***U.S. Fish & Wildlife Service***
**WIND TURBINE GUIDELINES ADVISORY COMMITTEE**

**Federal Advisory Committee Meeting**

**Austin Convention Center**
**500 E Cesar Chavez St**
**Austin, TX 78701**

**June 30 – July 2, 2009**

**-Final Meeting Summary-**

On June 30 – July 2, 2009, the Wind Turbine Guidelines Advisory Committee (FAC) convened its tenth in-person meeting at the Austin Convention Center in Austin, TX.

*For copies of the slides presented at the meeting and Attachments referred to herein, please visit the U.S. Fish & Wildlife Service Web site at:*
*www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee.html.*

*Meeting Objectives:*

- Review draft language proposals to add to, or replace sections of, Draft Version 3 of the One-Text of Recommended Guidelines, both from Subcommittees and individual FAC members. Develop direction for moving forward with each section of the FAC recommendations.
    - Synthesis Workgroup Draft Version 3 ("Draft v.3") of the One-Text of Recommended Guidelines (sent June 11th and June 25th, 2009)
    - Legal Subcommittee update
    - Scientific Tools & Procedures Subcommittee update
- Hear presentation from Warren Lasher, System Assessment Manager at ERCOT, on "Integrating Wind Energy in ERCOT."
- Discuss milestones, timelines, and process steps.

## I. WELCOME AND OVERVIEW OF THE AGENDA

Dave Stout, *USFWS/Committee DFO and Chairman,* welcomed all meeting attendees and asked them to introduce themselves (See Attachment A). He noted the importance of this meeting as a milestone to reaching consensus by October 24, when the FAC Charter expires. Abby Arnold, *facilitator,* asked members of the public to sign up if they would like to make a public comment to the FAC.

A. Arnold reviewed the agenda and the FAC approved it (see Attachment B).

## II. PRESENTATION AND DISCUSSION OF DRAFT V.3 OF THE "ONE-TEXT" AND PROPOSED LANGUAGE REVISIONS

### A. Overview of Draft v.3 of the One-Text:

The Synthesis Workgroup distributed Draft v.3 of the One-Text on June 11, 2009 (See Attachment C). On June 12th a webcast was held for FAC Members and interested public to provide an overview of Draft v.3, which was the same draft discussed at this meeting. A. Arnold briefly presented the PowerPoint that was used at the June 12th webcast, as a reminder of what was in Draft v.3 (See Attachment D):

I. Draft Preamble to the Committee Recommendations

A. Wind Turbine Guidelines Advisory Committee (Committee) Established to Provide Recommendations on Siting Wind Development Projects
B. Background on Context and Need for the Recommended Guidelines
C. Premises and Guiding Principles Under Which the Committee Operated

II. Committee Draft Policy Recommendations

III. Committee Draft Recommended Guidelines ("Guidelines")

- Chapter One: Introduction
- Chapter Two: Summary of the Guidelines and General Considerations
- Chapter Three: The Tiered Approach for Wildlife Assessment and Siting Decisions
- Chapter Four: Compensatory Mitigation
- Chapter Five: Advancing Use, Cooperation, and Effective Implementation of the Guidelines
- Chapter Six: Revisions to the Guidelines
- Chapter Seven: Recommendations for Effective USFWS Administration of Recommendations
- Appendices

The following changes were made to the One-Text based on FAC direction at the March 24 – 26, 2009 FAC meeting to produce the current One-Text, Draft v.3:

- The "Outline of the FAC Product" proposed at the March 24 – 26 FAC meeting was incorporated into Draft v.3, so that a Draft Preamble and a list of Draft Policy Recommendations precede the Guidelines section of the FAC product.
- The methods and metrics for Tiers 3 – 5 in Chapter Three of the Guidelines were revised for Draft v.3 to include the level of detail and prescription recommended by the FAC.[1]
- Sections on landscape and habitat level review, adaptive management, and mitigation were edited based on FAC direction from the March 24 – 26 meeting.

Sections that remain to be drafted in Draft v.3 of the One-Text are:

- Incentives and proof of adherence to the Guidelines (there is currently a placeholder in Chapter 5, Section A)

[1] Note that an updated version of Chapter Three was handed out to the FAC at the same meeting for review and comment (See Attachment E).

- Consideration of the costs of adhering to the Guidelines (partially addressed in Chapter 1, Section C.4; placement in the Guidelines is yet to be determined)
- Federal-tribal coordination (there is currently a placeholder in Chapter 5, Section D)

**B. Draft v.3 Policy Questions for FAC Discussion:**

A. Arnold recommended that the FAC wait to seek consensus on the total package until all sections of the Guidelines have been drafted, to allow FAC Members a complete understanding of what they are agreeing to. At the June 30 – July 2 FAC Meeting, A. Arnold asked that FAC Members try to decide for each section that is discussed whether it can stay or should be deleted from the One-Text. However, if language stays in the One-Text for Draft v.4, the FAC will be able to review it again at the next meeting and decide whether or not to include it in the recommendations to the Secretary.

A. Arnold identified and explained a list of policy issues for the FAC to discuss relating to Draft v.3. These important topics were listed in the cover memo to Draft v.3 (pages 1-3 of Attachment C).

**1. Review the order, organization, and content of the Policy Recommendations (Draft v.3, pp 4 – 6, lines 138 – 249).**

- FAC Direction: Include all of the policy recommendations in the next public iteration of the One-Text, Draft Version Four ("v.4"). The order of the policy recommendations will remain the same in Draft v.4.

**2. Review the policy recommendation addressing impacts to wildlife from other stressors, including climate change (Draft v.3, p 5, lines 203-217).**

The FAC expressed differing perspectives on whether the policy recommendation is appropriate to include.

- FAC Direction: Leave the current policy recommendation language in Draft v.4. This recommendation will be reevaluated by the FAC at the next meeting.

**3. Review use of the word "streamline" (Draft v.3, p 5, line 187).**

- FAC Direction: Strike "streamline" at page 5, line 187 of Draft v.3, and insert: "ensure timely and consistent review of wind energy projects and resolve conflicts." Also strike "streamline" throughout document where appropriate, and insert the above language.

**4. Review edits to the Cumulative Impact Analysis policy recommendation (Draft v.3, p 6, lines 236-249).**

While discussing the cumulative impacts section, the FAC requested a definition of "stressors." They agreed to use the Council on Environmental Quality (CEQ) definition, which defines stressors as "development-related significant adverse impacts."

- FAC Direction: Draft new language addressing the benefits of wind energy development in avoiding the impacts of *alternative* forms of development.
- Revise the Cumulative Impacts Analysis section in Chapter 2 (Draft v.3, pp 18-19, lines 764-788) to include the revisions to the policy recommendation and ensure that the two sections are consistent.
- Strike page 6, lines 236-249 in Draft v.3; insert the following proposed language approved by the FAC (See Attachment F):

❖ **NEW LANGUAGE:**
**Cumulative Impact Analysis**. The FAC recommends DOI improve its capability to assess cumulative impacts by working with the USFWS Regions to:

- Review the range of development-related significant adverse impacts

- Review indicator species or habitats within the landscape at the most risk of significant impacts from wind development, in conjunction with other reasonably foreseeable significant adverse impacts.

- Develop data that can be used to conduct regional or landscape level analysis

The product of regional analyses of cumulative impacts should be available to inform Tier 1 preliminary site assessment or Tier 2 site characterization and may be useful for designing Tier 3 wildlife surveys. However, the Committee stresses that the lack of tools for cumulative impact analysis should not in any way delay the use and application of the recommended Guidelines.

**5. Should the policy recommendation addressing offshore wind energy development be left in Draft v.4, edited, or removed (Draft v.3, p 6, line 230-234)?**

- FAC Direction: Strike the policy recommendation referencing offshore wind energy development.

**6. Review edits to the policy recommendation on landscape-habitat level review (Draft v.3, pp 1-2, lines 159-170) and decide whether landscape-habitat level review has been adequately addressed in Tier 1 of the Guidelines (Draft v.3, pp 19-20, lines 801-843).**

D. Stout emphasized that, in this section, they are not committing the USFWS to conducting landscape-level reviews across the nation, but to helping facilitate collaborative regional efforts that will carry out such reviews. These efforts should be applicable for renewable energy development more broadly, not exclusively wind energy. As with cumulative impact analysis, the development of wind energy projects should not be delayed until these efforts are completed. The language proposed to the FAC was modified and accepted for Draft v.4.

- FAC Direction: Landscape and habitat level review has been adequately addressed in Tier 1 in the Guidelines.

- Strike "eco-region" throughout the One-Text and insert "landscape."
- Strike pp 1-2, lines 159-170 of Draft v.3; insert the following proposed language approved by the FAC (See Attachment F):

❖ **NEW LANGUAGE:**

The Committee recommends that the Secretary instruct USFWS, in consultation with the USGS and state agencies, to assemble and maintain a comprehensive landscape database based on scientifically credible sources on a national scale. This database will assist in identifying and assessing development risks to ecosystems, large-scale habitats, and migratory and resident species that rely on large-landscape or specialized habitats. In developing this database, the USFWS should consult and assess existing and on-going landscape analysis and mapping efforts focused on renewable energy, including, but not limited to: the California RETI, Western Governors' Association Wildlife Habitat Council, The Nature Conservancy, National Audubon Society, and American Wind and Wildlife Institute activities. Such a database should have broad applicability to help guide decisions regarding other types of development, including other energy sources. However, the Committee stresses that the lack of landscape level tools should not in any way delay the use and application of the recommended Guidelines.

**7. Should Guiding Principle 7 be edited (Draft v.3, p 3, lines 127 - 129, and p 11, lines 450 – 452)?**

- FAC Direction: Review the following principle in light of the edits to Chapter 4 on mitigation; revise if necessary.

❖ **Guiding Principle 7:**

Present mechanisms for determining compensatory mitigation, when appropriate, in the event of unforeseen impacts to wildlife during construction or operation of a wind energy project.

**8. Should the Guidelines specify their intent to apply to only commercial turbines?**

- FAC Direction: Draft language describing current commercial technology, which the Guidelines intend to address; do not use an example in this section.

**9. Does use or application of the Guidelines support NEPA compliance (Draft v.3, p 12, lines 483-485)?**

The FAC agreed that the Guidelines should make it clear that following them supports only one aspect of NEPA compliance.

- FAC Direction: Review the following language with the FWS NEPA expert; then strike page12, lines 483-485 of Draft v.3 and insert the following approved language, with any necessary edits:

❖ **NEW LANGUAGE:**

Following the guidelines fulfills a purpose of the National Environmental Policy Act (NEPA) to provide a full and fair discussion of significant environmental impacts of wind development upon wildlife that arise from federal actions.

(This language is in reference to *40 CFR 1502.1)*

**10. How should the FAC phrase its recommendation for voluntary Guidelines (Draft v.3, p 13, line 516)? Should the FAC explicitly recommend for or against new regulations as part of the implementation of the Guidelines?**

Dr. Robert Robel, *FAC Member, Kansas State University,* suggested that the Guidelines note that the FAC discussed and considered both voluntary and mandatory guidelines, and chose to recommend voluntary Guidelines.

- FAC Direction: At page 13, line 516 of Draft v.3, strike "Rather than promulgate new regulations" and leave the rest of the current sentence: "These Guidelines are intended to be voluntary." Insert a note that the Committee had a full discussion of whether to recommend the Guidelines be mandatory or voluntary, and chose to recommend voluntary.
- Do not include a recommendation for or against new regulation.

**11. Do the Guidelines appropriately describe how adaptive management is reflected in the Tiered Approach (Draft v.3, pp 17-18, lines 719-754)?**

- FAC Direction: Insert the following language in Chapter 2, page 17, line 725 of Draft v.3, after "management" (See Attachment F):

- **NEW LANGUAGE:**
  Adaptive management, if necessary, should be explored and applied only when substantial uncertainty exists regarding the approaches to avoiding or minimizing impacts. The tiered approach is designed to accommodate adaptive management.

**12. Tier 1 - Early Coordination: Revisit how Tier 1 is described, with particular attention to use of the word "optional," at what point a developer selects a site, and how to address the sequence of activities a developer goes through internally prior to contacting the wildlife agency (Draft v.3, pp 19 - 20, lines 792 – 843).**

The FAC continued their efforts to achieve balanced language in Tier 1. The FAC would like to emphasize that developers must be able to adapt their use of the tiers to the situation, and yet also strongly encourage the landscape-level review and early coordination activities described in Tier 1. A way to balance these may be to acknowledge that the timing of when developers conduct these activities may vary.

- FAC Direction: In the introduction to Tier 2, draft and insert language noting that some projects will start in Tier 2, but will still address the questions listed in Tier 1 (which is why many of the same questions are repeated through the tiers).
- Review Tier 2 questions to see if there are any in Tier 1 that aren't in Tier 2.

- Ensure that revisions reflect both landscape level review and the discretionary aspect of Tier 1.
- Strike pages 19 - 20, lines 790 – 843 in Draft v.3; insert the proposed language approved by the FAC (see endnotes).[i]

**13. Population level impacts (page 22, line 940 of Draft v.3): should the Guidelines be more specific about which wildlife, habitat, and wildlife populations the developer is responsible for studying?**

- FAC Direction: Based on a review of the FAC direction from the January 27-29, 2009 meeting, the language currently in Draft v.3 of the One-Text does not need to be more specific.

**14. Methods and Metrics: How would the FAC like the technical subgroup to modify the methods and metrics (Draft v.3, pp 19 - 55, lines 790 – 2428)?**

The Methods and Metrics were revised again after Draft v.3 was distributed to the FAC, and some, but not all, of the edits are noted in the "Technical Edits to the Synthesis Workgroup Draft v.3" document distributed at the FAC meeting. Dr. Taber Allison, *FAC Member, Massachusetts Audubon Society,* noted that the revisions to Chapter Three attempt to address both the level of detail and prescription of the methods, as well as their technical validity. It was decided that the FAC should review the most recently revised Chapter 3 after the FAC meeting, and send comments in to ekimbrell@kearnswest.com by July 17.

- FAC Direction to the technical subgroup of the Scientific Tools & Procedures Subcommittee:
- Include further clarification on which studies are *typically* required, and for those studies that are *not* typically required, describe the circumstances in which they should be conducted.
- For those sections of the methods and metrics that are intentionally vague (due to the lack of a precise model to follow, for example) insert an explanation of why that section has less detail than other sections of the methods and metrics.
- For v.4, insert language that provides more clear linkages between the tiers, such as the relationship between decision points, and a checklist for the developer to use.
- Draft and insert language clarifying that the intent is *not* to favor any one method of surveying for bats, at pp 25-26, lines 1085-1099 of Draft v.3.
- Edit the flow chart to make it clearer, with the following changes (See Attachment :
  - Insert edits from FAC that provide additional decision points where there is the option to end a project, or to choose a different site and start the process over.
  - Review and correct Tier 3's boxes (actions) vs. diamonds (decision points) as needed
  - Insert a note and/or key for the reader on how to interpret the flow chart
  - Insert language in the text of Chapter 3 that cross references and integrates the text with the flow chart.

- **Proposal to move the methods and metrics for each tier into an appendix:**

Representatives of Steve Lindenberg, *FAC Member, DOE,* who could not attend the FAC meeting, described to the FAC his proposal to move the methods and metrics for each tier into an appendix. The suggested questions to be answered by the developer at each tier would be left in the text of the Guidelines, but the detailed descriptions for how to answer the questions would be moved into the appendix. This proposal was discussed, and most FAC Members expressed satisfaction with both options: keeping the methods and metrics in the document, and moving them into an appendix. However, some FAC Members pointed out that this suggested change may have significance for how the methods are viewed and used, as well as for how much detail ought to be included in them.

- FAC Direction: In a separate document, a portion of the methods and metrics will be extracted from the One-Text and placed in an appendix for the FAC to review as an example of what could be done for the entire document. The FAC should consider this example while considering whether the level of detail and prescription in the methods and metrics is appropriate.

**15. Level of detail in Tiers 3-4: discuss whether the Scientific Tools & Procedures Subcommittee has taken the desired approach for the level of detail of the methods and metrics, particularly in Tiers 3 and 4 (Draft v.3, pp 22 - 48, lines 928 - 2101).**

- FAC Direction: A PDF of the revised Chapter 3 (dated June 15) from the technical subgroup was circulated on July 6th for the FAC to review, and decide whether the revisions sufficiently respond to question of level of detail. Comments were due to ekimbrell@kearnswest.com by July 17, and will be incorporated into Draft v.4.

**16. Prescription (vs. description) in Tiers 3, 4, and 5: How prescriptive should the Guidelines be (Draft v.3, pp 22 - 55, lines 928 – 2428)?**

- FAC Direction: Same response as the Level of Detail question above… A PDF of the revised Chapter 3 from the technical subgroup will be circulated for the FAC to review, and decide whether the revisions sufficiently respond to the question of level of prescription. Comments were due to ekimbrell@kearnswest.com by July 17, and will be incorporated into Draft v.4.

**17. Approaches to Defining Trigger Points: Clarify thresholds, or "trigger points," by drafting better articulated off-ramps for terminating projects (i.e. what information determines when a developer decides to abandon a project, move to a different tier, or begin permitting and construction) (Draft v.3, pp 19 - 55, lines 790 – 2428).**

A subgroup of the Scientific Tools & Procedures Subcommittee drafted language on "Wildlife and Habitat Risk Profiling" (See Attachment #?) which focused on how to define the level of risk at a site. Dale Strickland, *FAC Technical Expert, West, Inc.,* also drafted a "Decision Framework Approach" which focused on how to make decisions to abandon a project, move to a different tier, or begin permitting and construction. The FAC reviewed both of these approaches to determine what language would be useful for the One-Text. T. Allison recommended that the FAC use the Decision Framework Approach and integrate it with the tiered approach that is already in Draft v.3. He also suggested that it would be

helpful to edit the flow chart (See Attachment #?) to make it clearer and create further linkages or cross-references between the flow chart and the text of the document. The FAC discussed the changes they would like to see in the flow chart.

