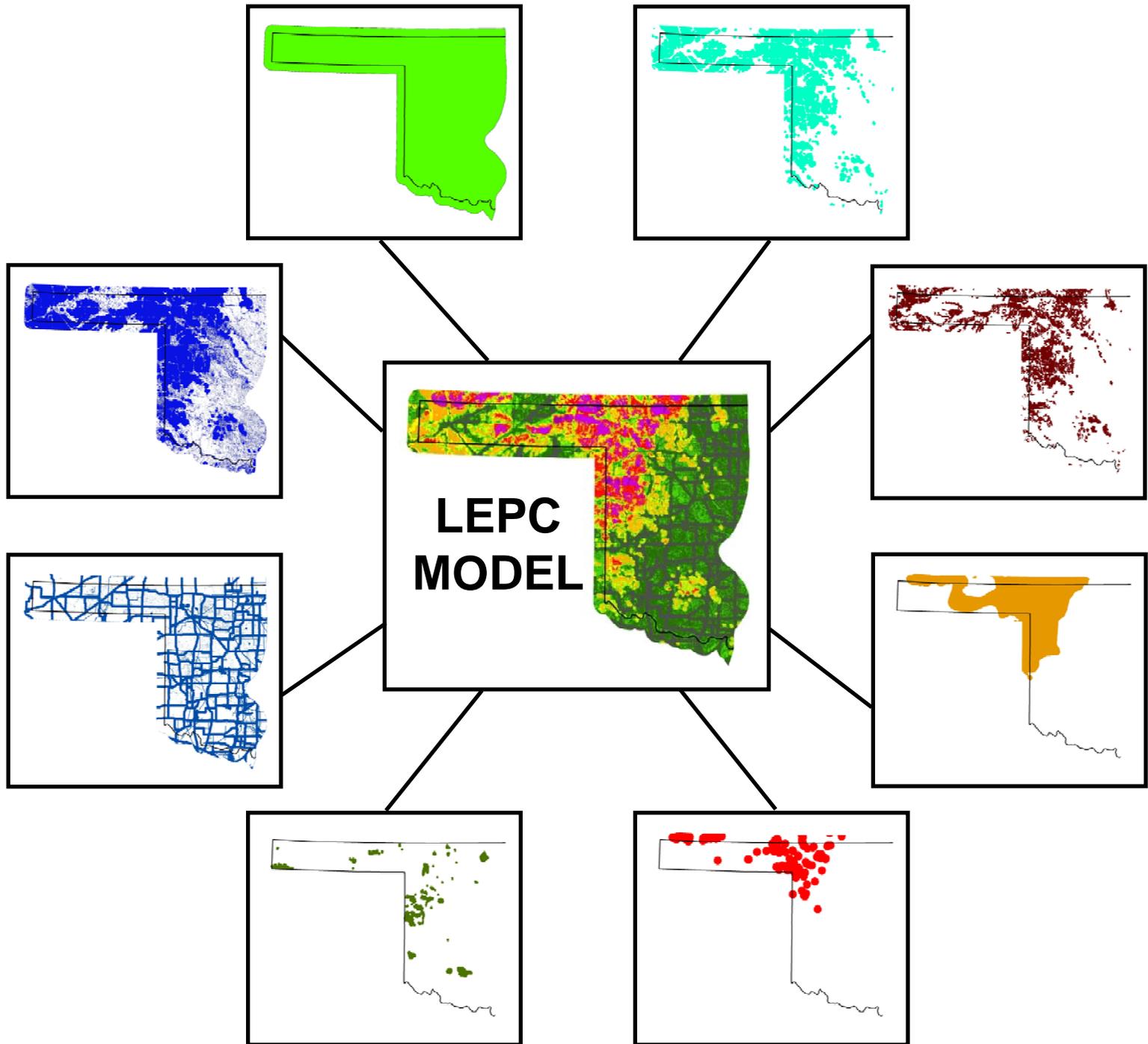
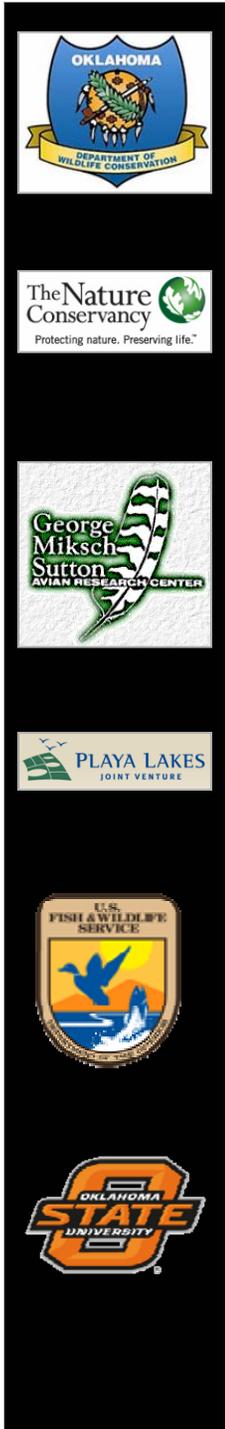


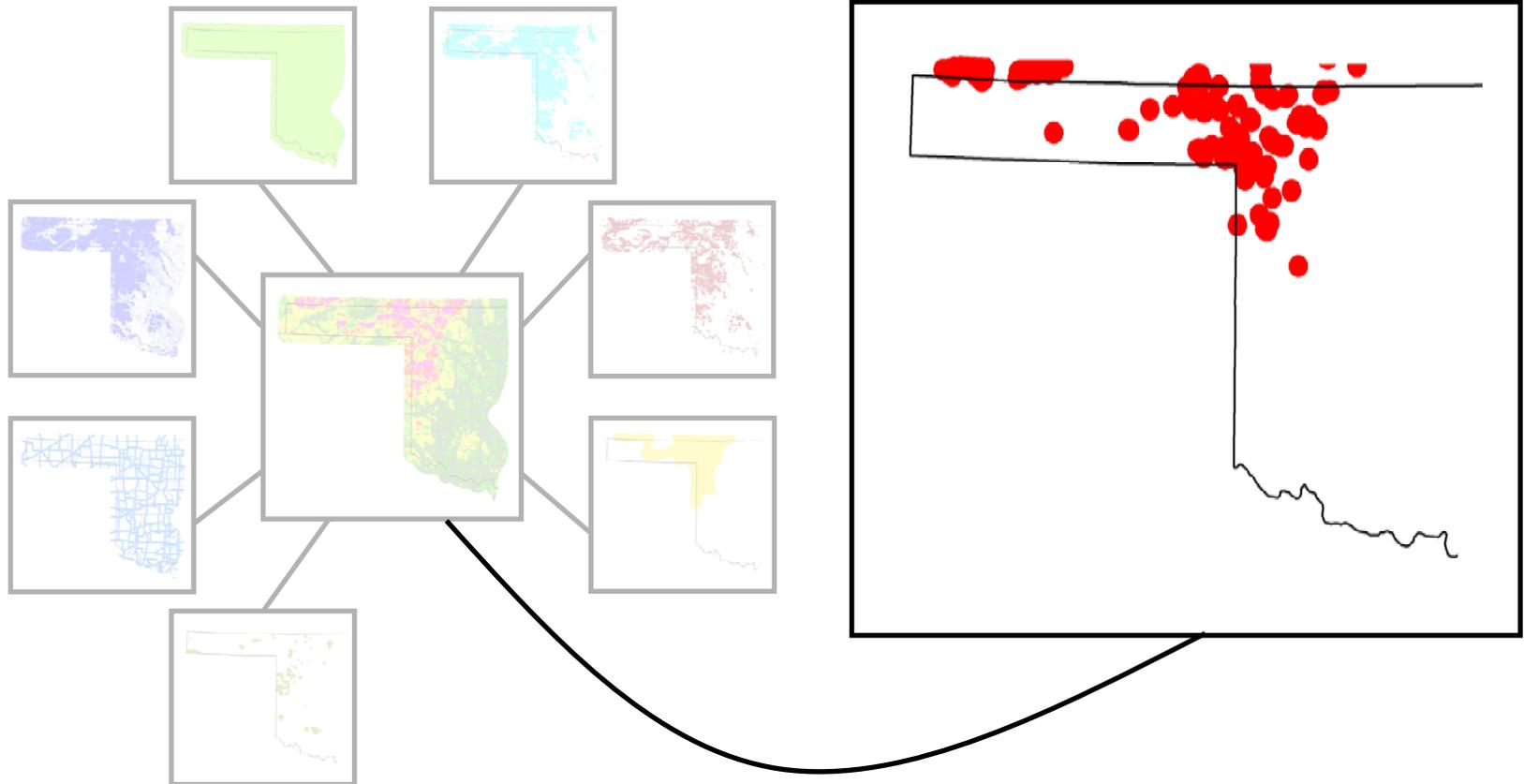
HIGHEST
IMPORTANCE



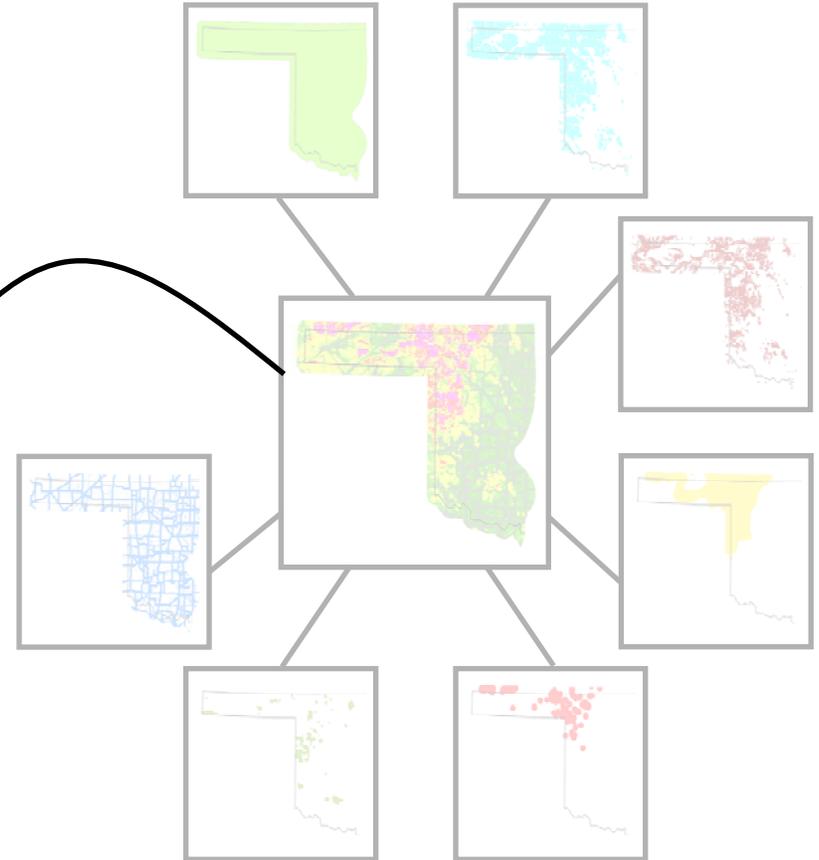
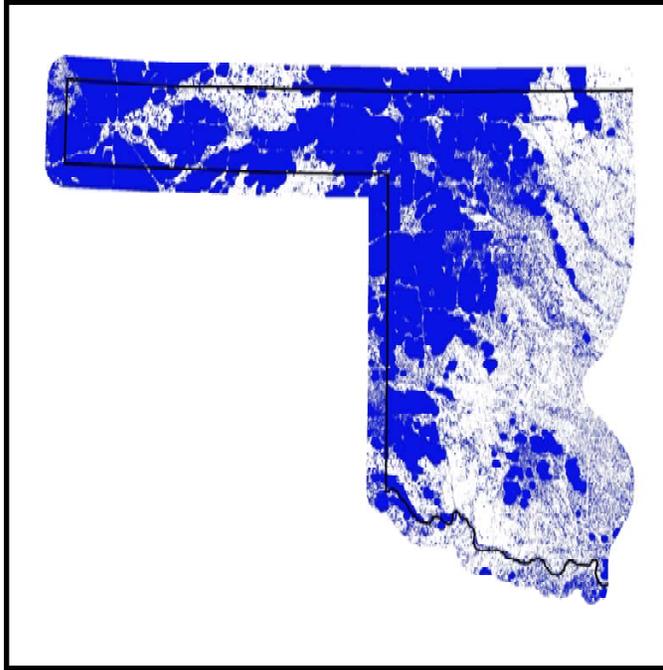