- FAC Direction: Review and edit the proposed "Decision Framework Approach" as necessary and then incorporate it into the tiered approach for Draft v.4 (see endnote for proposed language to be edited).[ii]

**18. Scalability: review proposed language and decide on placement in the One-Text (See Attachment G).**

Greg Hueckel, *FAC Member, Washington Department of Fish and Wildlife,* pointed out that the discussion of scalability in the Guidelines should describe the need for avoidance, minimization, and mitigation efforts to be proportional, or "scaled," to the level of risk posed by a site.

- **NEW LANGUAGE:**
  ***Scalability (this will be edited and reviewed further based on FAC direction)***
  The tiered approach is designed to address wind developments of various sizes. The approach leads to the appropriate amount of research for the anticipated level of risk the development may pose to wildlife and their habitats. Risk is determined by location, not necessarily the size of the project. For example, a small wind power development of 20 turbines located within 2 miles of a known Indiana bat maternity colony can pose a higher risk to the subject wildlife than a project of 100 turbines in a corn field. Therefore, a small project that may pose greater risk to wildlife may require more pre- and post-construction studies than a site that may have lower risk to wildlife. This is why the tiered approach begins with an examination of the potential location of the project, not the size of the project.

  - FAC Direction: Review the edited language from the FAC, and insert into Draft v.4. The placement of this section in the draft was not agreed to, although there was a proposal to include it in the "Intended Use of the Guidelines" section (Draft v.3, p 13, line 515).

**19. Transmission: review proposed language and decide on placement in the One-Text (See Attachment G).**

The FAC discussed the issue of transmission in the context of the Guidelines. They noted that transmission is addressed by other processes and reports, notably the Avian Power Line Interaction Committee (APLIC) Guidelines. Therefore the FAC Guidelines should make reference to the topic and sources of information on it, without including detailed recommendations.

- **NEW LANGUAGE:**
  ***Transmission (the FAC revised the proposed language as follows)***
  The Recommendations, and the proposed Guidelines, are designed to address all elements of a wind power facility, including the turbine string or array, access

roads, ancillary building, and the above and below ground electrical line which connects a project to the transmission system. The project evaluation should include consideration of the wildlife and habitat related impacts of these lines. The developer would include measures to reduce impacts of these electrical lines, such as those outlined in the APLIC Suggested Practices. The Recommendations are not designed to address transmission beyond interconnection to the transmission system. The national grid and proposed smart grid system are beyond the scope of these Recommendations. This recommendation does not supercede existing policies.

- FAC Direction: Review the edited language from the FAC, and insert into Draft v.4. The placement of this section in the draft was not agreed to, although there was a proposal to include it in the "Intended Use of the Guidelines" section (Draft v.3, p 13, line 515).

**20. Minimum standards: when is impact minimization sufficient; what is an acceptable level of impact; what amount of information is adequate to determine anticipated level of impact?**

- FAC Direction: Consider inserting *"one year may be adequate"* at Page 23, Line 983 of Draft v.3 while reviewing the revised Chapter 3.
- At page 23, line 983 of Draft v.3, strike "typically."
- Consider addressing this topic in the new "Implementation" Chapter.

**20. "Compensatory" Mitigation (Chapter Four): Consider whether to more explicitly emphasize the distinction between compensatory mitigation in Chapter 4 and the avoidance and minimization efforts described in Chapter 3. Also consider what level of impact is acceptable, when is mitigation recommended, and how much impact is too much (Draft v.3, pp 55 - 56, lines 2430 – 2479). Review new language proposal and decide whether this is an acceptable framework to use in the Guidelines (See Attachment H).**

To help inform the FAC's discussion, D. Stout described the step-by-step process, laid out in the USFWS Mitigation Policy (See Attachment #?), that USFWS uses to determines what kind of mitigation is recommended for a site. This is an informal, voluntary process that applies to unlisted species, whereas a different formal process is used for listed species. The mitigation section of the Guidelines does not address listed species. D. Stout emphasized that it is the responsibility of the USFWS to respond in a timely fashion so that developers can follow their guidance and make use of incentives that are provided. USFWS will provide training to their field staff to ensure that they understand the FWS Mitigation Policy and the Guidelines, and how to implement them.

Mike Azeka, *FAC Member, AES Wind Generation,* outlined several different circumstances in which a developer might contact a wildlife agency but that might necessitate differing recommendations in the Guidelines (i.e. when a developer is seeking an incentive vs. not seeking an incentives, or when they want to have documentation of their efforts in order to show a lender, vs. to show USFWS).

Steve Quarles, *FAC Member, Crowell & Moring LLP*, stated that the Guidelines' description of compensatory mitigation must include an emphasis on the preceding aspects of mitigation: avoidance and minimization. He also pointed out that recommending wind energy developers follow the FWS Mitigation Policy, when there is no federal nexus, may lead to the expectation that compensatory mitigation is required at most sites.

- FAC Direction: Revise and expand Chapter Four to include the proposed language after it is edited (see endnotes).[iii]
- Consider a possible new title for Chapter Four: "Enhanced Risk and Impact Reduction Approaches and Compensatory Mitigation."
- Develop a background for this chapter using basic terminology that addresses: federal and state roles; a proposed approach for a compensatory mitigation strategy for listed and for non-listed species; addressing timing, certainty, equity, fairness; distinction between when a developer is looking for incentives and when they are not looking for incentives; how to address MBTA; how to address fatalities .
- Revise references to mitigation throughout the One-Text to ensure consistency.

- **Operational Mitigation: where does this fit into the Guidelines (Draft v.3, p 56, lines 2471-2479)?**

- FAC Direction: In Draft v.4 include a proposed response to the issue of operational mitigation: either leave operational mitigation in Chapter Four if the title is changed, or move it to a different chapter.

- **Curtailment Studies: how and where should the Guidelines address these?**

- FAC Direction: Curtailment studies are a possible option to include in the section on operational mitigation. Curtailment studies should also be described in the Research section of the Guidelines (currently Chapter Seven, Section D of Draft v.3, lines 2700 - 2708). It is unclear whether they should be considered a minimization strategy.
- The FAC will review the proposals for content and placement of this section at their next meeting.

**21. Legal Incentives: should the Legal Subcommittee continue developing recommendations for a No-Action Letter Program under the Migratory Bird Treaty Act (MBTA) and for a Template HCP under the Endangered Species Act (ESA) (Draft v.3, p 56, line 2491)?**

- **The MBTA No-Action Letter Incentive Option (See Attachment I)**

The Legal Subcommittee is considering a recommendation that the FWS supplement its current enforcement discretion approach under the MBTA through a formal no-action letter, or letter of assurance, program. The subgroup studied similar programs in other federal agencies in order to develop their ideas. Through this program, a developer that follows the voluntary USFWS wind energy Guidelines with respect to a proposed wind energy project could obtain formal enforcement assurances under the MBTA. In the current version of the option the Subcommittee is considering, the FWS, based on a written request

by a wind energy developer with respect to a proposed wind energy project, may coordinate with FWS to develop a plan for how the developer could proceed with the project while adhering to the Guidelines. FWS would then issue a formal letter to the wind energy developer which states that, based on the facts presented and commitments made by the developer, the FWS will not recommend to the U.S. Department of Justice that an enforcement action be brought against the developer under the MBTA for unauthorized incidental take of protected migratory birds at the project. The Legal Subcommittee has noted that other federal agencies using this approach base these assurances on the facts presented, and if those facts change, the agency reserves the ability to revisit its decision as to whether assurances are appropriate. Understanding that it is not binding on any party, this is the strongest form of assurance currently being provided by other federal agencies.

Mike Daulton, *FAC Member, National Audubon Society,* summarized questions the Legal Subcommittee's MBTA subgroup has discussed related to the development of a no-action letter program under the MBTA: Do the Guidelines contain enough specificity for the developer to be able to prove they are adhering to them, which would be necessary to obtain an incentive? To what extent would USFWS rely on developers to self-certify their adherence with the Guidelines, and what level of certainty would developers have as to whether unanticipated high levels of take would affect the status of their no-action letter?

Clint Riley, *USFWS Division of Migratory Bird Management,* pointed out concerns that the no-action letter incentive might create a de facto permit program without the accompanying permit requirements. This would increase the risk of litigation faced by the USFWS. The risk for the USFWS could be lowered if a new regulation was created to support the program.

Jim Eisen, *BP Wind Energy,* reviewed some of the questions and concerns of the wind industry about the no-action letter program and its strength as an incentive. D. Stout confirmed that if this program were implemented, FWS field supervisor would issue the letters; this is the case in similar programs in other federal agencies.

- **The ESA Template HCP Incentive Option (See Attachment J)**

This option is based on an existing FWS program. A Habitat Conservation Plan (HCP) is a planning document that is a mandatory component of an incidental take permit application under section 10(a)(1)(B) of the ESA. The tiered approach described in the Guidelines, as a decision support system, can contribute to baseline information for an HCP. The HCP process can allow development to proceed in a manner consistent with the conservation of a federally-listed threatened or endangered species and their habitats. An incidental take permit may be sought by an applicant if the project occurs on private land or with no federal nexus and if take of a federally-listed threatened or endangered species is likely to occur.

Consistent with the tiered approach in Chapter Three of Draft v.3 of the voluntary Guidelines, the initial step for developing an HCP is early coordination with the local FWS field office. The developer/applicant can prepare the HCP using publicly available existing information and information gathered in the pre-construction portion of the tiered process (Tiers 1 through 3).

Dr. John Fay, *USFWS Division of Endangered Species,* reinforced that the template HCP option does not create a new mechanism, but a developer might be able to use the Guidelines to fulfill some HCP requirements. For projects with a federal nexus, following the Guidelines might likewise expedite a Section 7 permit. He does not know by how much the Guidelines would speed these processes.

One FAC Member pointed out that because most wind energy developers consider NEPA and HCPs difficult and time-consuming in the first place, the template HCP option is not very appealing as an incentive.

- FAC Direction: Continue work on the options proposed to the FAC: the no-action letter and the template HCP. A decision was not made on these options. They will continue to be discussed, and other options may still be considered.
- The USFWS will investigate what else might be required in order for the Guidelines to serve as a programmatic EIS in a NEPA context.

**22. Avian and Bat Protection Plans (ABPPs): should the section on ABPPs be edited? What does the FAC want to recommend regarding ABPPs (Draft v.3, pp 59 – 60, lines 2628 - 2634)?**

The FAC discussed the role of ABPPs, which can be either project-specific or company-wide. One possible way to encourage their use might be for developers that use an ABPP to gain additional liability protection. While the FAC does not want to recommend ABPPs as the only tool that developers should use, the Guidelines could flesh out how to use an ABPP as one tool to demonstrate adherence with the Guidelines and gain incentives in return. The FAC may decide to describe other types of tools in the Guidelines as well.

A suggestion was made to use "wildlife protection plans" as the generic term, rather than "wildlife conservation plans."

- FAC Direction: ABPPs are one possible tool in the toolbox of options.
- Revisit Draft v.2 proposed ABPP language discussed by the FAC in March 2009, and consider what else to include in the description in Draft v.4 (and which section to include it in).

**23. Implementation:**

- FAC Direction: Create a new subcommittee to work on an Implementation chapter (either as part of revised Chapters Five – Seven, or create a new chapter).
- *First call: July 14th from 12:00 –2:00pm EDT*

  - **Should Chapters Five - Seven be reorganized? Should they include further information on implementation (Draft v.3, pp 56 – 61, lines 2481 - 2709)?**
- FAC Direction: In Draft v.4, reorganize Chapters Five - Seven and add or incorporate the Implementation chapter after it is drafted.

- **What constitutes "adherence" with the Guidelines and how can wind energy developers demonstrate adherence with the Guidelines to USFWS and state wildlife agencies?**

➢ FAC Direction: Consider this question in the "Implementation" chapter, and develop a checklist of steps that developers can take to demonstrate adherence with the Guidelines.

➢ Strike "comply" and insert "adhere" or "conform" throughout document.

- **Federal-state coordination: should this section be edited? How should the Guidelines describe federal-state coordination (Draft v.3, pp 57 – 59, lines 2527 – 2591)?**

A FAC Member suggested that the Guidelines include a more comprehensive description of the important role state wildlife agencies can play in wind energy siting. Also, to provide an example of what a federal-state cooperation agreement might look like, the Guidelines could reference an existing, signed agreement, rather than drafting a model legal document themselves.

The FAC discussed the need to choose their vocabulary carefully to avoid implying the expectation that they are setting a "foundation" or "standard" that state wildlife agencies must meet, as they would if the Guidelines were federal legislation. These Guidelines will provide suggestions that the states are encouraged to follow, but the USFWS cannot force the states to implement the Guidelines or to treat them as a baseline.

➢ FAC Direction: Incorporate edits to the federal-state cooperation section from the FAC and insert into Draft v.4.

➢ Circulate an example of a signed federal-state agreement with FERC.

- **Federal-tribal coordination: this section is being revised (Draft v.3, p 59, line 2593).**

➢ FAC Direction: Consider proposed language, after FWS solicitors have reviewed; incorporate into Draft v.4.

- **NGO actions: this section in Draft v.3 is a placeholder. How should it be revised (Draft v.3, p 60, lines 2636 – 2644)?**

➢ FAC Direction: Review and edit the following proposed language from the FAC. After it is reviewed, strike page 60, lines 2636- 2644 of Draft v.3 and insert revised new language (See Attachment F).

❖ **NEW LANGUAGE (*to be revised*):**

A variety of non-governmental organizations have an interest and expertise in improving siting procedures for wind energy projects. Such groups can:

- Provide information to help identify sensitive sites at the preliminary screening phase
- Provide confidential early assessment opinion
- Provide technical expertise for conducting risk impact assessments

- Help design mitigation or offset strategies that lead to faster project review and approval
- Define, fund, and implement research priorities that lead to improved predictions of risk and impact assessment and solutions
- Peer review
- Articulation of concerns and successes to diverse audiences

## III. Outline of FAC and Subcommittee Next Steps and Schedule

- July 17: Comments were due on revised Chapter Three. The technical subgroup is reviewing and incorporating comments as well as direction from the FAC into the chapter.
- August 10: Draft v.4 of the One-Text is sent to the FAC and public.
- August 10 – 24: Caucuses review Draft v.4; caucus leaders may want to hold internal caucus meetings to discuss Draft v.4 and prepare comments to present to the FAC.
- August 24: FAC members and members of the public send comments on Draft v.4 to ekimbrell@kearnswest.com by close of business on Monday, August 24th, so that comments can be compiled and reviewed prior to the September 1 – 3 FAC meeting.
- **Dates for FAC meetings in Arlington, VA:**
  - September 1 – 3
  - September 29 – October 1
  - October 13 – 15
- **Subcommittee Work →**
  - **Synthesis Workgroup**: Language proposals discussed by the FAC at the June 30 – July 2 meeting are being incorporated into the One-Text according to FAC direction. The workgroup is continuing to review these revised sections and decide where to insert them into the One-Text.

  - **Legal Subcommittee** is continuing to develop recommendations for a No-Action Letter Program under the Migratory Bird Treaty Act, a Template HCP (Habitat Conservation Plan) under the Endangered Species Act, and perhaps other incentive options. They will present their progress on these recommendations at the September 1 – 3 FAC meeting.

  - **Scientific Tools & Procedures Subcommittee/ Technical Subgroup** is reviewing FAC comments on Chapter Three, "The Tiered Approach for Wildlife Assessment and Siting Decisions," and revising it to address the comments and the direction from the FAC. The revised Chapter 3 will be incorporated into Draft v.4 of the One-Text.

  - **Implementation Subcommittee** was created at the June 30 – July 2 FAC meeting to develop a new section for the One-Text. This section may incorporate all or parts of Chapters 5 – 7. Among other things, this new section will discuss USFWS, states, tribe, developer and others' implementation of the guidelines – for example, how to use them, how to

show due diligence, and the incentives to use -- in short, recommendations translating the Guidelines into practice.

- **Mitigation Subcommittee** was created at the June 30 – July 2 FAC meeting in order to revise Chapter Four, "Compensatory Mitigation" (which may be renamed, "Enhanced Risk and Impact Reduction Approaches and Compensatory Mitigation"). They are revising the language proposed at the FAC meeting, incorporating it into the rest of Chapter Four, and deciding how best to organize the chapter to address all aspects of mitigation. The Subcommittee may also review the rest of the One-Text to ensure that mitigation is addressed coherently and consistently throughout.

**IV. Presentation on Integrating Wind Energy in ERCOT: Warren Lasher, System Assessment Manager at ERCOT (See Attachment #__ For PowerPoint presentation)**

W. Lasher began by describing the three interconnections in the United States: the Western Interconnection, the Eastern Interconnection, and ERCOT, which serves Texas. Interconnections are regional networks within which electricity can flow freely to where it is needed. W. Lasher explained that electricity cannot be transferred *between* interconnections unless a specific process is used to move it from one to the other. ERCOT is unique because it uses a deregulated electricity market, which allows anyone to connect their energy generation to the grid, and allows consumers to choose their electricity provider. The transmission and distribution networks, however, are regulated. Forecasting tends to be easier in ERCOT than in the Eastern and Western Interconnections, but because ERCOT is smaller and contains less diverse power sources, it can also be less reliable.

ERCOT has a high percentage of wind energy compared to the other two interconnections. There are many reasons for this, including higher than average wind speeds in Texas compared to the rest of the country. Also, Texas was the first state to implement a Renewable Portfolio Standard (RPS), and the state has transmission policies that benefit the wind energy industry, as generators don't pay for upgrades to the transmission system. For the most part the marginal cost of electricity is set by gas generation, which is highly variable and makes wind energy the cheaper option. In addition to this, Production Tax Credits (PTCs) result in a cost of $0/mwh to produce wind energy.

W. Lasher noted that wind energy has significant ramifications for how electricity transmission and distribution take place. Coal and gas generation is based on matching generation to load. With wind generation forecasting tools, wind energy providers can match load to generation, although it is a complex process with uncertainties stemming from factors such as the predictability of weather patterns and the generator's position on the power curve.

## V. List of Attachments

A. **Attendee List**
B. **FAC Meeting Agenda June 30 – July 2, 2009**
C. **Synthesis Workgroup Draft v.3 of the One-Text for FAC Meeting June 30 – July 2, 2009**
D. **PowerPoint Presentation for June 12th Webcast on Draft v.3 of the One-Text**
E. **Proposed Technical Revisions to Draft v.3**
F. **Proposed Revisions to Draft v3**
G. **Revised Flow Chart for June 30 – July 2, 2009**
H. **Proposed Language on Scalability and Transmission**
I. **Proposed Language on Mitigation**
J. **MBTA No-Action Letter Incentive Option**
K. **ESA Template HCP Incentive Option**
L. **PowerPoint Presentation on Integrating Wind Energy in ERCOT by Warren Lasher**

MEETING OF THE

# WIND TURBINE GUIDELINES ADVISORY COMMITTEE

**June 30 – July 2, 2009**
**Austin, TX**

**FINAL PARTICIPANTS LIST**

Taber Allison
Massachusetts Audubon Society
208 South Great Road
Lincoln, Massachusetts 01773
781-259-2145
tallison@massaudubon.org

Cheryl Amrani
U.S. Fish and Wildlife Service
4401 North Fairfax Drive
Arlington, Virginia 22203
703-358-2161
Cheryl_Amrani@fws.gov

Dick Anderson
California Energy Commission
2850 Layton Drive
Davis, California 95618
530-758-4672
Danderson@cal.net

John M. Anderson, Jr.
BP Wind Energy, N.A.
700 Louisiana Street, 33rd Floor
Houston, Texas 77002
713-354-2137
john.anderson6@bp.com

Ed Arnett
Bat Conservation International
P.O. Box 162603
Austin, Texas 78716
512-327-9721
earnett@batcon.org

Abby S. Arnold
Kearns & West
1255 23rd Street, NW
Suite 275
Washington, DC 20037
202-535-7800
aarnold@kearnswest.com

Michael Azeka
AES Wind Generation
4542 Ruffner Street, Suite 200
San Diego, California 92111-2239
858-573-2018
mike.azeka@aes.com

Jill Birchell
U.S. Fish and Wildlife Service
4501 N. Fairfax Drive
Suite 3000
Arlington, Virginia 22203
703-358-1949
Jill_Birchell@fws.gov

Kathy Boydston
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744-3291
512-389-4638
kathy.boydston@tpwd.state.tx.us

René Braud
Horizon Wind Energy
808 Travis, Suite 700
Houston, Texas 77002
713-265-0350
Rene.Braud@horizonwind.com

Louis Brzuzy
Shell Oil Products US
910 Louisiana, Rm 614
Houston, Texas 77002
713-241-1506
louis.brzuzy@shell.com

Christina Calabrese
Horizon Wind Energy
808 Travis Street, Ste. 700
Houston, Texas 77002
713-356-2519
christina.calabrese@horizonwind.com

Donald A. Carr
Pillsbury, Winthrop, Shaw, & Pittman, LLP
2300 N Street, NW
Washington, DC 20037
202-663-9277
donald.carr@pillsburylaw.com

L. Caitlin Coberly
Merlin Environmental, LLC
12400 198th Ave NW
Fox Holm, North Dakota 58718
701-468-5996
prairie@dswebnet.com

Chris Crow
Austin Energy
2306 Bowman Avenue
Austin, Texas 78703
512-474-0656
ccrow11@gmail.com

Kara Cubbage
RES Americas
9050 Capital of Texas Highway N
Austin, Texas 78759
512-617-3544
kara.cubbage@res-americas.com

Scott R. Darling
Vermont Fish & Wildlife Department
271 North Main Street, Suite 215
Rutland, Vermont
802-786-3862
scott.darling@state.vt.us

Jim Darwin
Texas General Land Office
1700 N. Congress Ave
Austin, Texas 78701
512-463-2623
Jim.Darwin@glo.state.tx.us

Mike Daulton
National Audubon Society
1150 Connecticut Ave NW, Suite 600
Washington, DC 20036
202-861-2242 ext. 3030
mdaulton@audubon.org

Scott Dawson
Edison Mission Energy
18101 Von Karman Ave.
Irvine, California 92612
949-798-7834
sdawson@edisonmission.com

Aimee Delach
Defenders of Wildlife
1130 17th Street, NW
Washington, DC 20036
202-772-0271
adelach@defenders.org

Jim Eisen
BP Alternative Energy
1611 Telegraph Avenue, Suite 1515
Oakland, California 94612
510-267-0320
jim.eisen@bp.com

Samuel Enfield
Windline Development, LLC
4105 49th Street NW
Washington, DC 20016
202-966-6267
sam.enfield@windevco.com

John J. Fay
U.S. Fish & Wildlife Service
4401 N. Fairfax Drive
Arlington, Virginia 22203
703-358-2353
John_Fay@fws.gov

Kevin Garlick
U.S. Fish and Wildlife Service
Arl Sq 510C
Arlington, Virginia 22203
703-358-1949
Kevin_Garlick@fws.gov

Brandy Gibson
BP Alternative Energy
Houston, TX
713-354-2160
brandy.gibson@bp.com

Susan Goodwin
DOI (CADR)
1801 Pennsylvania Avenue, NW
Suite 500
Washington, DC 20006
202-327-5346
susan_goodwin@ios.doi.gov

Joseph F. Grennan
Renewable Energy Systems Americas Inc.
11101 West 120th Avenue, Suite 400
Broomfield, Colorado 80021
303-439-4281
joe.grennan@res-americas.com

Douglas D. Hagemeier
ARCADIS US, Inc.
1717 W. 6th Street
Austin, Texas 78703
512-451-1188
doug.hagemeier@arcadis-us.com

Deb Hahn
Association of Fish and Wildlife Agencies
444 North Capital Street, NW
Suite 725
Washington, DC 20001
202-624-8917
dhahn@fishwildlife.org

Christopher G. Heitman
Shell WindEnergy Inc.
910 Louisiana, Rm 580B
Houston, Texas 77002
713-241-6511
Christopher.Heitman@Shell.com

Jeremy D. Henson
Kleinfelder
1826 Kramer Lane, Suite M
Austin, Texas 78758
512-491-4630
jhenson@kleinfelder.com

Steve Hicks
POWER Engineers, Inc.
62 Marabou Place
The Woodlands, Texas 77380
361-655-1020
Steve.hicks@powereng.com

Catherine Howell
The Nature Conservancy
816 Congress Ave., Ste. 920
Austin, Texas 78701
512-494-9559 ext. 101
chowell@tnc.org

Greg Hueckel
Washington Department of Fish and Wildlife
600 N. Capitol Way
Olympia, Washington 98502
360-902-2416
Hueckgjh@dfw.wa.gov

Laurie Jodziewicz
American Wind Energy Association
1501 M Street, NW, 10th Floor
Washington, DC 20005
202-383-2516
ljodziewicz@awea.org

Elana Kimbrell
Kearns & West
1425 K Street, NW
Suite 410
Washington, DC 20005-3500
202-535-7800
ekimbrell@kearnswest.com

Joe Kuebler
URS CORPORATION
9400 AMBERGLEN BLVD
Austin, Texas 78729
512-419-6550
JOE_KUEBLER@URSCORP.COM

Clifton Ladd
Loomis Partners, Inc.
3101 Bee Cave Road, Suite 100
Austin, Texas 78746
512-672-8967
cladd@loomis-partners.com

Margaret Land
Texas Environmental Studies & Analysis
1713 Santa Monica Blvd.
Kingsville, Texas 78363
361-355-4111
margaret.land@tx-esa.com

James Lindsay
Florida Power & Light Co.
15146 95th Avenue N.
Jupiter, Florida 33030
407-640-2424
jim_lindsay@fpl.com

Rachel London
U.S. Fish and Wildlife Service
4401 North Fairfax Drive
Room 840
Arlington, Virginia 22203
703-358-2491
Rachel_London@fws.gov

Robert Manes
The Nature Conservancy, Kansas
108 N. Sherman
Sedan, Kansas 67361
620-388-2585
rmanes@TNC.org

Kevin A. Martin
Acciona Energy North America
420 Stevens Avenue, Suite 240
Solana Beach, California 91910
858-373-8864
KMARTIN@ACCIONA-NA.COM

Barbi Mata
Blanton & Associates
5 Lakeway Centre Court, Suite 200
Austin, Texas 78734
512-264-1095
bmata@blantonassociates.com

Qena McCarty
Aqena Inc.
12516 Wire Rd.
Leander, Texas 78641
512-699-1639
qmccarty@aqena.com

Natalie McCue
Babcock and Brown
1600 Smith Street, Suite 4025
Houston, Texas 77002
713-308-4281
natalie.mccue@babcockbrown.com

Louis Mills
Texas Tech University
Box 42121, Dept. of Landscape Arch.
Lubbock, Texas 79409-2121
806-742-2858
louis.mills@ttu.edu

Olivia Munzer
SWCA Environmental Consultants
4407 Monterey Oaks Blvd, Building 1, Suite 110
Austin, Texas 78749
512-476-0891, ext. 134
omunzer@swca.com

Robert Murphy
U.S. Fish & Wildlife Service
P.O. Box 1306
Albuquerque, New Mexico 87103
505-248-6879
Robert_Murphy@fws.gov

Jeff Nydegger
Stahl, Bernal & Davis, L.L.P.
7320 N. MoPac Ste. 211
Austin, Texas 78731
512-652-2948
jnydegger@sbaustinlaw.com

Steve Pelletier
Stantec
30 Park Drive
Topsham, Maine 04086
207-729-1199
steve.pelletier@stantec.com

Winifred Perkins
Next Era Energy Resources
700 Universe Boulevard
Juno Beach, Florida 33408
561-691-7046
Winifred_Perkins@fpl.com

Steven Quarles
Crowell & Moring LLP
1001 Pennsylvania Avenue, NW
Washington, DC 20004-2595
202-624-2665
squarles@crowell.com

Rich Rayhill
Ridgeline Energy, LLC
720 W. Idaho Street, Suite 39
Boise, Idaho 83702
208-841-5037
rrayhill@rl-en.com

Clint Riley
U.S. Fish and Wildlife Service
4401 N Fairfax Drive
Arlington, Virginia 22203
703-358-2003
clint_riley@fws.gov

Robert Robel
Kansas State University
116 Ackert Hall
Manhattan, Kansas 66506-4901
785-532-6644
rjrobel@ksu.edu

Dwain Rogers
TX GLO
dwain.rogers@glo.state.tx.us

Robert Roy
First Wind
1 Dana Street
Portland, Maine 04101
207-228-1862
rroy@firstwind.com

Jason Rylander
Defenders of Wildlife
Washington, DC
202-772-3245
jrylander@defenders.org

Cindi Sedberry
Shaw Environmental & Infrastructure, Inc
3010 Briarpark Drive
Houston, Texas 77042
863-255-0440
cindi.sedberry@shawgrp.com

Keith Sexson
Kansas Department of Wildlife and Parks
512 SE 25th Avenue
Pratt, Kansas 67124
620-672-0701
keiths@wp.state.ks.us

Lynn Sharp
Tetra Tech EC, Inc.
1750 SW Harbor Way, Suite 400
Portland, Oregon 97201
503-222-4546
lynn.sharp@tteci.com

Mark Sinclair
Clean Energy States Alliance/Clean Energy Group
50 State Street, Suite 1
Montpelier, Vermont 05602
802-223-2554 x206
msinclair@cleanegroup.org

Jim Sinclair
Texas Environmental Studies & Analysis
1713 Santa Monica Blvd.
Kingsville, Texas 78363
361-355-4111
jim.sinclair@tx-esa.com

Karin Sinclair
National Renewable Energy Laboratory
1617 Cole Boulevard
Golden, Colorado 80401
303-384-6946
karin_sinclair@nrel.gov

Owen E. Sitton
Element Markets LLC
3555 Timmons Lane, Suite 900
Houston, Texas 77027
281-207-7209
ositton@elementmarkets.com

Attachment A

Danna Small
Horizon Wind Energy
808 Travis Street, Suite 700
Houston, Texas 77002
713-356-2502
Danna.Small@horizonwind.com

Randy Sowell
Fremantle Energy, LLC
2700 Via Fortuna Suite 150
Austin, Texas 78746
432-301-0002
randy.sowell@macquarie.com

David J. Stout
U.S. Fish and Wildlfe Service
4401 North Fairfax Drive
Arlington, Virginia 22203
703-358-2555
Dave_Stout@fws.gov

Dale Strickland
Western EcoSystems Technology, Inc.
2003 Central Avenue
Cheyenne, Wyoming 82001
307-634-1756
dstrickland@west-inc.com

Christine Sutter
Pandion Systems, Inc
4603 NW 6th St
Gainesville, Florida 32605
352-372-4747
csutter@pandionsystems.com

Patrick D. Traylor
Hogan & Hartson, LLP
Columbia Square
555 13th Street, NW
Washington, DC 20004
202-637-6866
pdtraylor@hhlaw.com

Karen Tyrell
BHE Environmental, Inc.
11733 Chesterdale Road
Cincinnati, Ohio 45246
513-326-1500
ktyrell@bheenvironmental.com

Matthew J. Wagner
DTE Energy
2000 Second Avenue, 1045 WCB
Detroit, Michigan 48226
313-235-5575
wagnerm2@dteenergy.com

Wendy Wallace
Energetics Incorporated
901 D Street SW
Suite 100
Washington, DC 20024
202-406-4122
wwallace@energetics.com

Travis Warren
Padoma Wind Power, LLC
1313 Terrace Dr.
Andrews, Texas 79714
832-795-1686
twarren@padoma.com

**WIND TURBINE GUIDELINES ADVISORY COMMITTEE**
**FEDERAL ADVISORY COMMITTEE MEETING**
(7th in-person meeting)

***FINAL AGENDA***

**AUSTIN CONVENTION CENTER, MEETING ROOM 2**
**500 E CESAR CHAVEZ ST**
**AUSTIN, TX 78701**

**JUNE 30 – JULY 2, 2009**

**WIND TURBINE GUIDELINES ADVISORY COMMITTEE MEETING**

- Review Subcommittee reports and materials, and develop proposal for moving forward with recommendations.
  - Synthesis Workgroup's One-Text of Recommended Guidelines Draft Version Three
  - Legal Subcommittee update
  - Scientific Tools & Procedures Subcommittee update on Methods and Metrics
  - Cost Subgroup update
- Agree on steps to reach consensus on and complete the Synthesis Draft One-Text of Recommendations, for the FAC to review and finalize in October.
- Discuss milestones, timelines, and process steps for any additional items.

(*Note: Lunch will be brought in for FAC members from Jason's Deli. FAC members will pay for own lunch. FAC Members please bring cash – box lunches approximately $12 each)*

**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, June 30, 2009**

8:00-8:15 **Welcome** Carter Smith, Executive Director, Texas Parks and Wildlife

8:15 – 8:40 **Introductions, & 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 and agenda
  *Agenda is subject to change dependent upon the needs of the FAC*

8:40-10:00 **Overview of Draft v.3**

*Objective of this session: Review Synthesis Draft and policy questions to address.*

- Provide overview of the Synthesis draft
- Overview of items for FAC to work on during this meeting
  - Policy questions
  - Technical Items
  - Editorial

10:00-10:15 Break

10:15-11:00 **Overview of Subcommittee Reports**

*Objective of this session: Progress reports from Subcommittees; walk through products; obtain FAC direction and next steps.*

- Scientific Tools & Procedures
  - Brief on Technical Questions and proposed approach
  - Brief on Review of Methods and Metrics
- Legal
  - Brief on Subcommittee Work Incentives under MBTA, ESA
- Cost
  - Brief Review of cost information

11:15-12:30 **Discuss Policy Issues Raised in Draft 3**

*Objective of this session: review policy items to discuss in each section of the Draft in more detail; receive feedback from the FAC. (Note: the Committee may break into caucuses or Subcommittee discussions)*

12:30 – 1:45 **Lunch: Presentation on ERCOT** *Warren Lasher, Manager, System Assessment, Electric Reliability Council of Texas*

*Lunch will be brought in for FAC members from Jason's Deli. FAC members will pay for own lunch.* ***Please bring cash*** *– box lunches approximately $12 each)*

| | |
|---|---|
| 1:45 – 3:00 | **Discuss Policy Issues Raised in Draft 3 (*continued*)**<br>*Objective of this session: review policy items to discuss in each section of the Draft in more detail; receive feedback from the FAC. (Note: the Committee may break into caucuses or Subcommittee discussions)* |
| 3:00 – 3:15 | **Public Comment**<br>*Members of the public are invited to speak to the FAC. Please sign up on the Public Comment Form. Written comments will be accepted by the Committee.* |
| 3:15-3:30 | **Next Steps and Adjourn for evening** |

Day Two: Wednesday, July 1, 2009

| | |
|---|---|
| 8:00-8:15 | **Review and Approve Agenda**<br>*Agenda is subject to change dependent upon the needs of the FAC* |
| 8:15-10:15 | **Discuss Policy Issues Raised in Draft v.3**<br>*(Note: the Committee may break into caucuses or Subcommittee discussions)*<br>*Objective of this session: Discuss Policy Recommendations and the Recommended Guidelines.* |
| 10:15-10:35 | Break |
| 10:35-12:00 | **Legal Subcommittee Report**<br>• MBTA Subgroup – Discuss Letter of Assurance Option and possibly other options<br>• ESA Subgroup – Discuss Habitat Conservation Plan Option and possibly other options |
| 12:00-1:00 | **Lunch** *(on your own)* |
| 1:00-4:45<br>*(including break)* | **Discuss Policy Issues Raised in Draft 3,** *continued*<br>*(Note: the Committee may break into caucuses or Subcommittee discussions)*<br>*Objective of this session: Discuss Policy Recommendations and the Recommended Guidelines.* |
| 4:45-5:15 | **Public Comment** |
| 5:15-5:45 | **Reflections on Discussion, What Do We Need To Do Tomorrow, Review Next Steps** *A.Arnold, facilitator*<br>• Based on conversation regarding Draft v.3, what is our guidance to the Scientific Tools & Procedures and Legal Subgroups?<br>• 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, July 2, 2009

8:00-8:15 **Review Day's Agenda**

8:15-10:15 **Review Synthesis Workgroup's Draft 3**
*(Note: the Committee may break into caucuses or Subcommittee discussions)*

- *Continue with discussion from prior day, as needed*
- *What is missing? What do we need to work on?*

10:15 – 12:00 *(including break)* **Return to Discussion of Draft v.3, or break into caucuses or subcommittees**

- *What is missing? What do we need to work on?*

12:00-1:15 **Lunch** *(on your own)*

1:15-2:00 **Plenary: Return to Discussion of Draft 3**

- *What is missing? What do we need to work on?*

2:00-2:15 **Review Outstanding Items and Today's Reflections from Chairman/DFO**
*Objective of this session: clarify outstanding issues, direction, and next steps for FAC.*

- Hear from DFO on reflections of the meeting and next steps….