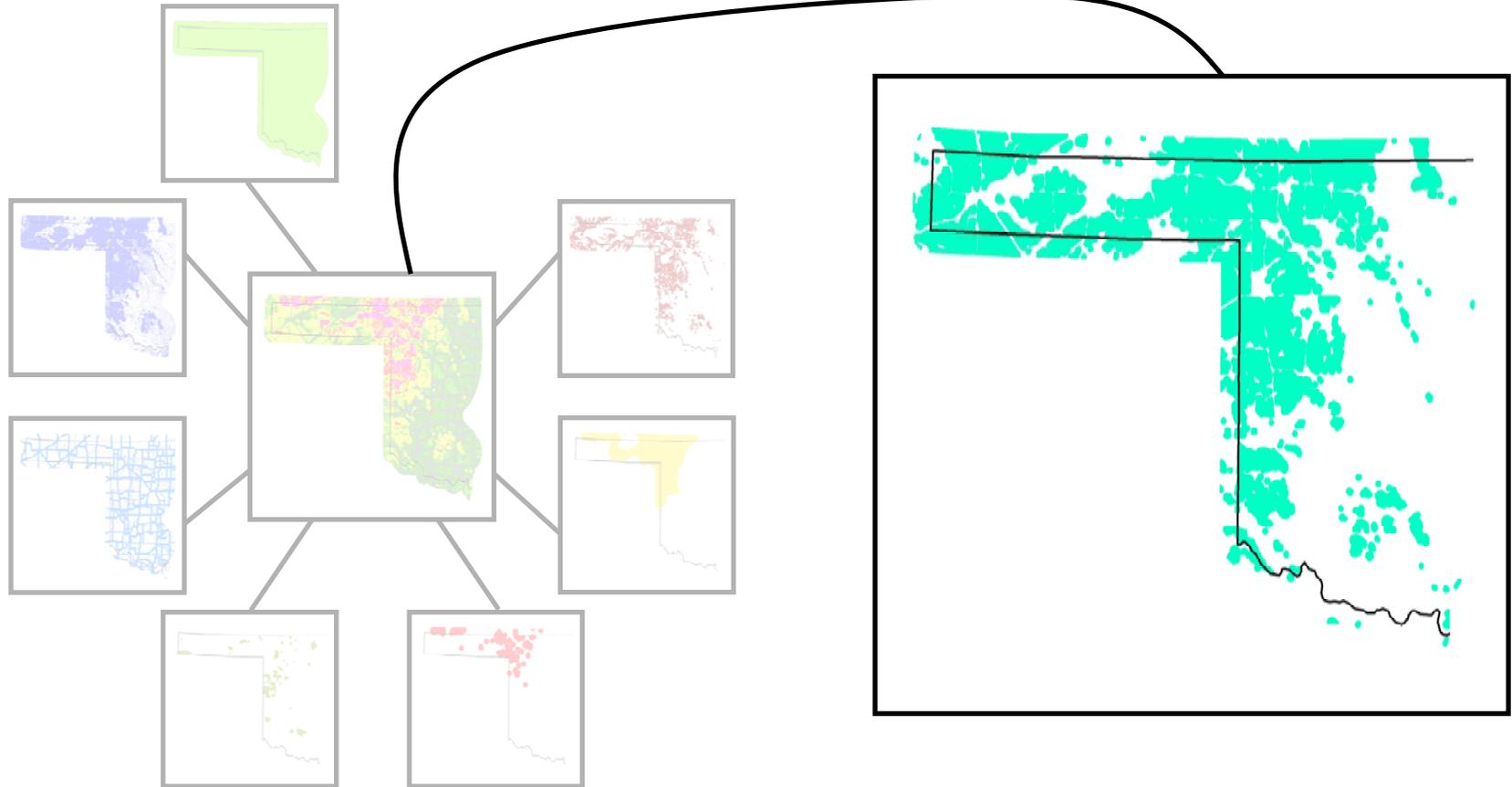
FACTOR	MODEL VALUE	DESCRIPTION	NOTES
Within 5-mile Buffer of Lek	1/0	- Area with 5-miles of lek. Buffers are based on point data of lek locations.	<ul style="list-style-type: none"> - Addresses concentrated occurrence and vital habitat. - Lek buffer size based on recommendations of the U.S. Fish and Wildlife Service regarding placement of wind turbines relative to lek locations (Manville 2004). - Lek locations provided by Oklahoma Department of Wildlife Conservation and the Sutton Avian Research Center. All leks were sited between 1996 and 1998 (ODWC).



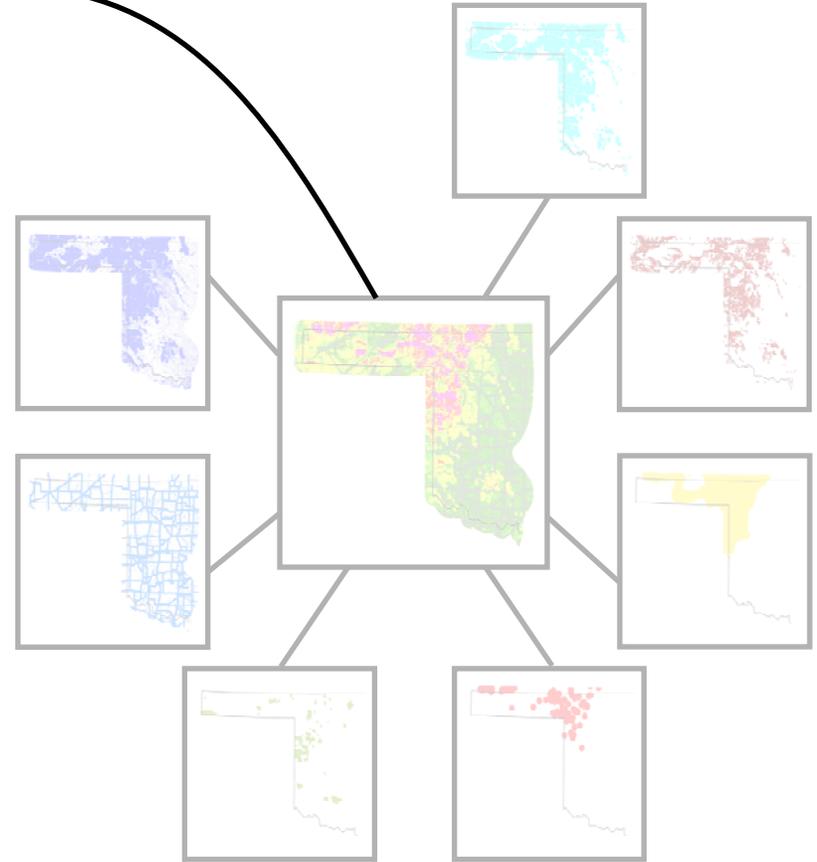
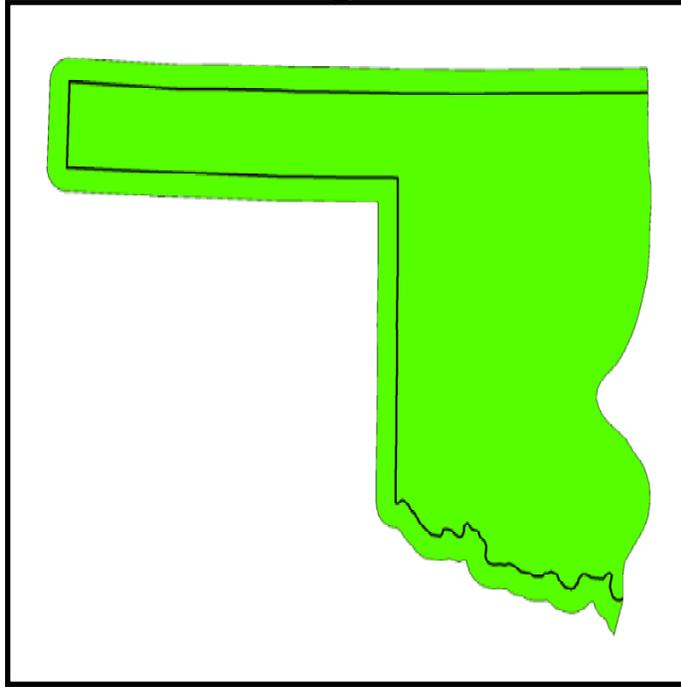
FACTOR	MODEL VALUE	DESCRIPTION	NOTES
Suitable(S)/ Potentially Suitable(PS) Habitat	1/0	- Any of the following landcover types: <ul style="list-style-type: none"> • Mixed-grass prairie (S) • Tallgrass prairie (S) • Sandhills prairie (S) • Shortgrass prairie (S) • Sandsage (S) • Shinnery (S) • Wet Meadow (S) • Eastern Red Cedar (PS) • Mesquite(PS) • Conservation Reserve Program (CRP) land planted to grass practice (PS) 	- <u>Addresses habitat types</u> - Suitable habitat classes are derived from multiple publications.



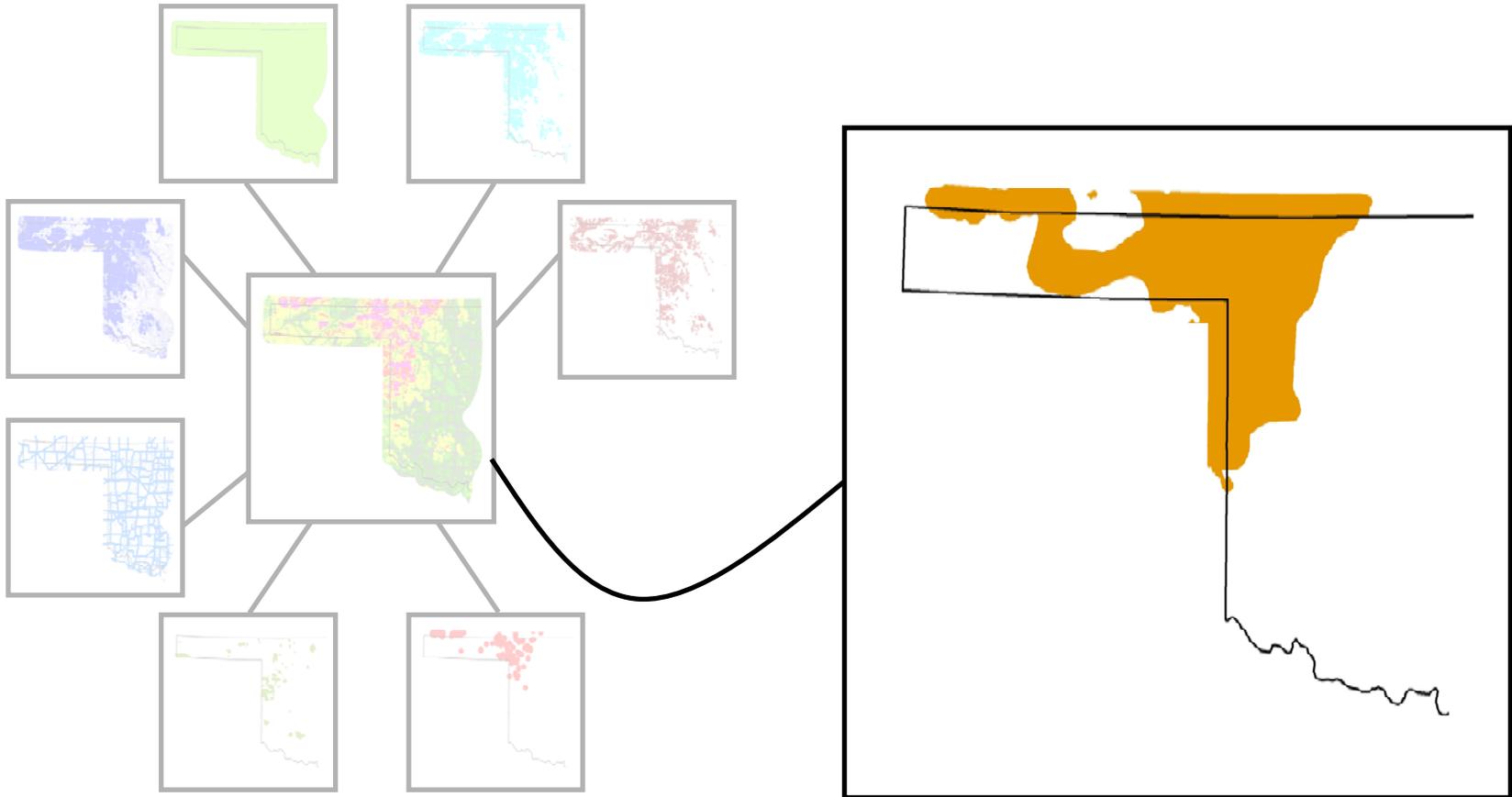
FACTOR	MODEL VALUE	DECSRIPTON	NOTES
Core Habitat Patch	1/0	- Patches of Suitable (S) or Potentially Suitable (PS) habitat that are: 1) either > 2,000ha in area or 500ha – 2,000ha in area and no more than 10km from another patch of at least 500ha (i.e., patches with high connectivity), 2) at least 1600m wide (about 1 mile), and 3) contain gaps of unsuitable habitat no wider than 450m (about 0.25 mile). Suitable and potentially suitable habitats are as listed above except CRP which is excluded because CRP is considered temporary habitat.	<ul style="list-style-type: none"> - Addresses suitable habitat patch size (fragmentation) and juxtaposition criteria. - Core Habitat always occurs within Core Buffer Habitat so it will automatically receive 1 additional point. - Core Habitat does not include patches of suitable habitat <500ha. - These thresholds are based on Hagen et al. 2004. - See attached Methods for detailed description of Core Habitat.



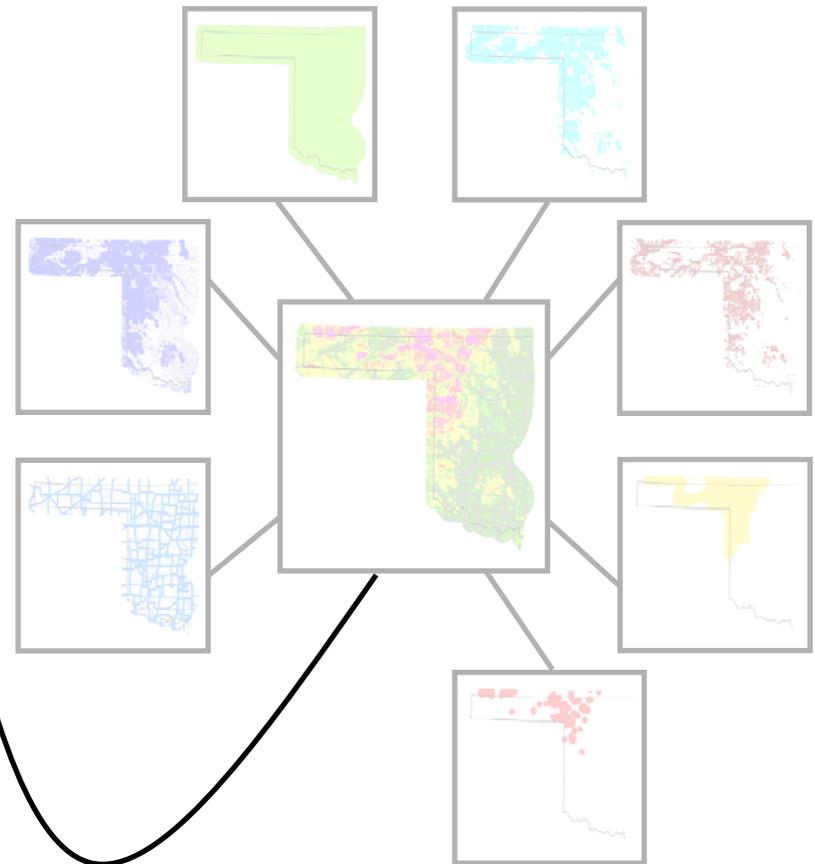
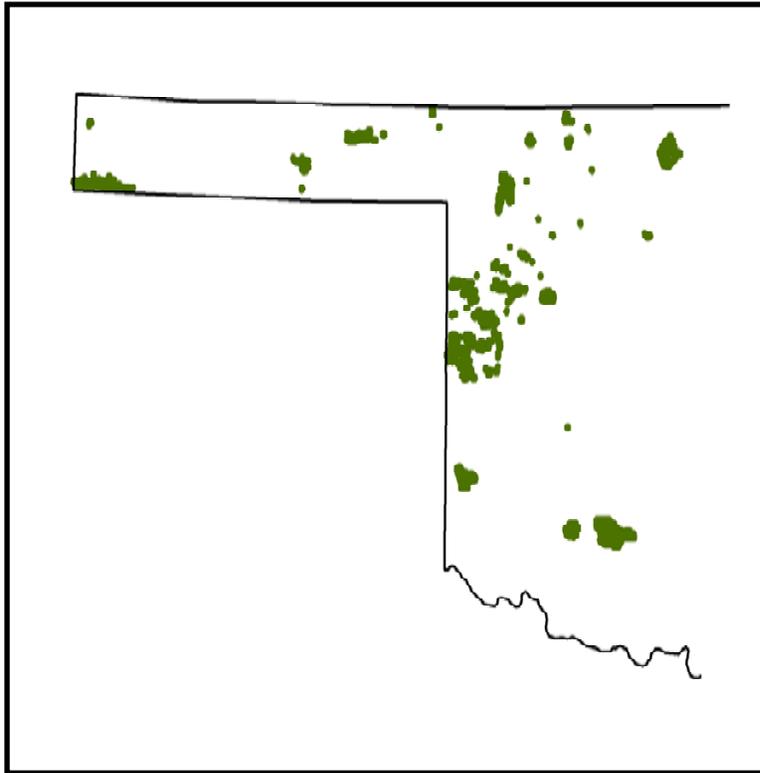
FACTOR	MODEL VALUE	DECSRIPTON	NOTES
Core Buffer Habitat	1/0	- Areas of 2,025ha in which there is at ≥ 810 ha (40%) of Suitable (S) or Potentially Suitable (PS) habitat, ≤ 810 ha of cropland (including pasture), ≤ 50 ha of woodland (upland and riparian types not including mesquite or eastern red cedar), and no urban/suburban development or major roads (e.g., state highways, interstates, freeways; secondary roads such as county roads not included). Suitable and potentially suitable habitats are as listed above	<ul style="list-style-type: none"> - Addresses landscape composition criteria. - This factor gives greater value to <i>areas</i> with appropriate landscape matrix criteria. - Core Buffer Habitat does not incorporate patch size (just composition of the area) and includes suitable and non-suitable habitat (except for major roads and developed areas). - These thresholds are based on <i>The LEPC Conservation Initiative (2008)</i> and the LEPC Interstate Working Group (LPCIWG) recommendations. - See attached Methods for detailed description of Core Buffer Habitat.



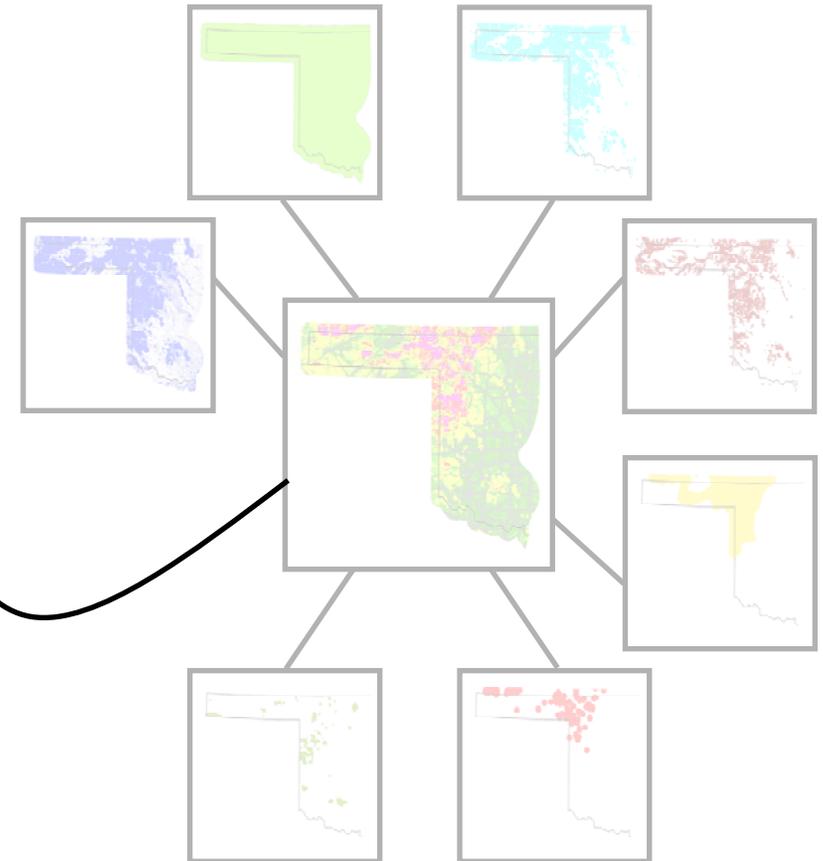
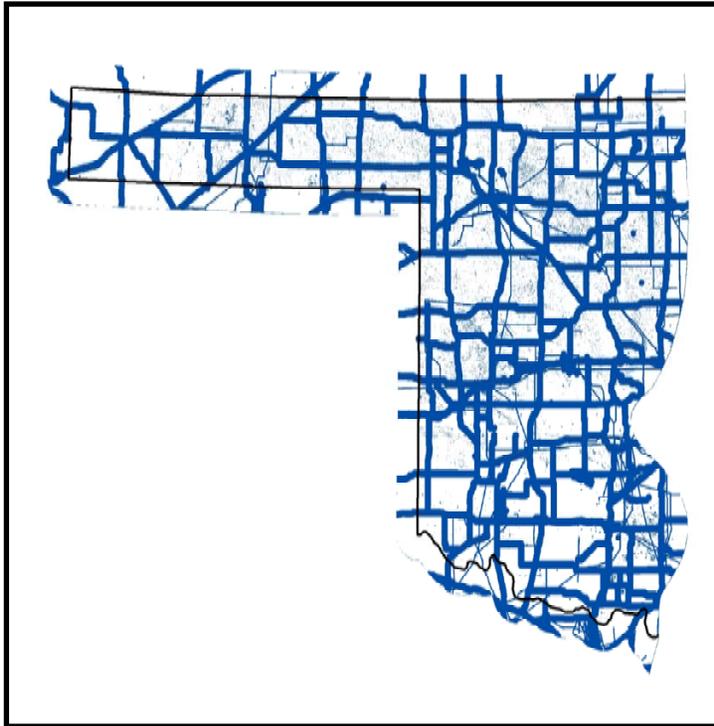
FACTOR	MODEL VALUE	DECSRIPTON	NOTES
Within Historic Range	1/0	- Historic range boundary for LEPC.	<ul style="list-style-type: none"> - Addresses geographic area for expansion. - This factor gives greater value to any habitat type within the historic range. - Range boundary developed by the LPCIWG and extended further into Colorado per requests of the Colorado Division of Wildlife (to better encompass historic range).