2:15–2:45 **Review of Next Steps**

- Review list of outstanding items; what are the next steps for those items?
- Review next steps and activities between now and October
- Confirm location, starting and ending times for September and/or October Meetings
- Develop timeline with milestones through October 2009
- Agenda items for September/October

2:45-3:00 **Public Comment**

3:00 **Adjourn FAC Meeting**

Attachment C

TO: Readers of USFWS Wind Turbine Guidelines Advisory Committee Public Packet

FR: USFWS Wind Turbine Guidelines Advisory Committee Synthesis Workgroup, or Drafting Subcommittee

RE: Background and Explanation of Draft v.3

DT: June 30 – July 2, 2009

---

The USFWS Wind Turbine Guidelines Advisory Committee (Committee) has been working diligently for 1.5 years to produce a recommendation to the Secretary of the Interior.

The attached *Draft v.3* is a draft to be discussed by the Committee and then modified. This is not a consensus draft. There are important policy, technical, and editorial issues yet to be addressed. Once the Committee has discussed the draft at the June 30 - July 2, 2009 meeting, it will be edited based on Committee direction.

Committee members are beginning to develop a list of policy, technical, and editorial items to discuss further at the next Committee meeting from June 30 - July 2, 2009. This initial list is noted below:

- ***Policy-Related Items to be Addressed by the Committee at the June 30 - July 2, 2009 Meeting* - shaded in gray in the Draft and noted in the margins with a"(P)."**

***Section II of Draft v.3 Committee Draft Policy Recommendations and Language***

- Review all policy recommendations (including the order of policies).
- Review policy recommendation on addressing the impacts to wildlife from other stressors, including climate change.
- Review use of the word "streamline."
- Cumulative Impacts Analysis and Cumulative Effects: this section is being revised.

**Comment [ejk1]:** P4, Line 138-P 6, Line 249

**Comment [ejk2]:** P5 Lines 203-217

**Comment [ejk3]:** P 5, line 187

**Comment [ejk4]:** P6 Lines 236-249.

***Section III of Draft v.3 Committee Draft Guidelines (Guidelines)***

**Chapter One**

- **NEPA Compliance:** does use or application of the Guidelines support NEPA compliance?

**Comment [ejk5]:** P12 Lines 483-485

**Chapter Two**

- **Recommend voluntary guidelines?** Should the FAC explicitly recommend for or against new regulations as part of the implementation of the Guidelines?
- **Adaptive Management:** Do we have the right description regarding how adaptive management is reflected in the Tiered Approach?
- **Cumulative Effects of Project Development:** this section is being revised.

**Comment [ejk6]:** P13 Lines 516-520

**Comment [ejk7]:** Page 17, Lines 719-754.

**Comment [ejk8]:** P18 Line 763 – P19 Line 788

**Chapter Three**

- **Tier 1 - Early Coordination:** Revisit how Tier 1 is described, with particular attention to use of the word "optional," as well as to *when* the developer actually selects a site, and how and whether to include in the Guidelines the sequence of activities a developer goes through prior to talking with agency staff.
- **Tier 1 - Landscape/habitat level review:** have we adequately addressed this issue?
- **Level of detail in Tiers 3-4:** the Committee will discuss and confirm that the Science & Tools Subcommittee is taking the right approach with the level of detail contained in the methods and metrics.
- **Tier 3 - Field studies to document site wildlife conditions:** should the Guidelines be more specific about which wildlife, habitat, and wildlife populations the developer is responsible for studying?
- **Tier 3 - Prescriptive (vs. descriptive) in Tiers 3, 4, and 5**
  - A basic question for the Guidelines is: what is the appropriate level of detail and specificity for each of the Tiers, and how prescriptive should the Guidelines be?
  - Factors to think about include:
    - The Guidelines need to apply to 50 states
    - They need to allow for a range of flexibility to address local conditions
    - They are written to reflect what is needed to best describe and address risk at each of the tiers, but not necessarily to prescribe one specific method (since different methods are more or less useful depending on local habitat, species, and site conditions)
- **Tier 3 - Minimum standards:** consider including these, i.e. when is impact minimization sufficient; what is an acceptable level of impact; what amount of information is adequate to determine anticipated level of impact?
- **Tier 5 - Curtailment Studies**: where should these be included in the Guidelines and in the development process?
- **Tier 5 -** How to approach Tier 5 in general (Science & Tools is reviewing)
- **"Triggers"/Wildlife and Habitat Risk Profiling**
  - The Guidelines need to clarify thresholds, or trigger points, which will require better articulated off-ramps for terminating projects (i.e. what information determines when to decide to abandon a project, move to a different tier, or permit/construct).
- **BMPs:** Are the BMPs sufficient as written; are there any additional BMPs needed? Any to delete?

**Comment [ejk9]:** P20, Lines 824 - 825

**Comment [ejk10]:** P19 Line 801 – P20 Line 823

**Comment [ejk11]:** P23 Line 961 – P41 Line 1786, P43 Line 1871 – P48 Line 2101

**Comment [ejk12]:** P22 Line 928

**Comment [ejk13]:** (same as "level of detail" sections listed above): P23 Line 961 – P41 Line 1786, P43 Line 1871 – P53 Line 2338

**Comment [ejk14]:** P39, 1686

**Comment [ejk15]:** P52, 2288-2302

**Comment [ejk16]:** P48 Line 2104-P53 Line 2338

**Comment [ejk17]:** Tiers 1-5: P19 Line 790 - P53 Line 2338

**Comment [ejk18]:** P41, Line 1789 – P43 Line 1866; additional BMP suggested for P43, 1867. P53 2341 – P55 2428.

**Chapter Four**

- **Mitigation**
  - The goal of Chapter Three of the Guidelines is to recommend effective measures to avoid or minimize impacts to wildlife. Chapter Four focuses on the third element of mitigation, "compensatory mitigation." The draft needs to make this distinction clearer through its presentation of the material and the language used.

**Comment [ejk19]:** P55 Line 2430 – P56 Line 2458.

- What level of impact is acceptable, when is mitigation recommended, and how much impact is too much?

**Comment [ejk20]:** P3, Line 127-129; P11, Line 450-452; P18, 739-741

**Chapters Five - Seven**

- **Chapter Five, Section C – USFWS-State Coordination and Cooperation**: At the federal level, the Guidelines are not recommending regulation. Revisit the description of delegation to states and consistency of application.
- **Chapter 5, Section E - USFWS-Developer Coordination and Cooperation:** What constitutes "compliance" with the Guidelines?
- **Chapter 5, Section G – NGO Actions:** this section is a placeholder.

**Comment [ejk21]:** Currently there is language on this topic at P21, 894-896 – consider moving to Ch. 5, Sect. C (P57 Line 2527 – P59 Line 2591)?

**Comment [ejk22]:** P59, Lines 2604, 2622, 2626.

**Comment [ejk23]:** P60, Lines 2636-2644.

- ***Overall Technical Questions Regarding Draft v.3***
  - The Science & Tools Subcommittee is evaluating the Methods and Metrics section of the draft for accuracy and completeness, and may bring issues to the Committee for its consideration. The technical edits being reviewed include, for example, modifications to the flow chart describing the tiered approach, the definition of terms, protocols related to lighting, buffers, survey and monitoring protocols (intervals and tools), etc.

**Comment [ejk24]:** Numbers are inserted in the Draft where technical edits have been made. See handout "Proposed Technical Revisions to Draft v.3."

- ***Overall Editorial Changes To Be Made to Draft v.3***
  - **Organization of Chapters:** In a subsequent draft it may be desirable to modify the chapters, particularly Five, Six, and Seven.
  - **Citations: A**dd sources and consistency. Include references to recent studies that are currently missing so that the document reflects the most up-to-date information.
  - **Distinction of Roles:** The Guidelines need to be clearer on who is being addressed in each section.
  - **Glossary:** A thorough review of the definitions will be needed between Drafts v.3 and v.4.
  - **Appendices**: At the January 2009 meeting, the Committee agreed to make all appendices part of the final consensus Draft. The Committee will need to conduct a thorough review of all appendices.

- **Policy Questions are shaded in gray and noted in the margins, indicated by (P).**
- **Technical edits are numbered and correspond to handout "Proposed Technical Revisions to Draft v.3."**

## I. Draft Preamble to the Committee Recommendations

### A. Wind Turbine Guidelines Advisory Committee (Committee) Established to Provide Recommendations on Siting Wind Development Projects

In response to interest in development of wind power in the United States, the U.S. Fish and Wildlife Service (USFWS) released in July 2003 for public comment a set of voluntary, interim guidelines for developing wind power projects. After USFWS reviewed the public comments, the Secretary of the Interior (Secretary) established a Federal Advisory Committee to provide recommendations to avoid or minimize impacts to wildlife and their habitats related to land-based wind energy facilities. In March of 2007, USFWS announced the establishment of the Committee in the *Federal Register*.

Pursuant to the requirements of the Federal Advisory Committee Act (FACA), the Committee Charter was signed by the Secretary on October 26, 2007, and is effective for two years. The Charter states the Committee's scope and objective:

*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." (See Attachment X for full Charter)*

The attached Recommended Guidelines (Guidelines) are the result of two years of deliberation by the Committee. Committee Members represent a balance of stakeholder groups with the necessary policy, technical, and/or scientific expertise to address minimization of wildlife impacts associated with the development of the Nation's wind power potential. Committee Members were carefully selected by the Secretary from a large pool of candidates.

**Committee Members**

Taber Allison, Massachusetts Audubon Society
Ed Arnett, Bat Conservation International
Michael Azeka, AES Wind Generation
Kathy Boydston, Texas Parks and Wildlife Department
René Braud, Horizon Wind Energy
Scott Darling, Vermont Fish & Wildlife Department
Mike Daulton, National Audubon Society
Aimee Delach, Defenders of Wildlife
Karen Douglas, California Energy Commission
Greg Hueckel, Washington Department of Fish & Wildlife

Jeri Lawrence, Blackfeet Nation
Steve Lindenberg, U.S. Department of Energy
Andrew Linehan, Iberdrola Renewables
Rob Manes, The Nature Conservancy, Kansas
Winifred Perkins, Next Era Energy
Steve Quarles, Crowell & Moring, LLP
Rich Rayhill, Ridgeline Energy, LLC
Robert Robel, Kansas State University
Keith Sexson, Kansas Department of Wildlife & Parks
Mark Sinclair, Clean Energy Group
Dave Stout, U.S. Fish & Wildlife Service
Patrick Traylor, Hogan & Hartson, LLP

## B. Background on Context and Need for the Recommended Guidelines

Wind development in the United States increased by 46%[2] in 2007, and at the end of 2007 the United States had the second highest cumulative wind capacity globally. This rate of development is expected to continue, and perhaps to accelerate, as United States energy policy emphasizes independence from foreign oil and reduction of carbon emissions. USFWS and the Committee Members recognize that wind-generated electrical energy is renewable, and is considered to be a generally environmentally-friendly technology.

Wind energy produces electricity without air pollution, greenhouse gas emissions, water consumption, mining, drilling, refining, waste storage and other problems associated with many traditional forms of energy generation. Wind power has recently received increased attention because it is a domestic source of energy, and because carbon dioxide emissions from fossil fuel combustion is the leading cause of anthropogenic climate change, which is likely to have serious negative impacts on ecosystems and wildlife.[3] The U.S. Department of Energy (DOE) estimates that a single 1.5 MW wind turbine displaces 2700 metric tons of $CO^2$ per year compared with the current U.S. average utility fuel mix.[4] Due to these advantages, wind is expected to play an increasingly important role in meeting the Nation's energy goals in the coming years.

Nevertheless, as the U.S. moves to expand wind energy production, it also must maintain and protect the Nation's wildlife and habitats, which wind energy production can negatively affect. With proper diligence to siting, operations and management, it is possible for facilities to avoid, minimize and mitigate these impacts. As with all responsible energy development, wind power facilities should adhere to high standards for environmental protection.

## C. Premises and Guiding Principles Under Which the Committee Operated

[2] (20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. (2008).248 pp; NREL Report No. TP-500-41869; DOE/GO-102008-2567).
[3] Intergovernmental Panel on Climate Change 2007
[4] 20% Wind Energy by 2030 2008).

**Committee Premises**

- Acknowledging the USFWS definition of wildlife (see glossary); recognition that different species and species groups have different levels of protection under tribal, federal and state wildlife statutes. (See Legal White Paper).

- Identify, evaluate and recommend approaches to assessing risk and impacts to wildlife associated with wind energy development that are useful regardless of the regulatory status of any particular species, and that are particularly focused on those species most likely to be affected by wind energy development.

- Recognition that, among different wind energy projects, there will be varying degrees of potential impact to wildlife as well as varying degrees of certainty associated with the assessments of that potential impact. Thus varying levels of effort will be appropriate in assessing the risk of potential projects and how or whether the projects are developed

- Recognition that it is possible and essential to avoid, minimize, and/or mitigate negative impacts on wildlife populations and habitats while balancing expected impacts with the costs of undertaking necessary studies and monitoring.

**Committee Guiding Principles for the Guidelines**

- Provide a consistent methodology for conducting pre-construction risk assessments and post-construction impact assessments to guide siting decisions by developers and agencies

- Encourage communication and coordination between the developer and relevant state and federal agencies during all phases of wind energy project development

- Provide mechanisms to encourage their adoption and use by all federal agencies, as well as the wind energy industry, while recognizing the primary role of the lead agency in coordinating specific project assessments

- Complement state and tribal efforts to address wind/wildlife interactions and provide a voluntary means for these entities to coordinate and standardize review of wind projects with the USFWS

- Provide a clear and consistent approach that increases predictability and reduces the risk of liability exposure under federal wildlife laws

- Provide sufficient flexibility to accommodate the diverse geographic and habitat features of different wind development sites

- Present mechanisms for determining compensatory mitigation, when appropriate, in the event of unforeseen impacts to wildlife during construction or operation of a wind energy project

- Define scientifically rigorous and cost-effective study designs that improve the ability to predict direct and indirect wildlife impacts locally and regionally

- Include a formal mechanism for revision in order to incorporate experience, technological improvements, and scientific advances that reduce uncertainty in the interactions between wind energy and wildlife

## II. Committee Draft Policy Recommendations

Comment [ejk25]: (P) All policy recommendations are under review, including their order and organization.

*Adoption and Use of the Guidelines*

**Adopt, promulgate, and consistently implement the voluntary Guidelines recommended in this document.** The Committee gave considerable attention to the production of a suggested protocol for wildlife assessment and siting decisions at wind power facilities. This protocol, described in detail in Chapter 3 of this document, uses a tiered approach to evaluate, predict, and minimize the risk of potential wind projects to wildlife and habitat, and to assess and mitigate impacts post-construction. The Committee believes that the final product reflects a comprehensive and user-friendly risk assessment and decision-making tool that supports Department of the Interior's (DOI) priorities with respect to renewable energy development, federal and state trust responsibilities, developer cost and confidentiality concerns, and the needs of sensitive wildlife and habitats, without creating new regulations. The Committee recommends that the Secretary direct USFWS to promptly adopt the recommended voluntary Guidelines developed by the Committee.

**In adopting and implementing the Guidelines, the Committee recommends that the Secretary use the premises and principles adopted by the Committee, as set forth in Section I.C. above.**

*Tools and Support for Implementation*

**Develop landscape tools and provide analysis to assist in implementation of the Guidelines.** An important aspect of the tiered risk assessment process is that it encourages the use of existing landscape and habitat mapping data to provide a rapid early assessment of the potential wildlife and habitat risk of a site or region. In order to facilitate this process for the developer, the Committee recommends that the Secretary instruct USFWS to investigate existing on-going landscape analysis and mapping efforts focused on renewable energy. USFWS should determine if these processes provide timely and adequate geographic and/or habitat and species information associated with wind energy development. USFWS should also seek opportunities to coordinate its own related processes, and/or supplement these activities to provide a landscape-level habitat and ecosystem mapping tool that will be useful for improving wind energy siting. The Committee also recommends that USFWS staff assist in the analysis and interpretation of these tools to further facilitate the process.

**Provide and/or support adequate, meaningful incentives for industry's voluntary adoption of the Guidelines**. The Committee has explored a suite of legal and financial incentives to encourage universal adoption of the recommended voluntary guidelines. The results of these

investigations are described in detail in Chapter 5 of the Guidelines. The Committee recommends that DOI implement incentives within DOI's purview simultaneously with promulgation of the Guidelines. The Committee also recommends that DOI engage constructively to support potential incentives that are outside the purview of DOI (for instance those that would require statutory changes) and encourage their timely adoption and implementation.