FACTOR	MODEL VALUE	DECSRIPTON	NOTES
Within Current Range	1/0	- Current range boundary encompasses known lek locations in addition to some individual bird sightings.	<ul style="list-style-type: none"> - <u>Addresses geographic area of occurrence.</u> - This factor gives greater value to any habitat type within the current range. The purpose is that development/disturbance anywhere in this range, regardless of habitat suitability, has greater potential to affect LEPC than areas outside the range. - Range boundary was derived from the boundary developed by the LPCTWG and edited (extended) to incorporate recently identified areas of occurrence (individuals and leks) and corridors connecting those areas.



FACTOR	MODEL VALUE	DECSRIPTON	NOTES
Within 2-km buffer of Land Managed for LEPC habitat	1/0	- 2-km buffer of polygon boundaries of lands currently managed for LEPC-suitable habitat conditions. These lands occur within and outside the current range boundary.	- Buffer size based on published 2-km effect radius of wind turbines on LEPC (Hagen et al. 2004; same buffer size used for wind turbine avoidance buffer, below). - Includes lands that are managed by both government agencies and private non-for-profit conservation groups (e.g., The Nature Conservancy).



FACTOR	MODEL VALUE	DESCRIPTION	NOTES
Outside Avoided Structure Buffer	1/0	<p>- Area outside any combination of the following buffered areas of avoided structures:</p> <ul style="list-style-type: none"> • <u>Oil/gas well head</u> - area within a 0.18km buffer applied to point location data for oil and gas wells. • <u>Electric transmission lines</u> - area within a 0.50 km buffer applied to line location data. • <u>Wind turbine</u> - area within a 2km buffer applied to point location data. • <u>Other vertical structures</u> - area within 0.50km buffer or point location data. • <u>Roads</u> - area within a 0.79km buffer of major roads (e.g., highways, interstates). Applied to line location data for roads. 	<p>- <u>Addresses avoidance caused by oil and gas, vertical structures, and roads.</u></p> <p>- This factor detracts value from any habitat within the buffered area.</p> <p>- Oil/gas buffer size based on Pitman et al. 2005.</p> <p>- Electric transmission line buffer size based on Pruett et al. in press. (Pitman et al. 2005 states 0.37km).</p> <p>- Wind turbine buffer size based on suggestion of Hagen et al. 2004 (Robel et al. 2004 suggests 1.6km).</p> <p>- Verticals structure buffer size assumed to be same as transmission line.</p> <p>- Road buffer sizes based on Pitman 2005.</p>



Best Information Available to the Modeling Group

The model does not replace the need for:

- Site specific evaluation / studies
- Technical assistance / review from biologists

**LEPC Model is a value-added
process and product to the
Wind Turbine Guidelines Advisory Committee
recommendations and final product(s)**

Assumptions and Limitations

- Relative valuation of the landscape for LEPC
 - No biological threshold (Need PVA)