**Advance the use, cooperation, and effective implementation of the Guidelines.** Coordinate within DOI and with other federal agencies, tribes, states, wind developers and other stakeholders to maximize the use and effectiveness of the Guidelines. In order to do this, the Committee recommends the Secretary consider the following:

- Encourage collaboration and coordination with other federal and state agencies and tribes to streamline and encourage consistent review of wind energy projects.
- Develop best management practices based on the Guidelines.
- Promote use of the Guidelines by federal and state agencies, as well as by the private sector.
- Provide training to USFWS and other federal agency field personnel on effective use of the Guidelines.
- Streamline the review and permitting process for wind projects by federal agencies.
- Advance the involvement and cooperation of non-governmental organizations with an interest in improving siting and compensatory mitigation for wind projects.

**Comment [ejk26]: (P)** Use of "streamline" throughout document is being reviewed.

**Assure that the USFWS has an adequate budget and staff resources to implement the Guidelines as necessary, including training of Regional and Field staff and other interested stakeholders.**

**When making policy decisions, address both the threat to birds and other wildlife from climate change, and the effects of other stressors.** The Secretary is encouraged to make management, policy, project-specific assessment, siting, and mitigation decisions, with appropriate consideration of wind energy's air pollution, greenhouse gas, water consumption, and other benefits, when conducting its review of wind energy development pursuant to the Guidelines. According to the USFWS Climate Change Strategic Plan (Strategic Plan), "Climate change is the greatest challenge the Service has ever faced in conserving fish, wildlife and their habitats." The Strategic Plan outlines a joint commitment to *mitigation*[5] (reducing the sources or enhancing the sinks or carbon dioxide) and *adaptation*[4] (management to reduce the impacts of climate change on fish, wildlife and habitats). The Committee urges the Secretary to hold both of these commitments in mind when making management decisions related to wind development: recognizing both the important role that wind power, as a carbon-free energy source, will play in climate change *mitigation*[4], while also delivering wind on the landscape in a manner that supports wildlife *adaptation*[4] to climate change, namely by minimizing wind's potential to itself be a non-climate stressor.

**Comment [ejk27]: (P)** Under review.

[5] As defined by the Intergovernmental Panel on Climate Change (IPCC).

*Future Application*

**Research**. Work with other federal agencies, stakeholders, and states to develop a national research plan that identifies and implements research priorities to reduce impacts to wildlife resources while allowing wind energy development. Research should be conducted collaboratively, wherever possible, and should include appropriate stakeholders and peer review.

**Revise the Guidelines.** Review and revise the Guidelines, as justified, at least once every five years to incorporate new knowledge on wildlife interactions with wind energy and the rapidly advancing technology of commercialized wind energy production. The Secretary should use the Committee's premises and principles to assist in revisions of the Guidelines.

**Use an approach as consistent with these Guidelines as appropriate when reviewing off-shore wind energy development.** Other guidelines should be developed for wind projects near-shore and on the Outer Continental Shelf. Off-shore wind projects may use different survey methods, but the tiered approach can be used to determine site development potential and identify potential natural resource issues.

**Cumulative Effects Analysis**. The Committee recommends DOI improve its capability to assess cumulative impacts by working with the USFWS Regions to undertake, subject to available resources, a comprehensive look at the range of development stressors at an ecoregion level, that looks at indicator species or habitats within the ecoregion at the most risk of significant effects from wind development, in conjunction with other reasonably foreseeable development pressures. As part of this process, USFWS should engage with wind industry and other stakeholders to estimate, if feasible, the effects that full build out of wind energy might have on those species or habitats within an ecoregion.

Therefore, the Committee recommends that each region of the USFWS develop a cumulative effects analysis with the goal of identifying species and habitats at particular risk from the cumulative effects of wind energy and other types of development. The product of regional analyses of cumulative effects should be available to inform Tier 1 preliminary site assessment or Tier 2 site characterization as well as for designing Tier 3 wildlife surveys.[6]

**Comment [ejk28]: (P)** This section is being revised. See proposed language changes.

[6] The Committee also recommends that in developing the scope of this cumulative effects analysis, the USFWS review the conclusions of the white paper on cumulative effects analysis developed by the USFWS, Oregon Department of Fish and Wildlife, and other stakeholders during the development of the Oregon Columbia Ecoregion Wind Energy Siting and Permitting Guidelines (September 29, 2008). The white paper reviewed multistate cumulative effects analyses prepared by WEST, Inc. in the Pacific Northwest and made recommendations on how such analyses could be more effective. Recommendations included:

- Collaborative funding and management of regional cumulative effects analysis
- Focus on a limited number of key regional indicator species and habitats most likely to be affected by wind energy
- Studies to better understand the population dynamics of the key indicator species and to develop "impact levels of concern"
- Development of an action plan for impacts to key species and habitats that are above "threshold of concern" levels

# U.S. Fish and Wildlife Service
# Wind Turbine Guidelines Advisory Committee

***Draft Recommended Guidelines***

***Submitted to the Secretary of the Interior***
***(Date)***

***By the Wind Turbine Guidelines Advisory Committee***

# U.S. Fish and Wildlife Service
# Wind Turbine Guidelines Advisory Committee

## Draft Recommended Guidelines

## Draft Table of Contents

Executive Summary (*to be inserted)*

Chapter One: Introduction
A. Background
B. Premises and Guidelines Principles
C. Benefits of Using the Guidelines

Chapter Two: Summary of the Guidelines and General Considerations
A. Intended use of the Guidelines
B. Use of Mitigation policies and principles
C. Introduction to the decision-framework using a tiered approach
    1. Application of the tiered approach and possible outcomes
    2. Research Questions
    3. Adaptive Management (AM)
    4. Confidentiality of site evaluation process as appropriate
    5. Cumulative effects of project development

Chapter Three: The Tiered Approach for Wildlife Assessment and Siting Decisions
A. Tier 1 - Preliminary evaluation or screening of potential sites
B. Tier 2 - Site characterization
C. Tier 3 - Field studies to document site wildlife conditions and predict project impacts
D. Site Construction – site development and construction best management practices (BMPs)
E. Site operation – conduct Tier 4 and 5 studies, as appropriate
F. Retrofitting
G. Repowering Existing Wind Projects
H. Decommissioning

Chapter Four: Mitigation
Impact Avoidance and Minimization
Compensation
Mitigation Plans

Chapter Five: Advancing Use, Cooperation, and Effective Implementation of the Guidelines

A. Recommendations from the Legal and Incentives Subcommittees on Incentives for Use of the Guidelines (*currently being drafted)*
B. Federal Interagency coordination and cooperation
C. USFWS-state coordination and cooperation
D. USFWS-tribal coordination and cooperation
E. USFWS-developer coordination and cooperation (*currently being drafted)*
F, Use of Avian and Bat Protection Plan
G. NGO Actions

Chapter Six: Revisions to the Guidelines

Chapter Seven: Recommendations for Effective USFWS Administration of the Guidelines

A. Consistent application
B. Training
C. Staff support
D. Research

Appendices - *incomplete*

Please see the FAC website for the Other Models Subcommittee Matrix from October 21-23, 2008: *www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee.html*

A. WTGAC Legal Subcommittee White Paper October 21-23, 2008
B. WTGAC Landscape/Habitat Subcommittee, "Mapping Tools Case Studies" October 21-23, 2008
C. WTGAC Landscape/Habitat Subcommittee, Summary of Metadata for Data Layers Mapped, October 21-23, 2008
D. WTGAC Existing Guidelines Subcommittee Recommendations, October 21-23, 2008
E. First Draft Recommended Elements of an Avian and Bat Protection Plan, October 21-23, 2008
F. Glossary

Bibliography

# Draft Recommended Guidelines

**Executive Summary, *to be inserted***

**Chapter One: Introduction**

### A. Background

In response to the Nation's growing demand for production of electricity by wind power and in recognition of the U.S. Fish and Wildlife Service (USFWS) mission "Working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people," the Secretary of the Interior (Secretary) authorized USFWS to charter the Wind Turbine Guidelines Advisory Committee (Committee) to recommend effective measures to avoid or minimize impacts to wildlife and their habitats related to land-based wind energy facilities.

Herein are the Committee's Recommended Guidelines (Guidelines) based on two years of deliberations and judgments regarding the siting and operation of large wind developments while minimizing impacts to wildlife and their habitat. The Committee is composed of a broad array of representatives selected for their outstanding experience on these issues, and who are among the most informed in the country. These Guidelines are the Committee's best attempt to present the most effective, feasible, and appropriate approaches that are available to the Department of the Interior (DOI), tribes, states, local jurisdictions, and the wind industry to address USFWS responsibilities to protect wildlife resources while encouraging responsible siting and operation of wind energy projects.

### B. Premises and Guiding Principles

In its development of these Guidelines, the Committee accepted by consensus the following premises and principles on March 26, 2009 and recommends these be incorporated into the final guidance published by the USFWS.

Premises

1. The Committee acknowledges the USFWS definition of wildlife (see glossary). The Committee recognizes that different species and species groups have different levels of protection under tribes, federal and state wildlife statutes. (See Legal White Paper).

   It is the Committee's intention to identify, evaluate and recommend approaches to assessing risk and impacts to wildlife associated with wind energy development that are useful regardless of the regulatory status of any particular species, and that are particularly focused on those species most likely to be affected by wind energy development.

2. The Committee recognizes that, among different wind energy projects, there will be varying degrees of potential impact to wildlife as well as varying degrees of certainty

associated with the assessments of that potential impact. Thus varying levels of effort will be appropriate in assessing the risk of potential projects and determining how or whether the projects are developed.

3. The Committee recognizes that it is possible and essential to avoid, minimize, and, if necessary, mitigate negative impacts on wildlife populations and habitats while balancing expected impacts with the costs of undertaking necessary studies and monitoring.

Principles

1. The Guidelines should provide a consistent methodology for conducting pre-construction risk assessments and post-construction impact assessments to guide siting decisions by developers and agencies

2. The Guidelines should encourage communication and coordination between the developer and relevant state and federal agencies during all phases of wind energy project development

3. The Guidelines should provide mechanisms to encourage their adoption and use by all federal agencies, as well as the wind energy industry, while recognizing the primary role of the lead agency in coordinating specific project assessments

4. The Guidelines should complement state and tribal efforts to address wind/wildlife interactions and provide a voluntary means for these entities to coordinate and standardize review of wind projects with the USFWS

5. The Guidelines should provide a clear and consistent approach that increases predictability and reduces the risk of liability exposure under federal wildlife laws

6. The Guidelines should provide sufficient flexibility to accommodate the diverse geographic and habitat features of different wind development sites

7. The Guidelines should present mechanisms for determining compensatory mitigation, when appropriate, in the event of unforeseen impacts to wildlife during construction or operation of a wind energy project

8. The Guidelines should define scientifically rigorous and cost-effective study designs that improve the ability to predict direct and indirect wildlife impacts locally and regionally

9. The Guidelines should include a formal mechanism for revision in order to incorporate experience, technological improvements, and scientific advances that reduce uncertainty in the interactions between wind energy and wildlife

### C. Benefits of Using the Guidelines

As our Nation moves to achieve its renewable energy commitments, it must also maintain and protect its wildlife resources. The Committee's Guidelines will facilitate wind energy development while protecting wildlife and their habitat. The Guidelines will provide best management practices for wind energy-wildlife interactions and result in greater regulatory certainty for the wind developer by:

1. **Reduced Ecological Impacts**
   The Guidelines offer a science-based reference for use by industry, federal, state, tribal and local agencies, and other stakeholders in the siting and permitting of wind projects. The Guidelines describe the kind of information needed to adequately identify, assess, minimize, mitigate, and monitor the wind-wildlife impacts when developing new wind energy projects and repowering existing facilities. The Guidelines will promote scientifically sound, cost-effective study designs; produce comparable data among studies throughout the Nation; allow for analyses of trends and patterns of impacts at multiple sites; and ultimately improve the ability to estimate and resolve impacts to wildlife and habitats locally and regionally.

2. **Increased Compliance and Reduced Regulatory Risk**
   The Guidelines are a tool for facilitating compliance with relevant laws and regulations by recommending methods for conducting site-specific, scientifically sound biological evaluations. Following the Guidelines supports National Environmental Policy Act (NEPA) compliance, facilitates permit review, and provides a measure of regulatory certainty for wind energy developers. Using the methods described in the Guidelines will provide information for impact assessment, minimizing impacts, and compensatory mitigation (if needed) for the application of wildlife protection laws. It also demonstrates a good faith effort to develop and operate wind projects consistent with the intent of local, state, and federal laws.

   **Comment [ejk29]: (P)** Does following the Guidelines support NEPA Compliance?

3. **Improved Predictability of Wildlife and Habitat Impact**
   The goal of the Guidelines is to provide a consistent, predictable approach to assessing impacts to wildlife and habitats from wind energy projects, while providing flexibility to accommodate the unique circumstances of each project. As comparable information from projects using consistent and standardized methods and protocols becomes available from projects around the Nation, meta-analysis will continue to provide information that allows better predictive modeling. The growing body of information will assist in providing valuable information on "use" of wind energy sites by and potential impacts to birds and bats. Over time the growing knowledge base should decrease the need for some monitoring studies.

4. **Cost Savings**
   The Guidelines recommended herein will promote scientifically sound, cost-effective study designs; produce comparable data among studies within the nation; allow for analyses of trends and patterns of impacts at multiple sites; and ultimately improve the ability to predict and resolve impacts locally, regionally and nationally. This will reduce the need for some studies, thereby reducing project costs. Initiating pre-construction surveys early will help to avoid unnecessary and costly delays during permitting. The

Guidelines advise that the costs and the resulting benefits be considered when developing the monitoring efforts needed for each project site. Some monitoring methods and/or technologies are expensive and should only be recommended when necessary.

## Chapter Two: Summary of the Guidelines and General Considerations

### A. Intended Use of the Guidelines

Rather than promulgate new regulations, these Guidelines are intended to be voluntary. Although voluntary, the Guidelines described in this report are designed to be used by all prospective developers of wind energy projects and USFWS field staff reviewing such projects. The Guidelines also are intended to provide a useful, suggested approach for local, state and tribal officials, and other interested stakeholders.

**Comment [ejk30]: (P)** Should the FAC explicitly recommend for or against new regulations as part of the implementation of the Guidelines?

The primary purpose of these Guidelines is to describe the information typically needed to identify, assess, and monitor the potential adverse effects of wind energy projects on wildlife and their habitat, especially migratory birds, bats and species at risk, in order to:

- Guide the wind energy industry to make the best possible choices on the location, design and operation of wind energy installations to avoid and minimize the risks to wildlife and their habitat.

- Ensure that the responsible regulatory agency or advisory agency for any wind energy installation is aware of and considers the appropriate factors that present risks to wildlife and their habitat and the full range of options to avoid, minimize and, if needed, provide compensatory mitigation.

- Specify the types and amount of baseline information that are required for adequate review of a wind project; and describe the likely extent of follow-up that would be necessary after construction.

Other purposes include:

- To promote responsible development of wind facilities across the country;

- To enable states, tribes, USFWS, developers and stakeholders to share information and data regarding avian and bat studies, compensatory mitigation options, siting practices, and monitoring of habitat/species impacts, to increase understanding of risks and the effectiveness of siting and operating decision-making;

- To develop effective, consistent and 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 Committee wrote the Guidelines to be as specific as possible with regard to the expectations, recommendations, and appropriate assessments for developing a wind energy project. They must, however, apply to a large diversity of projects in many different habitats. The Guidelines are intended to provide flexibility in their application, in consideration of project specific factors, and not be rigidly applied in every situation.

### B. Use of Mitigation Policies and Principles

These Guidelines 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 objective is to avoid or minimize impacts to fish, wildlife and their habitats, and to provide compensatory mitigation for those impacts not avoided or minimized. Wind project proponents should consider the use of the USFWS Mitigation Policy (USFWS Mitigation Policy, 46 FR 7656 (1981)) whenever it is not possible or feasible to avoid and minimize impacts to wildlife habitats. The USFWS policy provides a common basis for determining how and when to use different compensatory mitigation strategies, and facilitates earlier consideration of wildlife values in wind project planning. The fundamental principles that will guide the use of compensatory mitigation and recommendations by the USFWS are reflected in Chapter 4 of these Guidelines. Wind developers also should consult with appropriate state agencies to ensure compliance with state compensatory mitigation requirements.

### C. Introduction to the Decision Framework Using a Tiered Approach

The Committee recommends using a tiered approach to evaluate and minimize the risk of potential wind projects to wildlife (see flow chart below, "General Framework for Minimizing Impacts of Wind Development on Wildlife in the Context of the Siting and Development of Wind Power, October 21-23, 2008"). The tiered approach is a decision framework for collecting information in increasing detail to evaluate risk and make siting and operational decisions. The tiered approach provides the 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, it allows efficient use of developer and wildlife agency resources with increasing levels of effort until sufficient information and the desired precision is acquired for the risk assessment.

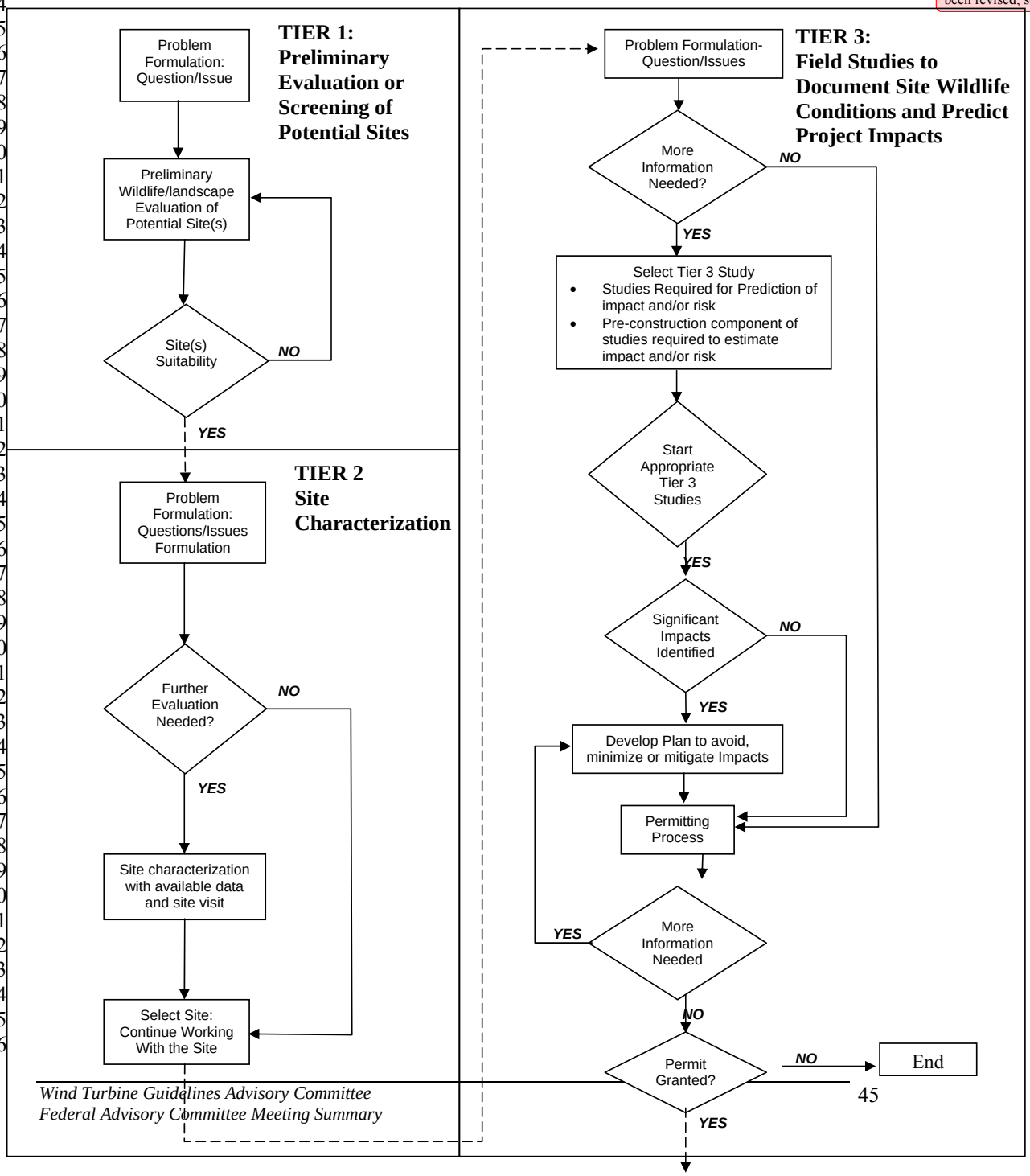
#### Application of the tiered approach and possible outcomes

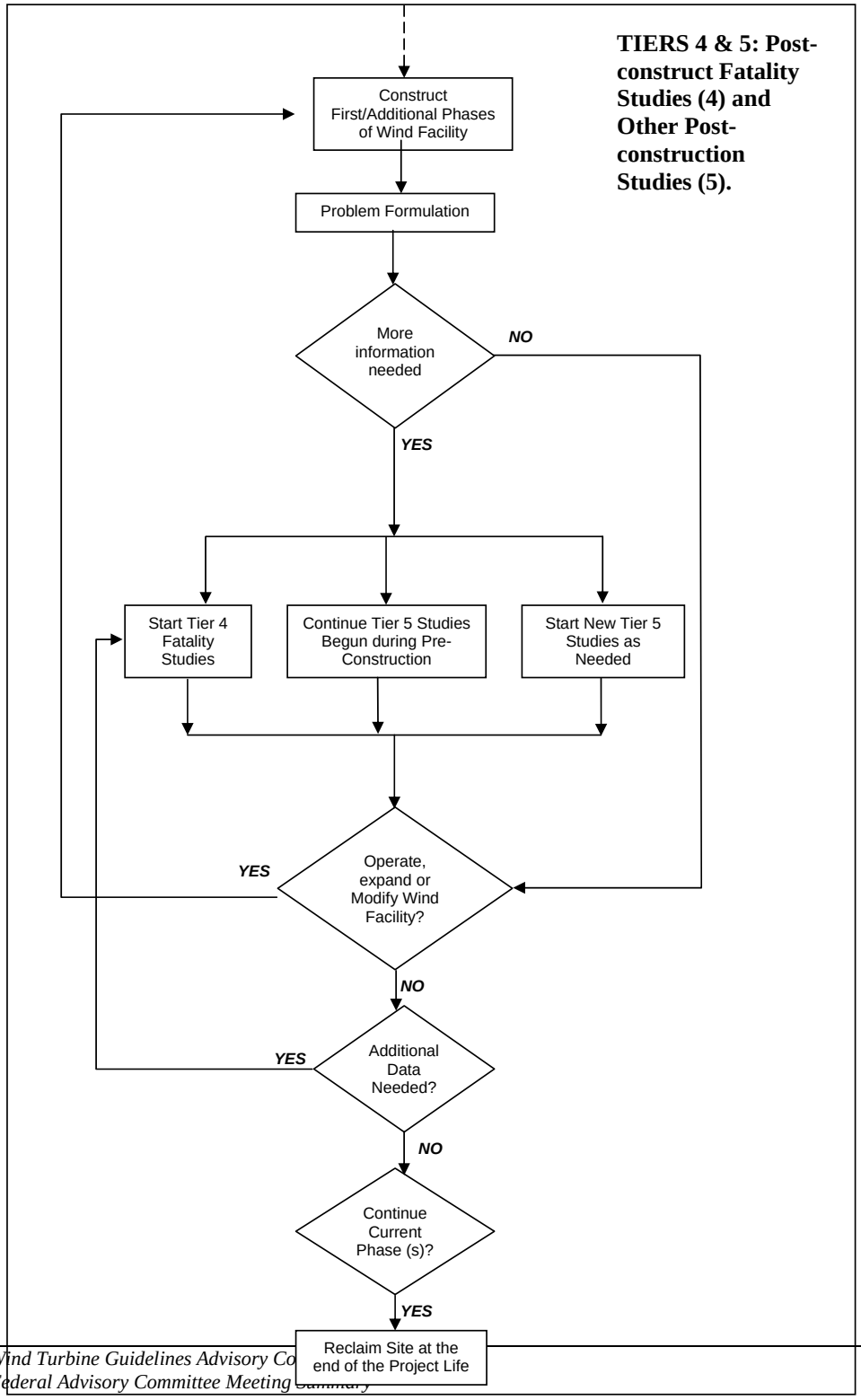
Five tiers comprise the preconstruction risk assessment and post-construction impact assessment phases of a wind project. Tiers 1-3 are pre-construction activities and are typically sequential investigations. Tiers 4-5 are post-construction activities that may occur simultaneously.

The tiered approach is an iterative process for quantifying the risks to wildlife of a potential wind energy project. At each tier, problem formulation guides the decision process by describing how to determine the need for additional data collection and the identification of potential problems associated with developing or operating a project. If sufficient data are available at a particular tier, the following outcomes are possible based on analysis of the information gathered: 1) the project is abandoned because the risk is considered unacceptable, 2) the project proceeds in the

**General Framework for Minimizing Impact of Wind Development on Wildlife in the Context of the Siting and Development of Wind Power (Appendix E from First Release Draft One-Text)**

Comment [ejk31]: The flowchart has been revised; see proposed changes.




TIERS 4 & 5: Post-construct Fatality Studies (4) and Other Post-construction Studies (5).
Construct First/Additional Phases of Wind Facility
Problem Formulation
More information needed
NO
YES
Start Tier 4 Fatality Studies
Continue Tier 5 Studies Begun during Pre-Construction
Start New Tier 5 Studies as Needed
Operate, expand or Modify Wind Facility?
YES
NO
Additional Data Needed?
YES
NO
Continue Current Phase (s)?
YES
Reclaim Site at the end of the Project Life

development process without additional data collection, or 3) an action or combination of actions, such as project modification, compensatory mitigation, or specific post-construction monitoring, is indicated. If data are deemed insufficient at a tier, more intensive study is conducted in the subsequent tier until sufficient data are available to make a decision to abandon the project, modify the project, or proceed and expand the project. The tiers are listed as follows:

- ✓ Tier 1 - Preliminary evaluation or screening of potential sites
- ✓ Tier 2 - Site characterization
- ✓ Tier 3 – Field studies to document site wildlife conditions and predict project impacts
- ✓ Tier 4 – Post-construction fatality studies
- ✓ Tier 5 – Other Post-construction Studies

**Research Questions**

Much uncertainty remains about predicting risk and estimating impacts of wind energy development on wildlife. It is in the interests of wind developers and wildlife agencies to improve these assessments to better avoid and minimize the wildlife impacts of wind energy development. The Committee recommends that research that improves predictions of pre-construction risk and estimates of post-construction impacts be a high priority. Research can provide data on operational factors (e.g. wind speed, weather conditions) that are likely to result in fatalities. It could also include studies of cumulative effects of multiple wind projects, or comparisons of different methods for assessing avian and bat activity relevant to predicting risk. Research projects may occur at the same time as project-specific Tier 4 and Tier 5 studies. Research would usually result from collaborative efforts involving appropriate stakeholders, and is not the sole or primary responsibility of any developer.

**Adaptive Management (AM): Definition of Active versus Passive AM and Applicability of AM to the Decision Framework and Tiered Approach.**

Adaptive management (AM) is a series of scientifically driven management actions (within economic and resource constraints) that use monitoring and research results to test competing hypotheses related to management decisions and actions, and apply the resulting information to improve management. AM can be categorized into two types: "passive" and "active" (Walters and Holling 1990, Murray and Marmorek 2003). In passive AM, alternatives are assessed and the management action deemed best is designed and implemented. Monitoring and evaluation then lead to adjustments as necessary. In active AM, managers explicitly recognize that they do not know which activities are best, and then select several alternative activities to design and implement.[7]

**Comment [ejk32]: (P)** Do we have the right description regarding how adaptive management is reflected in the Tiered Approach?

Passive AM may be applicable to wind energy development if warranted. The tiered approach employed by these guidelines is in fact a passive AM decision-making process. In the pre-construction environment, analysis and interpretation of information gathered at a particular tier

[7] In active adaptive management, monitoring and evaluation of each alternative helps in deciding which alternative is more effective in meeting objectives, and adjustments to the next round of management decisions can be made based on those lessons. With the possible exception of evaluating project specific mitigation measures, the Committee is not advocating that active AM be implemented at wind energy projects. Active AM may be appropriate if there is a specific research objective that is not project specific, and the Committee recognizes that accomplishing those objectives is outside the decision framework and would involve multiple stakeholders and funding sources.

influences the decision to proceed further with the project or the project assessment. If the project is constructed, information gathered in the pre-construction assessment guides possible project modifications, or the need for and design of post-construction studies. Analysis of the results of post construction studies can test design modifications and operational activities to determine their effectiveness in avoiding and minimizing impacts. When there is considerable uncertainty over the appropriate mitigation for a project active adaptive management is the preferred approach to testing the effectiveness of alternative approaches.

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

Passive and active AM as described above are similar to the process described in the DOI Adaptive Management Technical Guide (Williams et al 2007). As described in the Technical Guide, AM includes five key elements in its application: stakeholder involvement, management objectives, management alternatives, predictions of the effects of potential management actions, and monitoring protocols and plans. These elements are folded into the structured process of decision making, monitoring, and assessment. Passive AM, and its use in the tiered approach, is consistent with the technique outlined in the Technical Guide.

### Confidentiality of Site Evaluation Process as Appropriate

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

### Cumulative Effects of Project Development

**Comment [ejk33]: (P)** The section is under review. See proposed language changes.

Cumulative effects are the impact on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. The goal of cumulative effects analysis should be to incorporate environmental considerations into the wind energy planning process as early as possible to improve decisions. Without incorporating cumulative effects into planning and management, it will be impossible to move towards development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The magnitude and extent of the effect on a resource depends on whether the cumulative effects exceed the capacity of the resource to sustain itself and remain productive.

Cumulative effects analysis is required by NEPA; any energy project with a federal nexus must include cumulative effects analysis at the appropriate level as part of its NEPA analysis. In that case, developers should coordinate with federal and state resource agencies to assess what other federal, non-federal and private actions are being considered, and which should be included in a cumulative effects analysis. Federal and state agencies are more likely to have information regarding other current and proposed wind development and which species and habitats are at risk from the cumulative effects of wind development.

Where there is no federal nexus, individual developers are not expected to conduct cumulative effects analysis on their own; however, having cumulative effects analysis available would help developers and other stakeholders understand the significance of potential wildlife impacts. Developers are encouraged to coordinate with federal and state agencies early in project development to ensure that the developer is aware of any existing information on the cumulative effects of individual wind projects on species and habitats at risk and incorporates any such info into project wildlife studies.

## Chapter Three: The Tiered Approach for Wildlife Assessment and Siting Decisions

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

**Comment [ejk34]: (P)** The Guidelines need to clarify "trigger points," better articulated off-ramps for terminating projects (i.e. what information determines when to decide to abandon a project, move to a different tier, or permit/construct).

### A. Tier 1: Preliminary Evaluation or Screening of Potential Sites

**Comment [ejk35]: (P)** Do the Guidelines adequately address landscape/habitat level review?

For some wind energy projects, the first stage in the assessment of potential risk to wildlife is a preliminary regional evaluation of a potential site or sites in order to identify geographic areas of high wildlife sensitivity due to 1) the presence of large blocks of intact native landscapes, 2) intact ecological communities, 3) fragmentation-sensitive species' habitats, or 4) other important landscape-scale wildlife values. These evaluations rely on geographic databases and generally examine areas from a regional rather than a site-specific scale. Developers who choose to conduct Tier 1 investigations will utilize existing public or other readily available landscape-level maps and databases from sources such as federal, state, or tribal wildlife or natural heritage programs, the academic community, conservation organizations, or the developer's or consultant's own information. The Committee has made a policy recommendation to DOI that USFWS facilitate or participate in the development of a comprehensive landscape database on a national scale for the purpose of identifying and assessing development risks and cumulative impacts to ecosystems and large-scale habitats.

Tier 1 may be used in any of three ways:

a) to identify regions where wind energy development poses exceptional risks to wildlife or habitats, including the fragmentation of large-scale habitats and threats to regional populations of sensitive species;

b) to "screen" an ecoregion or set of multiple potential sites in order to avoid those that have the highest habitat values; or

c) to begin to determine if a single identified potential site poses serious wildlife or habitat concerns.

Tier 1 is considered to be an optional internal process for the developer, and it may not be

feasible in all situations. However, Tier 1 is recommended because it offers early guidance about the sensitivity of the site within a larger landscape context, and can help direct development away from sites that will be associated with higher study, mitigation costs, and uncertainty. In some cases, Tier 1 studies could reveal serious concerns indicating that a site should not be developed. In other cases it will raise questions or uncertainties that will guide investigations in further tiers, particularly if the necessary habitat data is deficient or outdated.

**Comment [ejk36]: (P)** Revisit how Tier 1 is described, especially use of the word "optional" and how to describe the developer's internal review process

Suggested questions to be considered in Tier 1 include:

1. Are there known threatened, endangered, federal "sensitive", state-listed, or other special status species present on the proposed site, and/or is habitat (including designated critical habitat) present for these species?
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 areas for non-government organizations; or other local, state, regional, federal, tribal, or international categorization that may preclude energy development?
3. 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?
4. Are there large areas of intact habitat with the potential for fragmentation, with respect to species with needs for large contiguous blocks of habitat?

**Tier 1 Methods and Metrics**

Answers to the above questions may determine whether suitable sites are available in the region where development is being considered and developers can then decide whether to proceed to further tiers (See Tier 2-5 below) as they plan for development of those sites. Developers should review the publicly available data, and the analysis of available sites in the region of interest will be based on a blend of the information available in published and unpublished reports, wildlife range distribution maps, and other such sources.

**Comment [ejk37]: Technical Edit #1**

The purpose of this tier is assist the developer in identifying wind energy development sites with few if any potential conflicts with wildlife. A developer's decision to proceed with further review of potential sites with "yes" answers to any or all of the above questions will entail more detailed studies in Tier 2 and Tier 3 for species considered at risk from the development. "Yes" answers may also result in stronger scrutiny from those state, federal, and tribal agencies that have responsibility for protecting wildlife resources. However, a "Yes" answer to any of the questions does not indicate that a project should not go forward.

While the answer of "no" to the questions where data exists may be encouraging to a developer, an answer of "no" in the absence of data will not necessarily indicate an absence of wildlife conflicts. If a site is selected for further analysis in the absence of data adequate to definitively answer the questions, the developer should attempt to locate the data necessary to answer the questions posed in Tier 2.

### B. Tier 2: Site Characterization

**Comment [ejk38]: (P)** The Guidelines need to clarify "trigger points," better articulated off-ramps for terminating projects (i.e. what information determines when to decide to abandon a project, move to a different tier, or permit/construct).

At this stage the developer has narrowed consideration down to specific sites, and additional data may be necessary to conduct a more detailed site characterization for a sufficient risk assessment. A distinguishing feature of Tier 2 studies is that they focus on site specific information and should include at least one visit to each of the prospective site(s). Questions suggested for Tier 2 can be answered using credible publicly available information that includes published studies, technical reports, databases, and information from agencies, local conservation organizations, and/or local experts. Developers or consultants working on their behalf should contact the federal, state, tribal, and/or local agencies that have jurisdiction over the potential project.

Comment [ejk39]: Technical Edit #2

1. Are threatened, endangered, federal "sensitive", state listed species, or other special status species present on or likely to use the proposed site(s)?
2. Are there rare or unusual plant communities present or likely to be present at the site(s), or plant communities that otherwise have a special designation?
3. Which species of birds and bats, especially those known to be at risk of colliding with wind turbines, are likely to use a proposed site based on an assessment of site attributes?
4. 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 associated with the proposed site(s)?
5. Are there large areas of intact habitat with the potential for fragmentation, with respect to species with needs for large contiguous blocks of habitat?