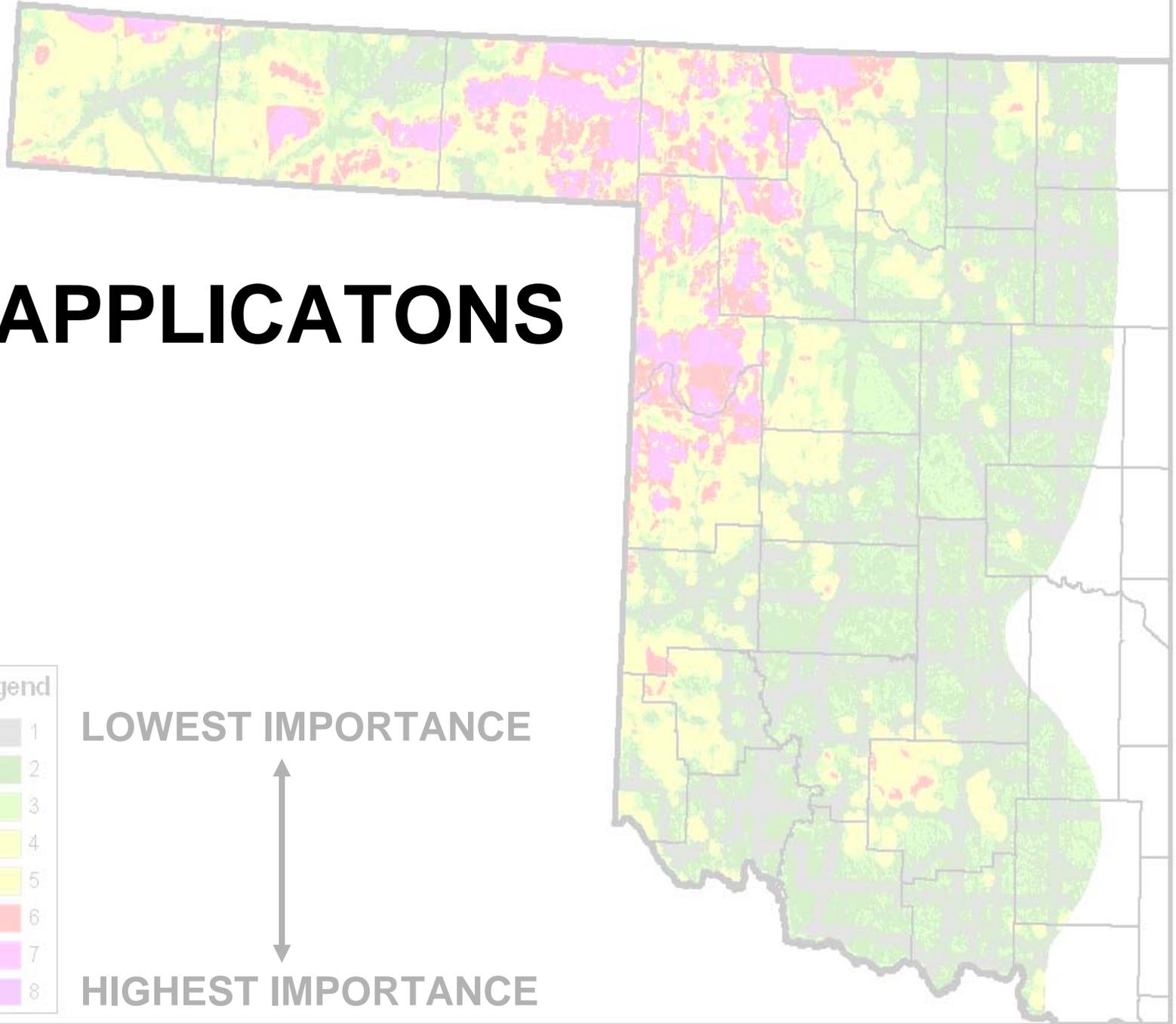
APPLICATIONS



LOWEST IMPORTANCE



HIGHEST IMPORTANCE

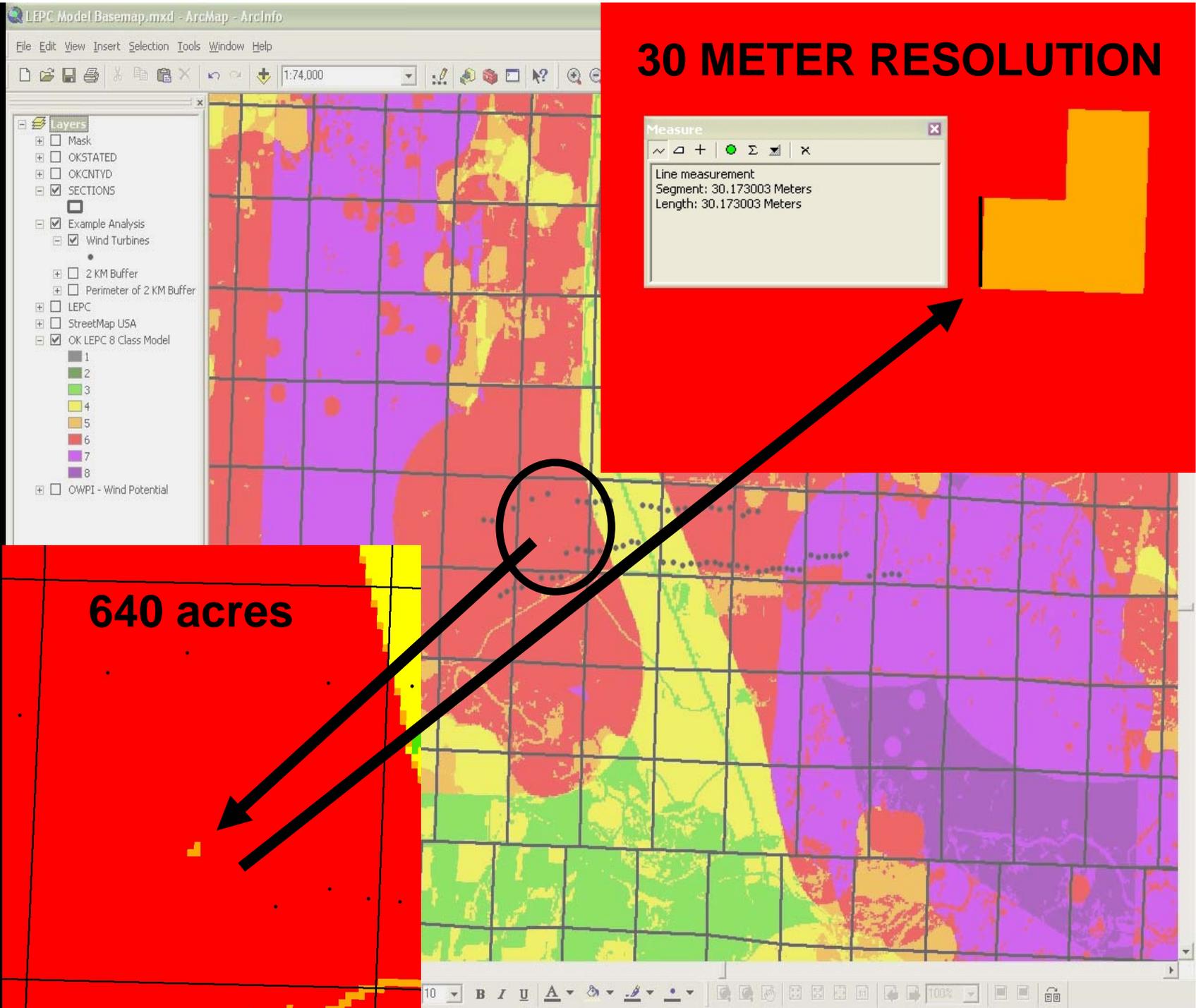


30 METER RESOLUTION

Measure

Line measurement
Segment: 30.173003 Meters
Length: 30.173003 Meters

640 acres





LEPC Model Basemap.mxd - ArcMap - ArcInfo

File Edit View Insert Selection Tools Window Help

1:74,000

80, 1.5 MW Turbines = 120 MW

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

Display Source Selection Catalog

Drawing Arial 10 B I U A 100%



LEPC Model Basemap.mxd - ArcMap - ArcInfo

File Edit View Insert Selection Tools Window Help

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Layers

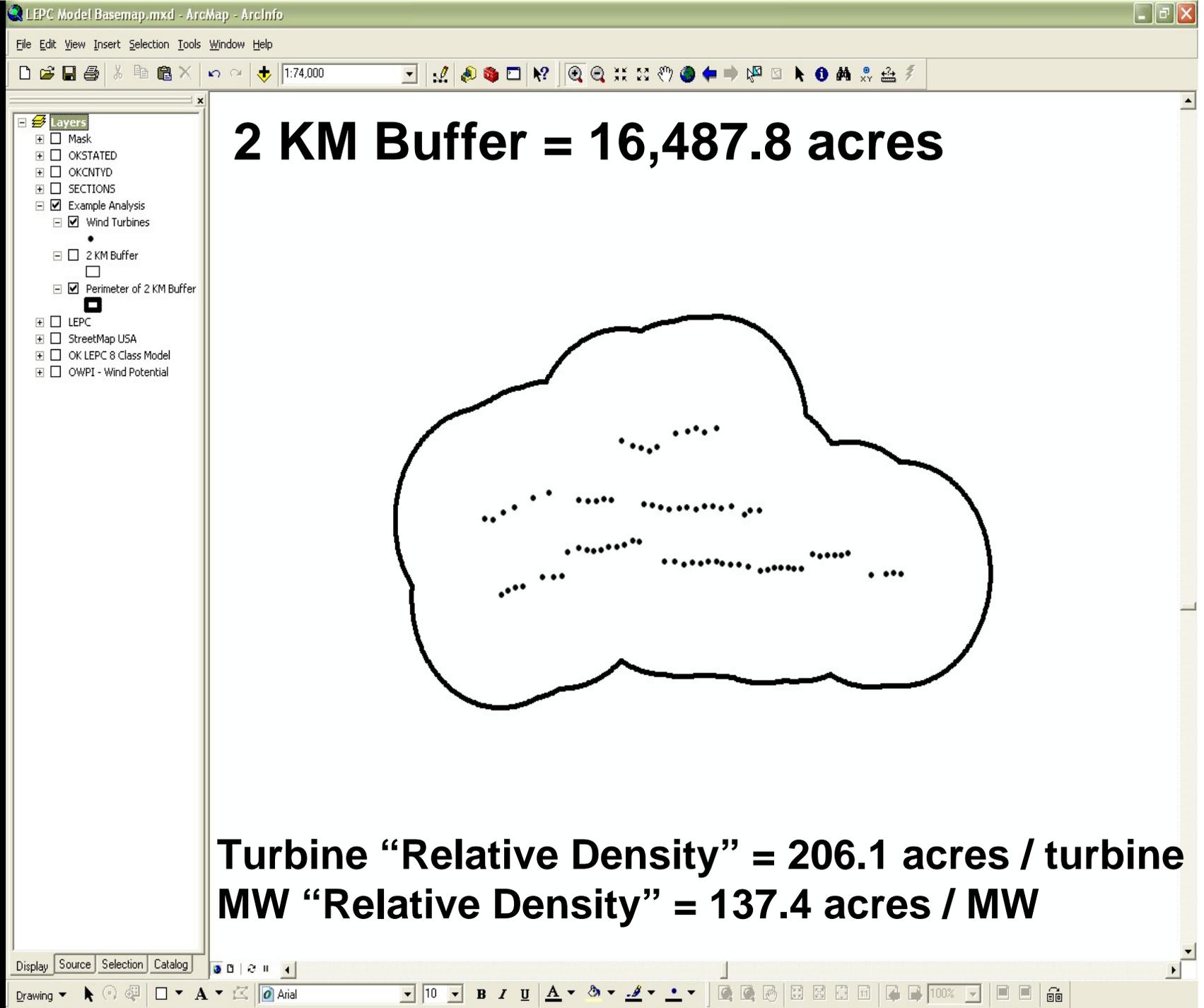
- Mask
- OKSTATED
- OKCNTYD
- SECTIONS
- Example Analysis
 - Wind Turbines
 - 2 KM Buffer
 - Perimeter of 2 KM Buffer
- LEPC
- StreetMap USA
- OK LEPC 8 Class Model
- OWPI - Wind Potential

2 KM Buffer (Hagen et al., 2004)

Hagen, C. A., B. E. Jamison, K. M. Giesen, and T. Z. Riley. 2004. Guidelines for managing Lesser Prairie-Chicken populations and their habitats. *Wildlife Society Bulletin* 32 (1):69-82.

Display Source Selection Catalog

Drawing Arial 10 B I U A 100%





LEPC Model Basemap.mxd - ArcMap - ArcInfo

File Edit View Insert Selection Tools Window Help

Spatial Analyst Layer: OK LEPC 8 Class Model

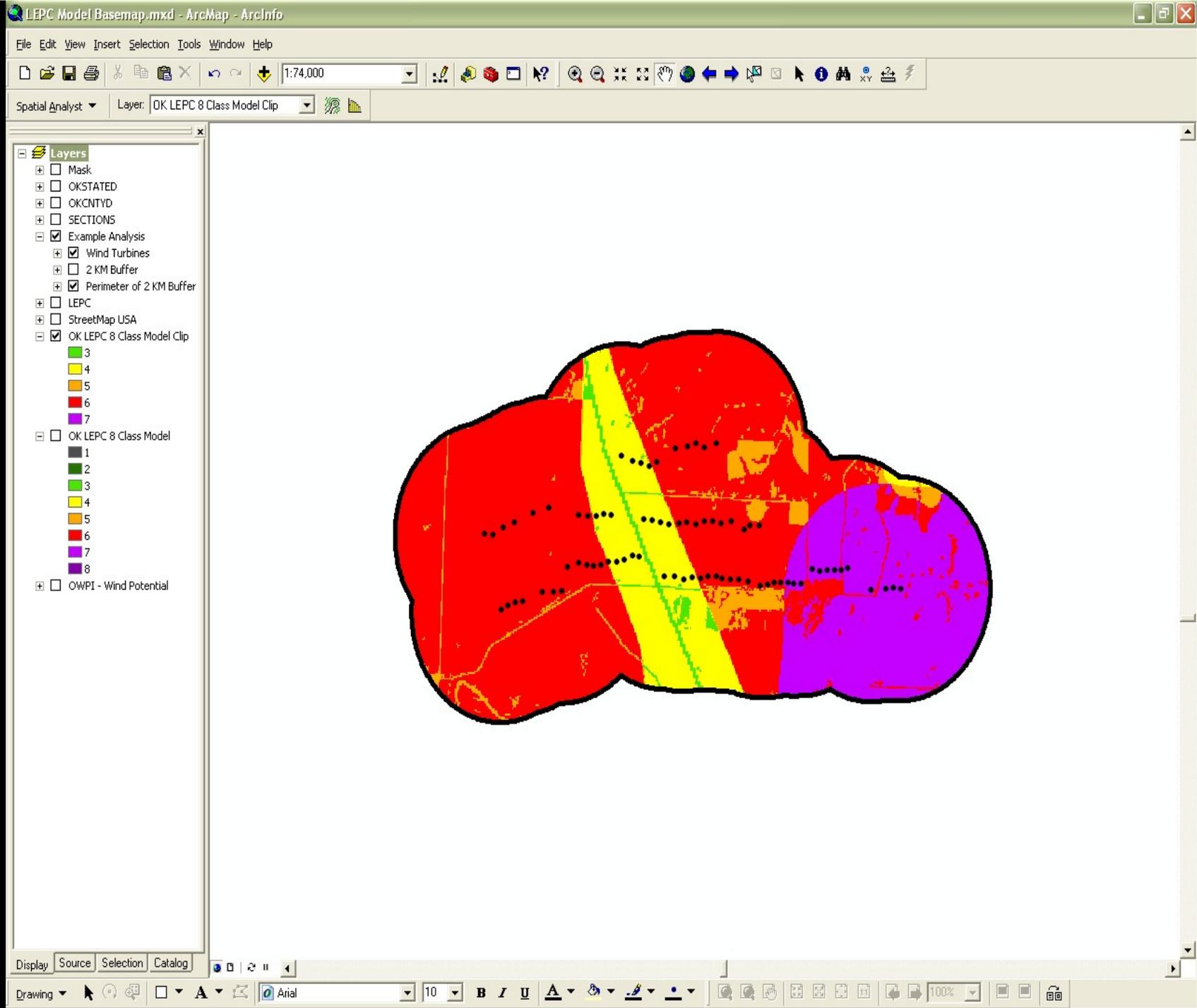
Scale: 1:74,000

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
 - 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
- OWPI - Wind Potential

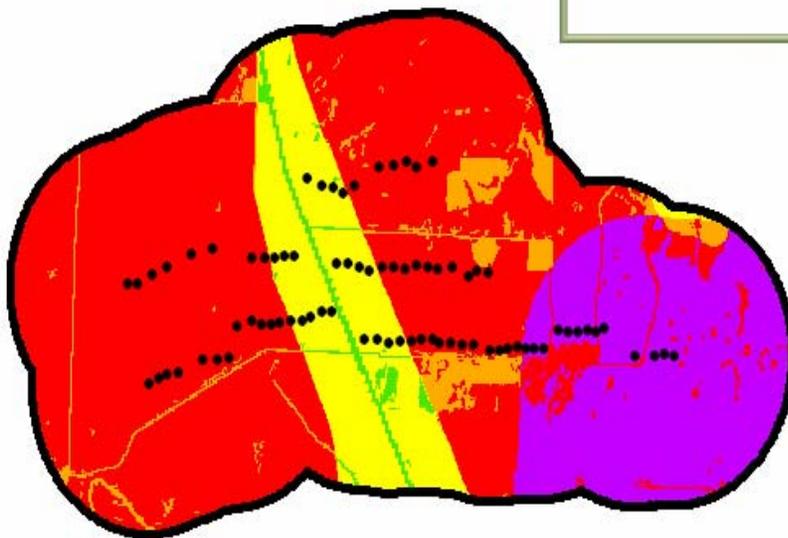
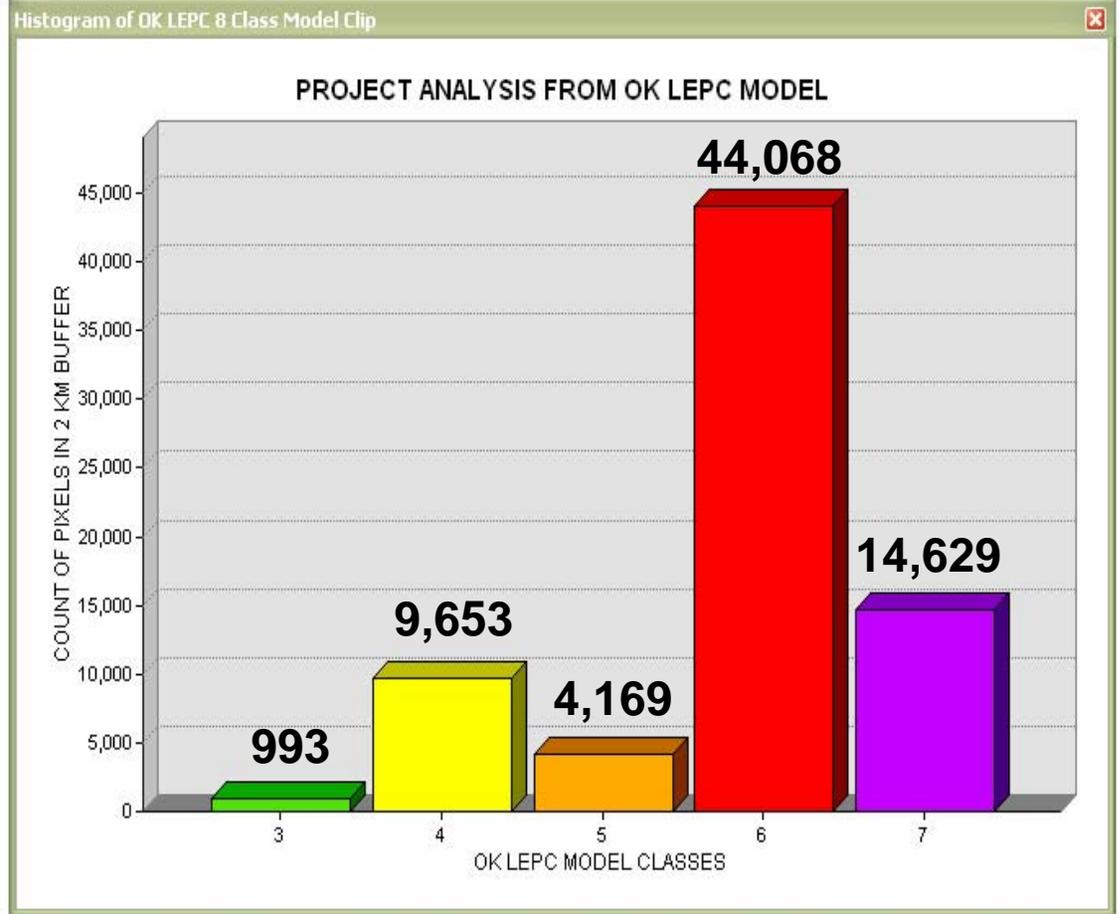
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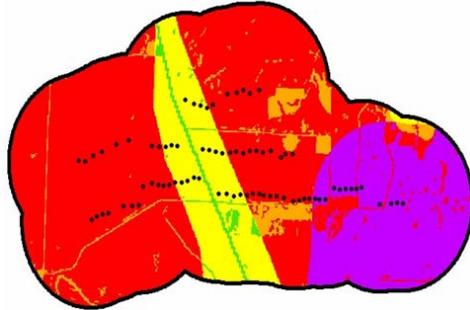


COUNT OF PIXELS BY CLASS WITHIN THE 2 KM BUFFER





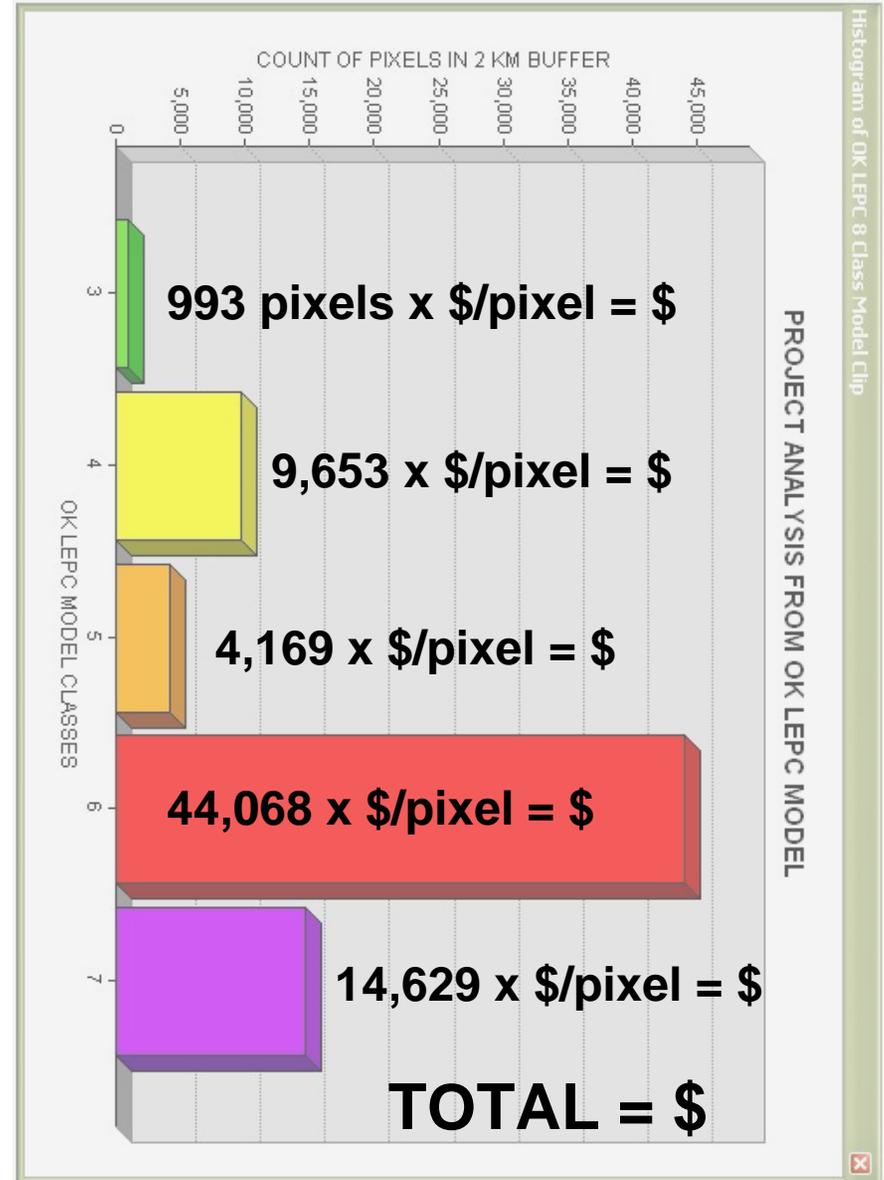
Voluntary Mitigation Fund



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

All mitigation work will be used under one or all of 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

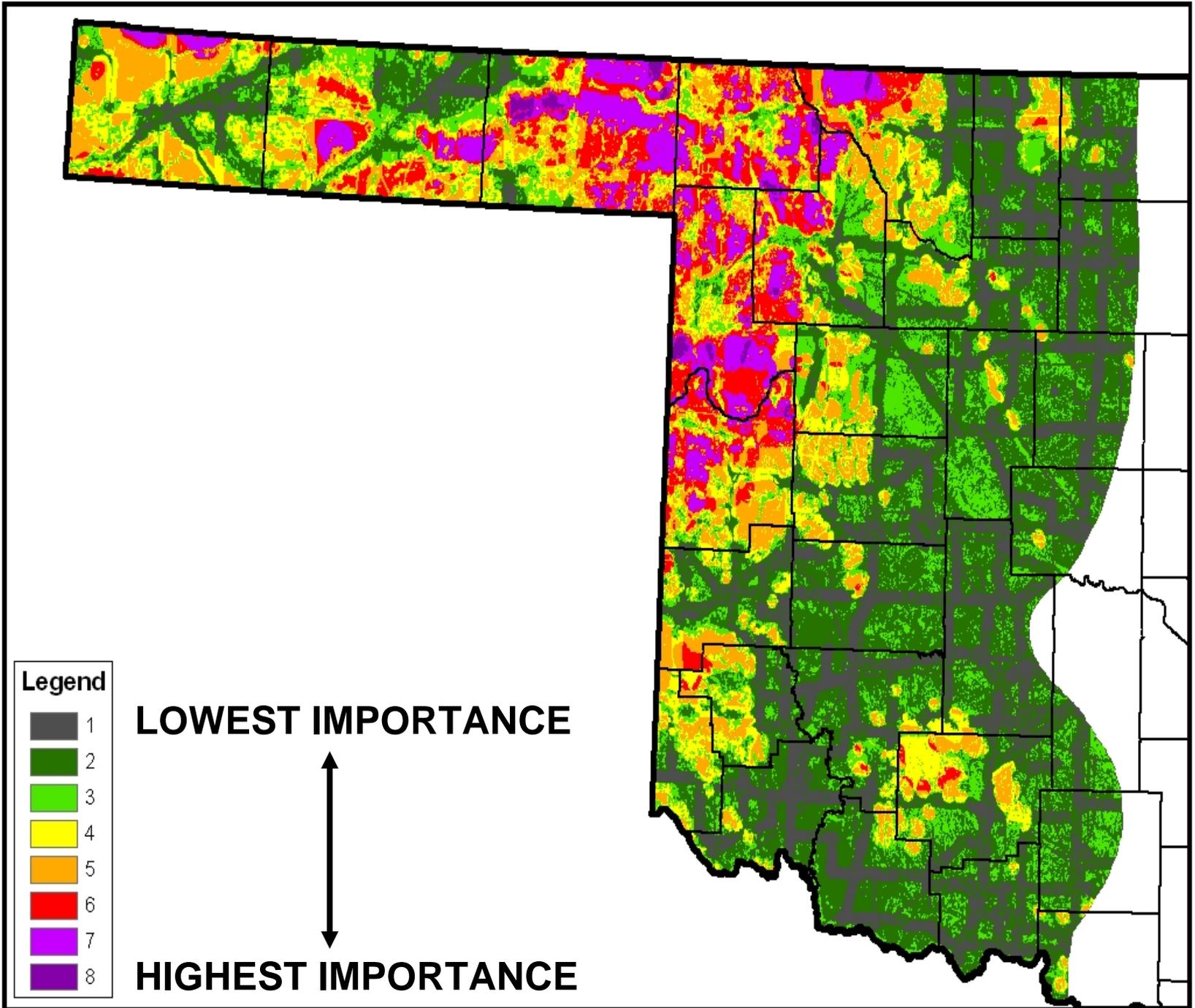
WIND MODELS:

AWS Truewind

USDOE, National Renewable Energy Labs

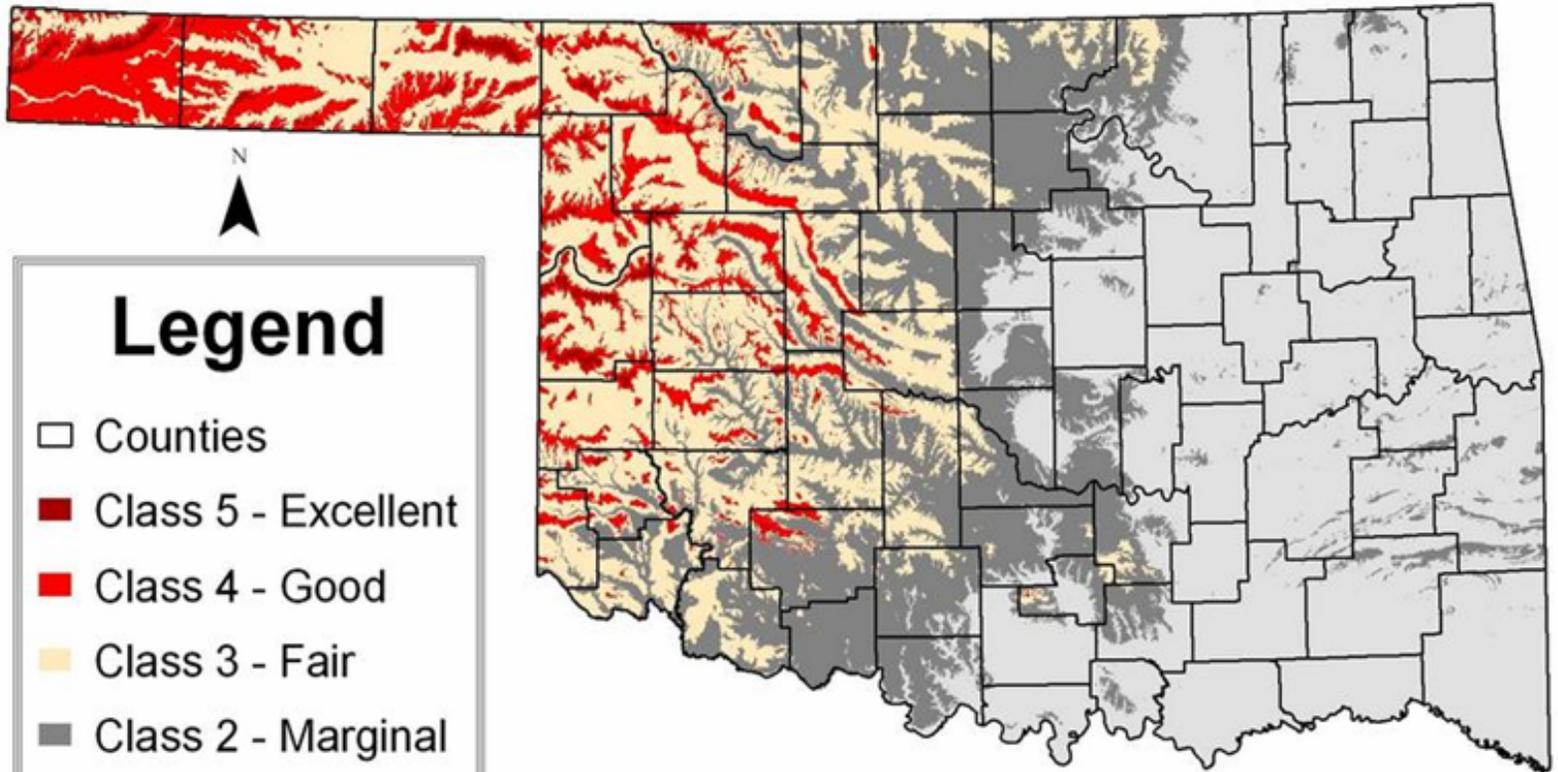
Oklahoma Wind Power Initiative

Others?



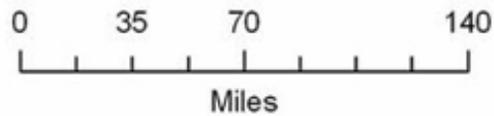


Wind Power Development Potential Neural Network

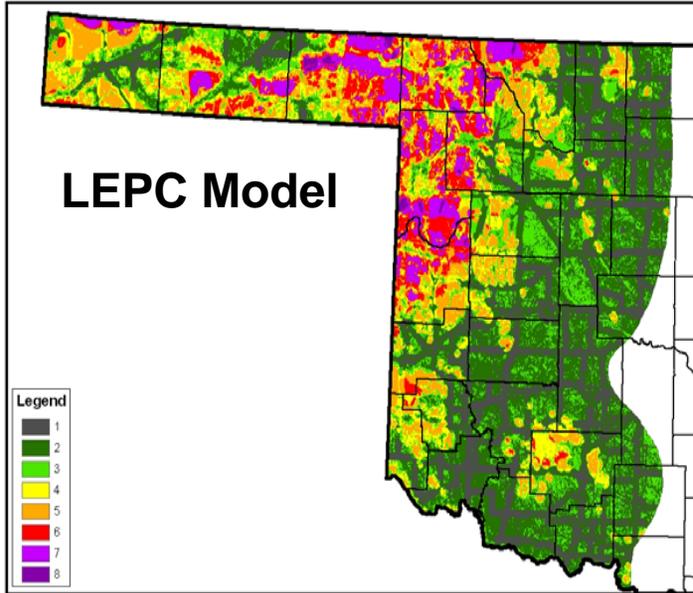


Legend

- Counties
- Class 5 - Excellent
- Class 4 - Good
- Class 3 - Fair
- Class 2 - Marginal
- Class 1 - Poor

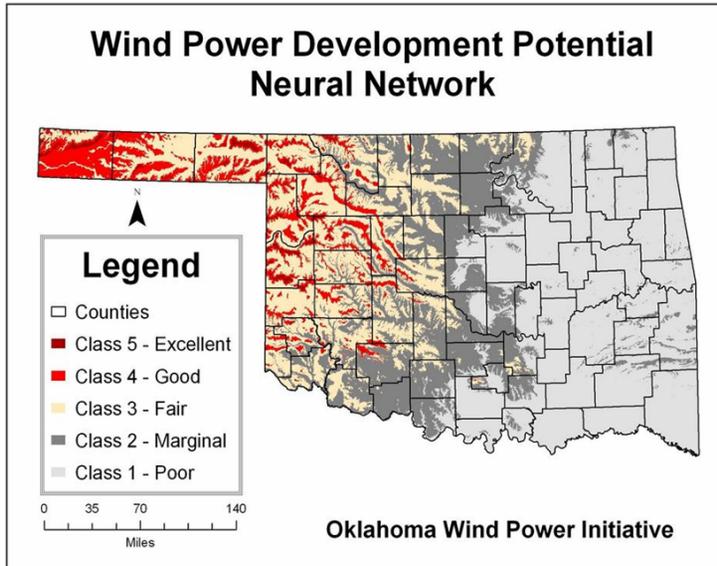


Oklahoma Wind Power Initiative

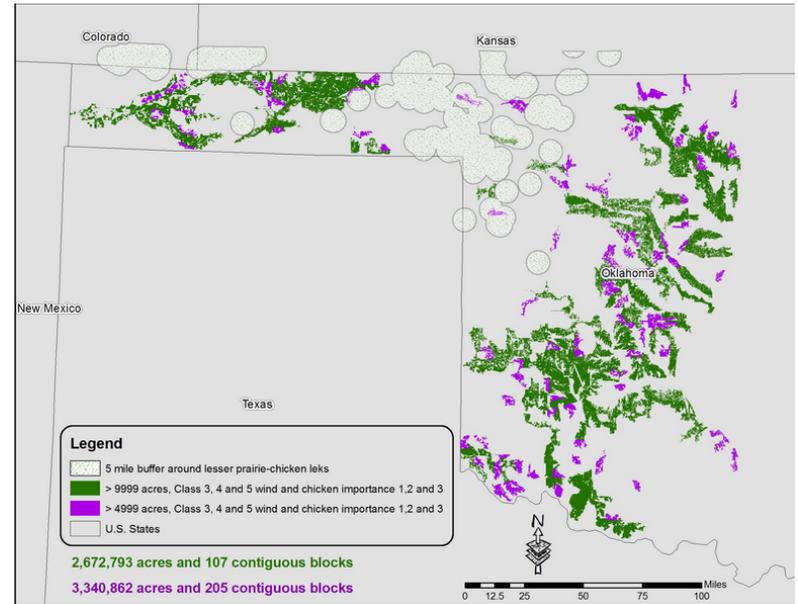


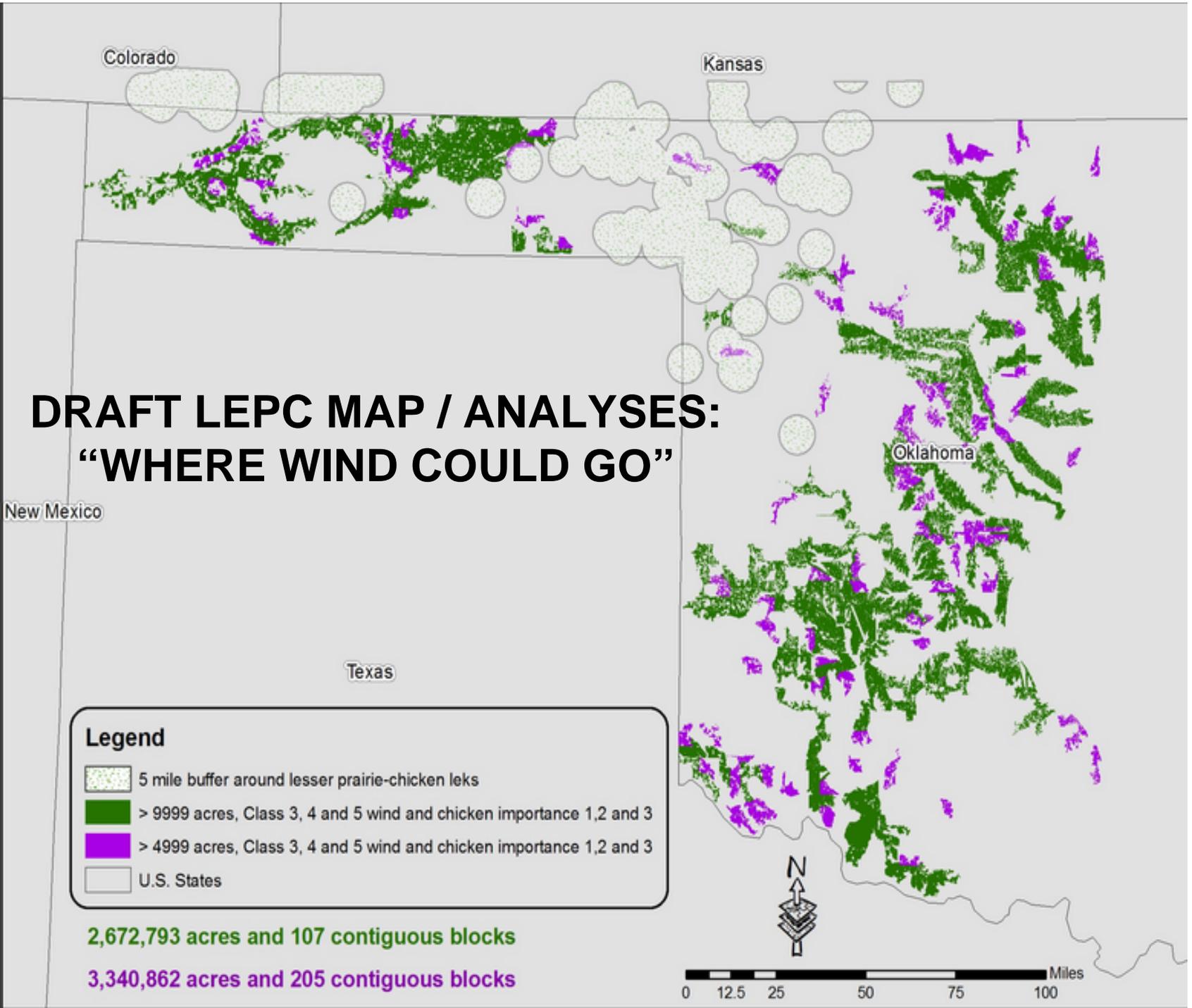
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“Where wind could go” and have little or no effect on LEPC conservation







QUESTIONS ?

Lesser Prairie-Chicken Model
Wind Turbine Guideline Advisory Committee
Washington, D.C. , January 27, 2009

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Placeholder for PowerPoint Presentation

Bonnie Ram, Energetics, Inc

White Paper Outline

Integrated Risk Analysis Framework for Gigawatt-Scale
Wind Energy Deployments

January 2009

Presented by Bonnie Ram, Energetics, Inc.