**Tier 2 Methods and Metrics**

Obtaining answers to Tier 2 questions will involve a more thorough review of the existing site-specific information than in Tier 1. It is expected that the developer will make contact with federal, state, tribal, and/or local agencies that have jurisdiction over the project or information about the potentially affected resources. In addition, because key non-governmental organizations (NGOs) and relevant local groups are often valuable sources of relevant local environmental information, it is recommended that developers contact NGOs, even if the developer is not able to identify specific project location information at this stage due to confidentiality concerns. These contacts also provide an opportunity to identify other potential issues and data not already identified by the developer.

Site visit(s) will normally be conducted to confirm the presence of habitat suitable for species of special interest (e.g., Federal and state listed species, species of conservation concern, species considered at high risk to collisions, etc.), the quality of the habitat, the presence of unique topographic or botanical features and an early indication of the potential for avoidance or mitigation of unavoidable impacts. A sample Site Characterization Study Scope of Work is provided in the Appendix (see attached).

"Yes" answers to any or all of the above questions would indicate potential wildlife conflicts that might preclude or substantially increase the difficulty of wind energy development. Developers should also evaluate whether the data collected from a more detailed site characterization are adequate to evaluate risks to wildlife resulting from the potential wind energy development. For example, do the available data adequately characterize the presence

and abundance of wildlife species of interest and their habitat? Furthermore, does information exist that allows the evaluation of risk to the same or similar species? A good source of this information is impact assessments from existing wind facilities operating in similar landscape types.

A developer may decide to abandon the project after Tier 2 analysis, or s/he may decide that potential conflicts can be easily avoided or minimized by the project design. Alternatively, the available data may not be sufficient to characterize the site and/or evaluate risk. If the developer wishes to pursue the potential development of the site then s/he should proceed to the more detailed field studies in Tier 3. The results of the Tier 2 analysis also could indicate, in unique circumstances where wildlife conflicts are low risk, that further studies are unnecessary and the developer can proceed to developing the site.

### C. Tier 3: Field Studies to Document Site Wildlife Conditions and Predict Project Impacts

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

**Comment [ejk40]:** Technical Edit #3

1. Do field studies indicate that threatened, endangered, federal "sensitive", state listed species, or other special status species are present on or likely to use the proposed site?
2. Do field studies indicate that there are large areas of intact habitat with the potential for fragmentation that would create significant adverse effects on species with needs for large contiguous blocks of habitat?
3. What is the distribution, relative abundance, behavior, and site use of wildlife determined to be of interest in Tiers 1 or 2, and to what extent do these factors expose these species to risk from the proposed wind power project?

**Comment [ejk41]:** Technical Edit #4

In answering the above questions developers should collect sufficient data to enable analysis that answers the following questions:

4. What are the potential risks of impacts of the proposed wind energy project to individuals and local populations? When necessary due to the presence of rare and/or endangered species, assessment of risk may also include consideration of possible impacts to entire species and their habitats.
5. If significant impacts are predicted, especially to wildlife of interest, can these impacts be avoided, minimized, or mitigated?
6. Are there studies that should be initiated at this stage that would be continued in either Tier 4 or Tier 5?

**Comment [ejk42]:** Technical Edit #5

### *Tier 3 Methods and Metrics*

Comment [ejk43]: (P) Level of detail and prescription is under review in Tiers 3-5

Tier 3 studies provide pre-construction information that can be used in several ways including:

- Evaluation of a site prior to the final decision to develop;
- The design of a site to avoid or minimize impacts if a decision is made to develop;
- The design of mitigation measures if significant impacts cannot be acceptably avoided or minimized; and,
- As the pre-construction component of Tier 5 studies necessary to estimate impacts.

The recommended Guidelines are designed to be flexible to accommodate local and regional concerns. The decision to conduct a Tier 3 study depends on whether or not additional data are necessary to answer questions of interest. For example, if adequate data are available from nearby sources and/or from studies of the site being evaluated, then additional studies may be unnecessary. Additionally, a reduced level of survey effort may be warranted for certain projects, such as infill development, some repowering projects, or projects contiguous to existing low-impact wind facilities provided these projects have sufficient credible information regarding impacts. When additional studies are warranted, the selected protocols will need to be adjusted to accommodate unique, site-specific conditions such as the species of birds and bats using the site, the frequency and type of bird and bat use, landscape characteristics of the site including terrain and vegetation. The protocol will also need to accommodate the potential for use of pre-construction data in post-construction studies of fatalities (Tier 4) and habitat impacts (Tier 5).

Comment [ejk44]: Technical Edit #6

One year of pre-permitting surveys are typically adequate to answer Tier 3 questions. In some cases, depending on the ecosystem type, species and their habitat, the questions to be answered, and availability of existing data, sample design and survey duration and intensity may need to be expanded to include multiple years to account for annual variability. Decisions on the level of survey effort need to be made in discussion with industry, the lead agency, state wildlife agencies, U.S. Fish and Wildlife Service, and local conservation groups as appropriate. One year of pre-permitting surveys are also typically adequate to provide pre-construction data if Tier 4 and 5 studies are contemplated.

The Tier 3 level is the first level in which scientifically rigorous studies may need to be conducted. In most cases we recommend the use of common methods and metrics for understanding wildlife and their habitat, such as bird and bat activity and distribution and the presence of their habitat, at a site and for answering the questions provided at the beginning of Tier 3 discussion. Standard methods and metrics provide great benefit over the long-term, allowing for comparisons among projects (e.g., meta-analysis) and for certainty regarding what will be asked of industry in general for each project. Varying from the standard methods we recommend should be carefully considered, scientifically justified and vetted with the USFWS, the permitting agency, state wildlife agencies and other involved stakeholders.

The specific protocol used in Tier 3 studies depends on the question being addressed. In these Guidelines we do not discuss all the methods and protocols established for specific species, their habitats, and important natural communities. Often threatened and endangered species, species of concern, or those of special interest, and their habitats, have specific protocols required by local,

state or federal agencies. The need for special surveys and mapping should be discussed with the appropriate stakeholders in order to address all species and situations adequately. Likewise, Tier 5 studies that require pre-construction data may have specific methods and protocols that go well beyond the Tier 3 studies (e.g., Before-After-Control-Impact (BACI) studies). Even though they begin in Tier 3, these studies are considered Tier 5 studies because they are more complicated, time consuming, and expensive.

The discussion below, therefore, does not always make specific recommendations on duration or frequency of sampling or study design. Instead, scientists experienced with the techniques must design the studies and sampling protocols to the unique features of each site and to the specific questions to be answered.

Many of the methods used to answer Tier 3 questions are areas of active research and worthy of investigation by collaborative, public-private research partnerships with federal and state agencies, wind energy developers and non-governmental organizations interested in wind-wildlife interactions (e.g., Bats and Wind Energy Cooperative; www.batsandwind.org and the Grassland Shrub Steppe Species Cooperative; www.nationalwind.org). While we recommend the use of standard methods we also recognize the need to use the results of this research when existing methods are improved or new methods are developed.

In the past, particular attention has focused on developing methods for predicting collision risk for birds and bats from pre-construction assessments of bird and bat activity. Less attention has been paid to describing direct and indirect impact to wildlife habitat. It is unlikely that a single method can adequately assess this potential collision risk or habitat impact. For example, answering questions regarding nocturnally active species such as migrating passerines and local and migrating passerines are likely to require a combination of remote sensing tools such as marine and NEXRAD radar and indirect inference from diurnal surveys during the migration period. Likewise, answering questions about habitat use by songbirds may be accomplished by relatively small scale observational studies, while answering the same question related to a wide ranging species such as prairie grouse may require more time consuming surveys, perhaps including radio-telemetry.

Below are general questions that should be considered for Tier 3 study. The methods for answering these questions are stated generally, but in some cases greater detail is given regarding more common methods and metrics.

**Do field studies indicate that threatened, endangered, federal "sensitive", state listed species, or other special status species are present on or likely to use the proposed site?**

During the problem formulation stage of Tier 1 and/or Tier 2 the specific species that are to be addressed when answering this question should be identified. While the inclusion of state and federal listed species is straightforward, the determination of the “other special-status species” will vary with the site and industry, agency and public concerns. Normally special-status species will include those species proposed for listing by state and federal species protection laws.

Raptors, passerines, grouse, bats, and species of high recreational value, such as big game may be included as special-status species as well.

During the problem formulation for Tier 3, a decision should be made as to which species will be studied further in the site assessment. This determination is based on analysis of existing data from Tier 1 and existing data and site visits in Tier 2, and the likelihood of presence and the degree of adverse impact to species or their habitat. Additional analyses should not be necessary if a species is unlikely to be present or is present but impact is unlikely or of minor significance.

For those species selected for further study, a determination of whether field studies are needed is also necessary and this evaluation should be based on the severity of adverse impact and the adequacy of existing data. For example, if the habitat is suitable for a species needing further study and the site occurs within the historical range of the species and/or it is near the existing range of the species but presence has not been documented, additional field studies may be appropriate.

**Comment [ejk45]:** Technical Edit #7

**Methods**

State and Federal agencies often require specific protocols be followed when listed and special-status species are potentially present on a site. The following discusses some general approaches to determine presence on, and use of a site by listed or special-status wildlife species.

**Birds**

The methods and protocols for determining threatened, endangered, and other special status bird species presence at a site are normally established for each species and required by federal and state resource agencies. Bird use counts (see question 3 below) will provide presence/absence as a byproduct. Surveys should cover the entire area of interest during seasons when species are most likely present. Normally the methods and protocols by which they are applied also will include an estimate of abundance and more detail is included under question number 3. In general none of these survey methods confirm absence and most presence/absence surveys should be done following a probabilistic sampling protocol to allow statistical extrapolation to the area and time of interest.

**Bats**

Acoustic monitoring can be a practical method for determining the presence of threatened, endangered or otherwise rare species of bats throughout a proposed wind energy facility (Kunz et al. 2007). Nevertheless, the method requires extensive effort to determine presence of a particular species. Full spectrum time-expansion detectors are the most reliable detectors for identifying species of bats (Kunz et al. 2007). Species identification using zero-crossing technology (i.e., Anabat detectors) is possible for some species (O'Farrell et al. 1999), but is more difficult and controversial for some groups of bats, especially *Myotis* species (Kunz et al. 2007). Sampling for rare species of bats should occur during different seasons and at multiple sampling stations to account for temporal and spatial variability.

While mist-netting bats is required in some situations by state agencies and the USFWS to determine the presence of threatened, endangered or otherwise rare species, we do not

recommend mist-netting as a standard method for assessing risk of wind development to bats. Our reasons for this recommendation are detailed below in the discussion of specific bat study methods.

Comment [ejk46]: Technical Edit #8

**Other Wildlife**

Determining the presence of diurnally and/or nocturnally active mammals, reptiles, amphibians, and other species of special interest will typically be accomplished by following agency required protocols. Most listed species have standard protocols for detection (e.g., black-footed ferret). State and federal agencies should be contacted regarding survey protocols for those species of special interest (see Corn and Bury 1990, Olson et al. 1997, Bailey et al. 2004, Graeter et al. 2008 for examples of reptile and amphibian protocols, survey and analytical methods).

**Do field studies indicate that there are large areas of intact habitat or the potential for fragmentation of large habitat blocks, with respect to species of special interest with needs for large contiguous blocks of habitat?**

Comment [ejk47]: Technical Edit #9

For the purpose of this question habitat fragmentation is defined as the separation of a block of habitat for a species into segments that reduces the genetic and/or demographic viability of the populations surviving in the habitat segments that remain.

The question of fragmentation is relevant as it relates to the habitat for a particular species of interest, the ecology of the species and how fragmentation is defined, as well as for intact expanses of vegetative communities such as wetland and riparian areas. When the characteristics of habitat for a species is well known the habitat can be mapped using existing information (e.g., data, maps, GIS layers, aerial photography) including vegetation, topography, unique habitat features, land use, and species distribution (both existing and historic). The aerial expanse or uniqueness of the habitat or vegetative community must be based on similar information for a much larger geographic area and perhaps the entire historical range of a particular species or expanse of a vegetative community. When the characteristics of habitat of a species is poorly understood or when the use of a particular area as habitat is uncertain, surveys of species use using the same methods described for estimation of risk (e.g., spatially distributed point counts) are appropriate.

**What is the distribution, relative abundance, behavior, and site use of wildlife determined to be of interest in Tiers 1 and 2, and to what extent do these factors expose these species to risk from the proposed wind power project?**

For those species of interest that are considered at risk to collisions or habitat impacts (e.g., displacement) it is of interest to know where they are likely to occur within a project site and in what abundance. The distribution of species at risk of collision can influence how a site is

Comment [ejk48]: Technical Edit #10

developed. This distribution should include the airspace for flying species. The abundance of a species and the distribution of its habitat can be used to determine the relative risk of impact to species using the sites and the absolute risk when compared to existing wind facilities where similar information exists and for use in modeling risk factors.

Distribution and relative abundance requires a complete coverage of the area of interest or a sample survey of the area using observational methods for the species of interest during the seasons of interest. As with presence/absence the methods used to determine distribution and abundance may vary with the species and its ecology. Distribution is determined by applying presence/absence or use surveys in a probabilistic manner over the entire area of interest. For example, presence of prairie grouse within the area of interest can be determined by visiting known male display areas (e.g., leks) during the breeding season to determine if any leks are active.

Because absolute abundance is difficult to determine for most species, surveys typically should estimate use as an index of abundance, for example, the relative abundance of breeding song birds can be considered the number of detections per period of survey per survey plot. Survey periods are typically 3-10 minutes for small bird surveys, depending on the site characteristics, and 20 minutes for raptors, or when all birds are the target of a survey. These statistics can be compared from plot to plot within the area of interest and from site to site where similar data exist. Relating use to site characteristics requires that samples of use also measure site characteristics thought to influence use (i.e., covariates such as vegetation and topography) in relation to the location of use. The statistical relationship of use to these covariates can be used to predict occurrence in unsurveyed areas during the survey period and for the same areas in the future.

**Comment [ejk49]:** Technical Edit #11

## Methods

### Birds

#### Standardized methods and metrics

The standardized data collection method for estimating the distribution and relative abundance of diurnal birds is the bird use count. Depending on characteristics of a proposed project site and the bird species potentially affected by the project, additional pre-permitting study methods may be necessary.

**Comment [ejk50]:** Technical Edit #12

For nocturnally active birds for birds that migrate at night, additional studies using different methods will be required if characteristics of the project site and surrounding areas potentially pose a high risk of collision to migrating songbirds and other species. This document discusses some of the primary tools available to study nocturnally active birds (for example radar, acoustic monitoring, visual monitoring) but does not provide standardized recommendations on duration or frequency of sampling or study design.

Early discussions with the permitting agency, USFWS, state wildlife agency, local agency, and interested conservation organizations is a crucial step in designing pre-permitting studies and deciding whether or not modifications to the standardized methods are warranted.

#### Bird Use Counts

The primary diurnal avian survey technique for pre-permitting studies at wind energy project areas is the bird use count (BUC), using avian point count or line transect sampling methods, and raptor nest searches. BUCs estimate the spatial and temporal use of the site by all birds, including large birds such as raptors, vultures, corvids, and waterfowl, as well as songbirds and other small species. BUC for passerines follows the methodology described by Reynolds et al. (1980) for point counts, only with a fixed area, or the line transect survey similar to Schaffer and Johnson (2008), where all birds seen within a fixed distance of a line are counted. The BUC for large birds, and when all birds are of interest, follows the same point count method described for passerines, although the radius of the survey is much larger, typically 0.8 Km. Point count plots or transects should be distributed throughout the area of interest using a probability sampling approach. Alternatively, the centers of the larger plots are located at vantage points throughout the potential area being considered with the objective of covering most of the area of interest. The BUC provides information regarding bird species and their use of the project site during the period of interest.

These survey techniques require experienced surveyors who are skilled at identifying the birds, accurately estimating vertical and horizontal distances and for raptors, accurately identifying nests for species that are likely to occur in the project area.

We recommend using the BUC protocol for large birds unless there is a specific interest in abundance and distribution of small birds. Nevertheless, all birds seen during these surveys, large or small, should be recorded during BUCs. Small Bird Counts (SBC) are discussed in more detail in a later section.

**Sampling Duration/Frequency**. The sampling duration and frequency must be determined on a project-by-project basis. The most important consideration for sampling frequency is the amount of variation expected among survey dates and locations and the species of interest. In areas where large birds (e.g., corvids, waterfowl, raptors) exhibit relatively high month to month variation in use but little distinct migration, surveys should be conducted at each plot for 20 minutes once a week for a year, or the period of occupancy if less than a full year. In areas where month to month variation is relatively small but there is a distinct migration season each plot should be surveyed once a week during the migration periods and twice per month during other periods of occupancy. The large BUCs should cover most daylight hours and weather conditions. However, each project needs to be considered individually. Please refer to the NWCC revised M&M (2009) document for detailed discussions regarding protocols.

**Number/Distribution of Sample Points**. A systematic sample of points is recommended to allow for statistical extrapolation of data to the area of interest. Alternatively, one can approximate a complete coverage of the areas proposed for a development. For large birds, BUC sample sites should be centered at vantage points that offer relatively unobstructed views of the surrounding terrain for a radius of approximately 800 meters. For the complete coverage of an area sites should be approximately 5,200 feet (1,600 meters) apart throughout the proposed facility, coinciding with proposed turbine sites, if they are known. In the case of small birds the plot radius or observational distance from the line transect should be approximately 50 m and a sample survey of the development site will be required (see discussion below for small bird

**Comment [ejk51]:** Technical Edit #13

**Comment [ejk52]:** Technical Edit #14

**Comment [ejk53]:** Technical Edit #15

**Comment [ejk54]:** Technical Edit #16

**Comment [ejk55]:** Technical Edit #17

**Comment [ejk56]:** Technical Edit #18

**Comment [ejk57]:** Technical Edit #19

counts). Refer to NWCC revised M&M (2009) document for more detailed discussion of sampling plans.

Comment [ejk58]: Technical Edit #20

**Variables.** For each observation period record number and species of birds observed, distance from bird to observer, flight height above ground at the location of the bird, and environmental variables that are likely to affect detection of bird use (for example, wind speed). Refer to the NWCC revised M&M document for detailed discussion of data documentation.