White Paper Outline¹
Integrated Risk Analysis Framework for Gigawatt-Scale
Wind Energy Deployments
January 2009

What is the paper about?

This paper proposes an integrated risk framework for evaluating a broad spectrum of environmental and human risks associated with wind energy deployments in the US. A risk framework is needed to underpin public policy and effective siting decisions. There is recognition that every site has a unique set of potential risks; where bats may be a problem at one site, community concerns and landscape impacts are more important somewhere else. Thus information is needed across risks and sites in order to discover where the problem areas or the benefits may be. This paper shows that focusing on one potential impact or “subsystem dominance” --making one subsystem the whole system -- typically leads to inaccurate findings and poor decisions. For example, sound judgments cannot be made on site suitability based on wildlife impacts alone, only on whether the site is “suitable” in regard to wildlife risks. An integrated framework also makes transparent what the potential “tradeoffs” may be in deciding whether to site wind or some other energy supply option. A risk perspective is a major asset for the wind community as it will not only address important aspects of the broader energy portfolio debate but also show that wind, as compared with other energy options, is a relatively benign energy source in terms of its health and environmental risks.

What is the paper not about?

It is not a policy framework or analysis of national guidelines needed to support gigawatt-scale wind energy deployments. It is also not a legal or regulatory analysis of how to assess risks within mandatory frameworks that exist within the state and federal agencies. It does not focus on who is doing what, but how it is being done and where we must go to deploy gigawatt-scale renewable energy. It does not address the risks for technology R&D decisionmaking or the specific sectoral risks to wildlife and their habitats.

Preliminary References

- National Research Council (NRC) 2005. *Decision Making for the Environment: Social and Behavioral Science Research Priorities*. Washington: National Academies Press.
- NRC. 1996. Stern, Paul and Harvey V. Fineberg, eds. *Understanding Risk: Informing Decisions in a Democratic Society*. Washington, DC: National Academies Press (orange book).
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- Gregory, Robin. 2003. Incorporating Value Tradeoffs into Community-Based Environmental Risk Decisions. *Environmental Values* 11: 461-488.
- Morgan, M.G. and Max Henrion. 1990. *Uncertainty: A Guide to Dealing with Uncertainty in Quantitative Risk and Policy Analysis*. Cambridge: Cambridge University Press.

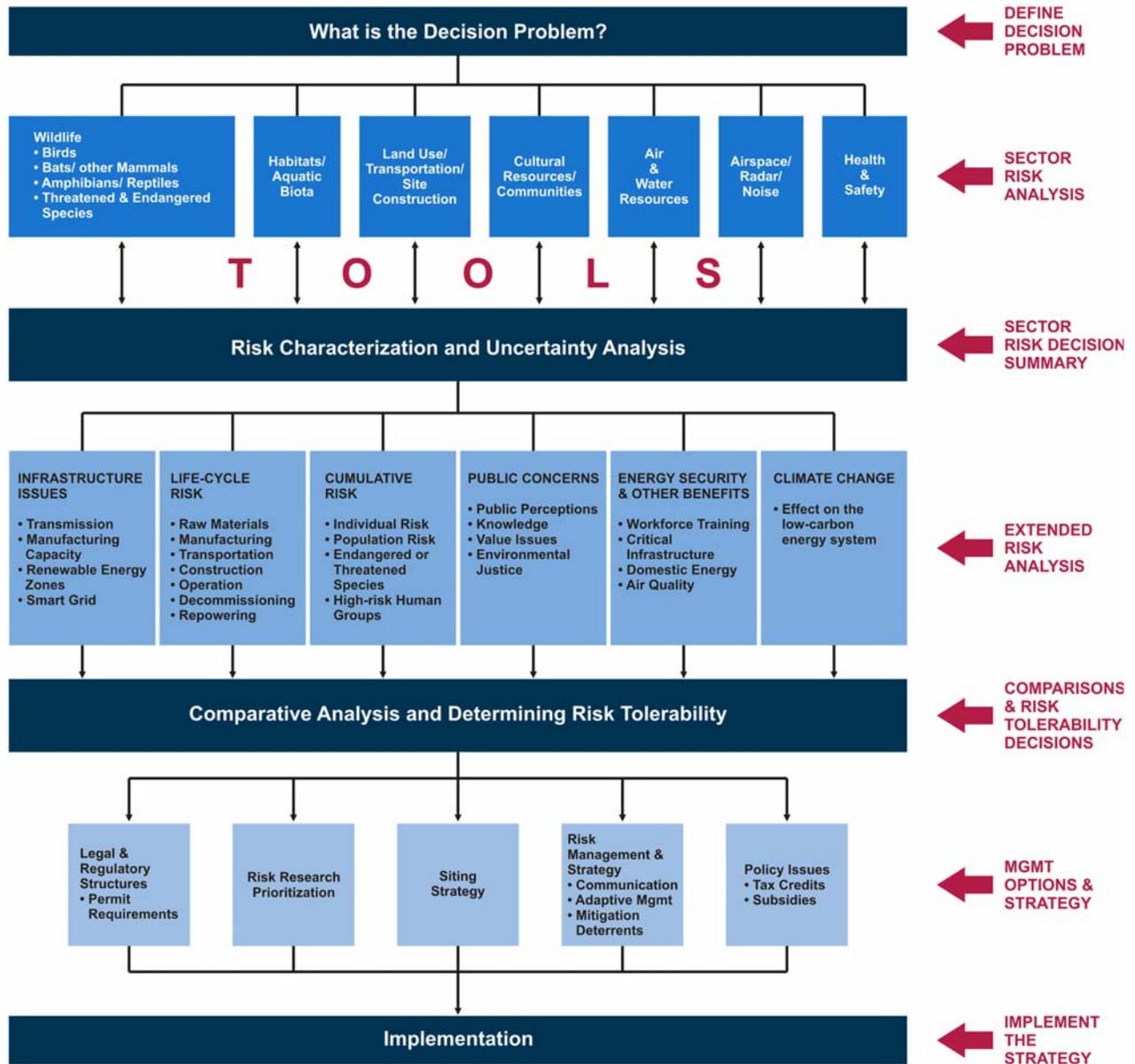
¹ The author would like to acknowledge the technical and financial support of this work from the National Renewable Energy Laboratory’s, National Wind Technology Center and the Office of Wind and Hydropower Technologies of the U.S. Department of Energy. This concept paper is under review. The views and content do not necessarily reflect the viewpoints of the federal agency or the national laboratory. Please submit comments to: Bonnie Ram bram@energetics.com

- U.S. EPA. Guidelines for Ecological Risk Assessment. U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, DC, EPA/630/R095/002F, 1998.

DRAFT OUTLINE

- I. Introduction**
- II. An Overview of an Integrated Risk Framework**
- III. The Decision Problem**
- IV. Sectoral Risk Analyses**
 - a. Wildlife
 - b. Habitat
 - i. Ecological Risk Assessment
 - c. Visual Resources
 - d. Airspace/Radar/Noise
 - e. Etc.....[see graphic]
- V. Risk Characterization and Uncertainty Analysis**
- VI. Extended Risk Analysis**
 - a. Public concerns
 - b. Lifecycle Risks:
 - c. Infrastructure and Workforce
 - d. Cumulative risks
 - e. Benefits
 - i. Energy Security
 - ii. Climate Change
- VII. Comparative Analyses and Determining Risk Tolerability**
- VIII. Management Options and Strategies**
 - a. Legal and Regulatory Structures
 - b. Prioritizing Risk Research
 - c. Risk Management Strategy
 - i. Adaptive Management and Mitigation
 - ii. Communication Strategy
 - d. Siting Strategy
 - e. Policy Issues
 - i. Tax credits and Subsidies
- IX. Implementation**
- X. Next Steps**

Gigawatt-scale Wind Energy Deployments: A Framework for Integrated Risk Analysis



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**Placeholder for Presentation by
Horizon Wind Energy**

Presented by René Braud

Comments for Fish and Wildlife Service Federal Advisory Committee on Wind
January 29, 2009
Michael Fry, American Bird Conservancy

The FWS advisory committee has made very significant progress in developing recommendations and a framework of guidelines for wind development. My comments deal with specific points of discussion from the past 3 days, and as such are really a list of observations and not a comprehensive comment on the overall plan, which I believe is progressing in a timely manner.

- 1) No statements in the final report should be attributed to the FWS, as this committee is quite separate from the FWS.
- 2) The issue of cumulative impacts is highly significant. It is not likely that individual projects will be able to identify the larger scale and long-term impacts, and should not be expected to assess or predict future possible impacts. These are issues for the Department of Energy in consultation with the Department of Interior, and critical to the US development of a comprehensive energy plan, examining fossil fuel as well as renewable energy.

Potential cumulative impacts of many anthropogenic activities are already putting grouse and prairie chicken population viability at risk. The first wind project may not cause any measurable or significant impact, but the 17th might. A developer should be expected to evaluate whether Project 17 has any impact compared to the situation in place after Project 16, and the answer will likely be “no measurable impact”. However, an evaluation of the environment before Project 1 compared to that after Project 16 may demonstrate considerable impact. Incremental impacts may appear not to be significant using crude assessment tools, even if they do cause cumulative degradation. The surest way to avoid cumulative impacts is to work diligently to avoid impacts at every stage of each project.

- 3) There must be a process to “red-flag” or “blacklist” sites where the most responsible developer abandons the site so it will prevent the least responsible developer from building on the site. We realize this may be very difficult with regard to private property rights of land owners, but the “playing field” needs to be level for everyone, and rewarding less responsible developers at the expense of others must be avoided. A credible permitting process would assist in avoiding this situation.
- 4) Incentives: There is considerable merit in providing incentives for projects adhering to best management practices (BMP) using best available technologies (BAT) and following guidelines promulgated by the FWS. These could include tax incentives, including production tax credits (PTC) as well as regulatory streamlining. However, there must be constraints coupled with incentives, to insure continued and long-term compliance with BMP, BAT, and guidelines. Linking PTC with continued performance would provide continuing incentive for projects to follow best practices.

We believe having voluntary guidelines will largely benefit the least responsible developers at the expense of the most responsible developers.

- 5) The Planning tool for Lesser Prairie-Chicken (LEPC) presented by Chris O’Meilia is excellent, and should be applied throughout the LEPC range as quickly as possible. This plan should also be extended in principle to Sage Grouse and other species of grouse vulnerable to wind development.
- 6) The concept of avoidance of sensitive habitats and species should be primary, and the concept of off-site mitigation, land banking or protection of “suitable” but unoccupied habitat as alternatives should be vigorously challenged, as such projects rarely provide meaningful mitigation.
- 7) The draft of the “One Text” document outlines issues and processes well, but does not discuss what results will trigger decisions. It appears plausible that the least responsible developer could go through these questions realizing impacts, and still decide to develop a project. There must be a discussion of how a decision tree is executed.
- 8) We are very much in favor of the FWS developing a permitting structure in conjunction with promulgation of new regulations to enable the Service to execute permits under the MBTA, but only if the FWS and DOJ will be willing to enforce these permits (including incidental take permits, certificates of inclusion, habitat conservation plans, or other legal instruments). We believe this can only be accomplished with significant increases in permitting and enforcement budgets and cooperation by the DOJ.
- 9) Credits for “externalities”, already, in our opinion, are being provided through PTC and lack of enforcement of the MBTA and Eagle Act by the DOJ. The concept of benefits and credit for “externalities” needs to be incorporated in a comprehensive US energy policy, with a national analysis of costs and benefits of each technology.