**Metrics**. The metric for all bird use may be expressed a number of ways. Thus, recording the total number of birds seen during each survey period, , the total amount of time for each sample survey point and the area surveyed. An important parameter necessary for estimating exposure of birds to collisions is the total number of birds seen at various altitudes. Observations should be placed into a minimum of three altitude bands approximating the area below, within and above the rotor swept area. For modern turbines these bands are typically <35 m as being below the zone of risk, 35-130 m as being within, and >130 m as being above the rotor swept area. These data should allow for comparisons with most other studies of bird use following a similar protocol around the nation. For large birds we recommend that the amount of time each observed bird spends in the surveyed plot for the entire survey period be recorded. Thus, the amount of time a bird spends in the zone of risk can be quantified resulting in a better estimate of risk.

**Other Diurnal Bird Survey Techniques**

**Raptor Nest Searches**

An estimate of raptor use of the project site is obtained through the large BUCs, but if potential impacts to breeding raptors are a concern on a project, raptor nest searches are also necessary. These surveys provide information to estimate impacts to the local breeding population of raptors, for micro-siting decisions, and for developing an appropriately sized non-disturbance buffer around nests, as well as baseline data to use to estimate impacts and to determine compensatory mitigation requirements. Methods for these surveys are fairly standard, but draft protocols should be discussed with biologists from the lead agency, USFWS, state wildlife agency, and conservation organizations as applicable. At a minimum the protocols should contain the list of target raptor species for nest surveys, the appropriate search protocol for each site, including timing and number of surveys needed, search area, and search techniques.

Comment [ejk59]: Technical Edit #21

**Search Area.** Conduct searches for raptor nests or raptor breeding territories on projects with potential for impacts to raptors in suitable habitat during the breeding season within at least one mile of wind resource area boundary.

Comment [ejk60]: Technical Edit #22

**Search Protocol**. In open terrain conduct nest surveys from the air with ground follow up to determine species and nest status. Avoid approaching the nest too closely to minimize disturbance, particularly when surveying from helicopters. In forested habitat the surveys should be done from the ground. Using tape-recorded owl or diurnal raptor calls to promote nest defense behavior from the nesting raptor can be helpful in finding nests.

**Small Bird Counts**

At some locations there may be an interest it getting a better estimate of small bird distribution and use than is possible when using 800 meter radius plots. Diurnal small bird counts (SBCs) are

point or line transect counts conducted at a greater density of smaller-radii point count circles or transects. We recommend SBCs using circular plots, although in open terrain SBCs can be conducted along walking transects (see the M&M Update document). This technique is most useful for pre- and post-construction studies assessing displacement effects and habitat losses to resident songbirds and other small birds (less than 10 inches [25 centimeters] in length) but, may be less useful for predicting fatality rates because studies have not shown a strong correlation between pre-project songbird use of the wind site and songbird fatalities. SBC point count sampling plots have a smaller radius, typically 50 meters, although plots up to 100 meters can be used in open areas with little vegetation. Savard and Hooper (1995) found that a 300-foot (100-meter) radius plots yielded nearly as many songbird detections as an unlimited radius for most species of birds.

SBC sampling points should be located systematically (with a random starting point) within the area proposed for turbine locations, if known. As a rule the points should be at least 820 feet (250 meters) apart to reduce the probability of double-counting individual birds (Ralph et al., 1995). If turbine locations are known, establish SBC sites every 820 feet (250 meters) in a row between turbines. Refer to the NWCC's revised M&M document (2009) for details in developing a sample design.

To determine which birds are breeding on the project site, SBCs should be conducted three times at approximately two-week intervals during the breeding season (April through July is the breeding season in much of the nation). Surveys should be conducted no earlier than a half-hour before and no later than four hours after sunrise. Time spent at each count station should be 10 minutes (Ralph et al., 1995). Refer to the NWCC's revised M&M document (2009) for more details.

If a precise estimate of density is required for a particular species (for example, when the goal is to determine densities of a special-status breeding bird species), the researcher will need more sophisticated sampling procedures including estimates of detection probability and should refer to the revised M&M document (2009) for sample design and protocol development.

**Comment [ejk61]:** Technical Edit #23

**Prairie Grouse Male Breeding Area (Lek) Counts**

**Comment [ejk62]:** Technical Edit #24

Male prairie grouse return to the same lekking grounds year after year to attract mates, and nesting and brood rearing habitat is generally located in the vicinity of these sites, although the distribution of females and young vary with vegetation and topography. It is generally agreed that breeding populations of prairie grouse should be assessed by either lek counts (a count of the maximum number of males attending a lek) or lek surveys (classification of known leks as active or inactive) during the breeding season (e.g., Connelly et al. 2000). Methods for lek counts vary slightly by species but in general require repeated visits to known sites and a systematic search of all suitable habitat for new leks, followed by repeated visits to active leks to estimate the number of grouse using the leks. Lek surveys require slightly less effort as the parameter of interest is whether the lek is active or not and a count of the number of grouse is not required. Both types of surveys may be done from the ground or a combination of ground and aerial surveys. Lekking areas should be visited for 15-30 minutes early in the morning, say 40 minutes before sunrise to 90 minutes after sunrise under good visibility and low wind conditions.

The extent of the impact of wind energy development on lekking activity and the associated impacts on breeding populations is poorly understood and is an area of much needed research. These effects should be addressed through Tier 5 studies on projects which proceed to construction.

Comment [ejk63]: Technical Edit #25

**Displacement Study Design**

The study designs described below, before-after/control-impact (BACI), resource selection function (RSF) and impact gradient, are the optimal study designs to estimate indirect habitat (i.e., displacement) effects. Displacement refers to the indirect loss of habitat if birds avoid otherwise suitable habitat due to turbine operation and maintenance/visitor disturbance. Displacement can also result in fragmentation of habitat when birds are deterred from using normal routes to feeding or roosting grounds or large blocks of suitable habitat are broken into smaller blocks of less suitable habitat.

Displacement studies are considered Tier 5 studies and typically start during pre-construction (Tier 3). When the primary concern is small bird displacement point counts or line transect counts are typically used following the methods described above for SBCs. Point count or line transect counts for birds or their sign can also be used when displacement of larger birds, such as prairie grouse, is the primary concern. When the primary concern includes prairie grouse (prairie chickens, sharp-tailed grouse, and sage grouse) where anthropogenic activity negatively impacts use of suitable habitat for reproduction by the birds, avoidance, minimization and/or mitigation for lost habitat needs to be factored into the project early in its design. BACI studies involving radio telemetry are the best approach to quantify the impacts of the project on prairie grouse in different environments (tallgrass, mixed grass, sandsage, sagebrush, etc.). Generally these studies will measure impacts of the project development on nesting, nest success, and survival of prairie grouse. Because of the ecology of these species the sample size and study area requirements can be large and the studies are expensive. Examples of study designs and analyses are presented in Holloran et al. (2005), Pittman et al. 2005 and Robel et al.(2004).

Comment [ejk64]: Technical Edit #26

BACI designs use data collected before and after a treatment (for example, construction of a wind project) at both the treatment sites and one or more reference sites. The BACI design requires data collection in both reference (control) and assessment (impact) areas using exactly the same protocol during both pre-impact and post-impact periods (Anderson et al., 1999) (NWCC's revised M&M, 2009). Perfect control sites, which exactly replicate the conditions at the proposed wind turbine site, usually do not exist in a field setting because of inherent natural variation. Thus, "controls" are reference sites that most closely match topographic, wind, and both on-site and adjacent habitat conditions at the proposed wind turbine site. Collecting data at both reference and assessment areas using the same protocol during both pre- and post-impact periods can help answer questions relating to construction and operation effects on bird abundance and distribution. Anderson et al. (1999) and the M&M update (2009) provide a thorough discussion of the design, implementation, and analysis of these kinds of field studies and should be consulted when designing the BACI study.

Comment [ejk65]: Technical Edit #27

BACI designs with replicated reference sites provide a rigorous basis for statistical analysis and supportable scientific conclusions. Multiple references improve discrimination between project impacts and impacts resulting from natural temporal changes or other factors. This replication provides the basis for formal statistical testing on the impacts of the project and estimates of confidence intervals. A before-after study design with a single site, the site that will be developed but no reference site, only provides a comparison of data from before and after construction of the project. Such a weak study design limits the researcher's ability to make inferences and draw conclusions about the impact of the project because natural temporal changes are likely to confound detection of changes due to impacts.

**Comment [ejk66]:** Technical Edit #28

A BACI study design is not always possible because locating appropriate reference areas that are not already planned for wind energy development may be difficult and wind project development schedules commonly preclude the collection of sufficient pre-treatment data for such a design. Furthermore, alterations in land use or disturbance over the course of a multi-year BACI study may complicate the analysis of study results.

An alternative approach that is effective in demonstrating displacement is the resource selection function (RSF) study design (See Anderson et al 1999 and the revised M&M document). Habitat selection is modeled as a function of characteristics measured on resource units and the use of those units by the animals of interest. See the answer to question #5 below for a more detailed explanation of RSF.

**Comment [ejk67]:** Technical Edit #29

In certain situations, such as for a proposed wind development site that is relatively small and in a more or less homogeneous landscape, an impact gradient design may be a more appropriate means to assess impacts of wind turbines on resident populations (Strickland et al., 2002). Data are collected at various distances from turbines along transects. This approach not only provides information on whether there is an effect, it may also allow quantification of the gradient of the effect and the distance at which the effect no longer exists. The assumption is that the data collected at distances beyond the influence of turbines are the reference data (Erickson et al., 2007). For example, a project located in homogeneous grasslands might use impact gradient analysis to assess project impacts to resident songbirds. An impact gradient analysis could for example involve measuring the number of breeding grassland birds counted at BUC plots as a function of distance from the wind turbines.

**Mist-Netting for Birds**

Normally, mist-netting is not recommended as a technique for estimating relative bird abundance. Mist-netting cannot generally be used to develop indices of relative bird abundance, nor does it provide an estimate of collision risk. Operating mist-nets is expensive and requires considerable experience, as well as state and federal permits.

**Comment [ejk68]:** Technical Edit #30

Occasionally mist-netting can be used to augment observational bird data, and help confirm the presence of rare species at documented fallout or migrant stopover sites. If mist-netting is to be used, follow procedures for operating nets and collecting data in accordance with Ralph et al. (1993).

**Nocturnal Bird Survey Methods**

Most songbirds, waterfowl, shorebirds, herons, and egrets migrate at night (Kerlinger and Moore, 1989), and radar studies yield some insight into general patterns of night flying behavior. Nocturnal migrants generally take off after sunset, ascend to their cruising altitude between 300 and 2,000 feet (90 to 610 meters), and return to land before sunrise (Kerlinger, 1995). For most of their flight, songbirds and other nocturnal migrants are above the reach of wind turbines, but they pass through the altitudinal range of wind turbines during ascents and descents and may also fly closer to the ground during inclement weather (Able, 1970; Richardson, 2000). In general, studies show that the paths of high elevation nocturnal migrants are little affected by topography or habitat beneath, but some studies suggest that landforms can have a significant guiding effect for birds flying below 300 feet (100 meters) (e.g. Williams et al., 2001). Radar studies reveal that major nocturnal migrations are triggered by weather (Gauthreaux and Belser, 2003) and often occur on nights with light tail winds. Low cloud cover or head winds can reduce the above-ground-level altitudes of migrants, bringing more birds within range of turbine blades (Richardson, 2000). Under certain conditions, such as low-lying fog, cloud cover might increase the flying height of birds that might find clear skies above.

Once nocturnal migrants descend from their night's flight and select a site for cover, foraging, and resting, local landforms and habitat conditions may play a role in determining where they alight (Mabey, 2004). Biologists knowledgeable about nocturnal bird migration and familiar with patterns of migratory stopovers in the region should assess the potential risks to nocturnal migrants at a proposed wind energy project site. In general, pre-permitting nocturnal studies are not recommended unless the site has features that might strongly concentrate nocturnal birds, such as along coastlines that are known to be migratory songbird corridors. If warranted, employ marine radar and other nocturnal study methods following Kunz et al. (2007) to determine relative abundance, flight direction and flight altitude of nocturnal flying animals passing through the site to assess risk to migrating birds. If project areas are within the range of nocturnal, special-status bird species (for example, marbled murrelet or northern spotted owl), surveyors should use species-specific protocols recommended by state wildlife agencies or USFWS to assess the species' potential presence in the project area.

The estimation of distribution and relative abundance of nocturnal flying birds are even more difficult as tools for detection are mostly indirect. The tools for the study of nocturnally flying birds are summarized in an appendix to the updated M&M document (and see Kunz et al, 2007).

Generally, for Tier 3 studies of relative abundance of nocturnally active birds can be determined by using marine radar and/or NEXRAD. Unfortunately neither form of radar allows separation of detected targets into birds and bats. Some effort has been made to use night vision equipment to separate the two groups of flying organisms, but these methods have not been evaluated for their relative probability of detection. Auditory surveys have also been used for birds with some success (Kunz et al 2007), although with less success for birds than for bats. Detection probabilities have also not been studied, the range of detection for the equipment is limited, and the data confirm presence but not absence because not all birds vocalize within the range of the equipment and not all species vocalize at the same rate.

**Comment [ejk69]:** Technical Edit #31

In contrast to the diurnal avian survey techniques previously described, considerable variation and uncertainty exist on the optimal protocols for using acoustic monitoring devices, radar, and other techniques to evaluate species composition, relative abundance, flight height, and trajectory of nocturnal migrating birds. The use of radar for determining passage rates, flight heights and flight directions of nocturnal migrating animals has yet to be shown as a good indicator of risk of collision, and additional studies are needed before making recommendations on the number of nights per season or the number of hours per night that are appropriate for radar studies of nocturnal bird migration (Mabee et al., 2006).

**Comment [ejk70]:** Technical Edit #32

We do not make specific recommendations on duration or frequency of sampling or study design. The NWCC has developed guidelines that describe the metrics and methods used to study nocturnal birds and bats (Kunz et al. 2007). Consult these guidelines, which are available at the NWCC Web site (hyper link) and as an appendix to the updated M&M, before developing pre-permitting studies of nocturnal migration. Each of the methods described here has strengths and weaknesses for answering questions about collision risk. No one method by itself can adequately assess the spatial and temporal variation in nocturnal bird populations or the potential collision risk.

Nocturnal bird study methods and collision risk are areas of active research and worthy of investigation by collaborative public-private research partnerships.

***Bat Survey Methods***

Acoustic monitoring is perhaps the most practical method for monitoring bats at proposed wind facilities (Kunz et al. 2007). Acoustic monitoring provides information about bat presence and activity, as well as seasonal changes in species composition and use, but does not measure the number of individual bats or population density. Passive acoustic surveys can provide baseline patterns of seasonal bat activity at proposed wind energy sites, but researchers should be aware that with the current state of knowledge about bat-wind turbine interactions, a fundamental gap exists regarding links between pre-permitting assessments and operations fatalities. The ability to predict fatalities, and thus risk, from acoustic data has not yet been established, and acoustic data gathered in Tier 3 should be linked with Tier 4 post-construction fatality data from multiple facilities.

Acoustic monitoring should be used at sites to estimate seasonal use at proposed wind facility sites where potential bat fatalities are of concern. Notwithstanding, discussions with experts, state wildlife trustee agencies, and USFWS will be needed to assist in the determination as to the credibility and applicability of any existing data and to assess whether acoustic monitoring is warranted at a proposed wind energy site. The NWCC's revised M&M (2009) document and Kunz et al. (2007) provide more detailed discussion of sampling techniques.

**Duration of Acoustic Monitoring.** Acoustic monitoring for bats generally should be performed at proposed wind energy sites unless defensible, site-specific data are available indicating that the project is unlikely to pose a risk to bats. Monitoring for a full year is recommended in

warmer climates because little is known about the timing of bat migratory activity in many parts of the country and some bat species overwinter in some southern states and can be active throughout the year. Year-round surveys are particularly important at proposed project sites if, in the opinion of bat experts involved in scoping the pre-permitting studies, the sites are likely to support resident bat populations and include habitat features conducive to general bat activity (for example, nearby roosts, water bodies). If year-round surveys are not feasible or necessary, acoustic monitoring should include at least spring and fall migration, the periods that pose the greatest risk to bats. Data on environmental variables such as temperature, precipitation, and wind speed should be collected concurrently with acoustic monitoring so these weather data can be correlated with bat activity levels.

**Number and Distribution of Monitoring Stations.** The number and distribution of sampling stations has not been well established, but multiple sampling stations will be required to account for spatial variability. If variation among sampling stations is low then fewer stations will be needed, whereas the opposite is true for sites with high variability among sampling stations. At sites where there is high variability in bat calls, or those sites where no data occur to evaluate site-to-site variability, we recommend that all existing met towers be equipped with detectors. Additional sampling may be needed to supplement detectors placed on met towers to adequately sample some sites.

**Comment [ejk71]:** Technical Edit #33

Two acoustic detector systems should be placed at both high and low positions on each meteorological tower in the proposed project area. The "ground-level" detectors should be approximately 5 feet (1.5 meters) above the ground to avoid interference from vegetation, and the elevated detectors should be located as high as possible without interfering with weather monitoring equipment.

**Comment [ejk72]:** Technical Edit #34

**Data Collection and Analysis**. Acoustic data should be gathered at least ½ hour before sunset to ½ hour after sunrise each night of monitoring, and data should be collected continuously through the duration of the study. Call analysis should be performed by individuals trained in these analyses using appropriate software for specific detector systems.

**Metrics.** A "bat pass" is defined as a sequence of two or more echolocation calls, with each sequence, or pass, separated by one second or more (Fenton 1970, Thomas and West 1989, Hayes 1997). Bat passes are used as an index of activity, but it is important to understand that they do not indicate the number of individuals. The total bat passes and mean passes per detector night and per detector hour (excluding nights with measurable precipitation) are metrics used to express activity.

**Other Bat Survey Techniques**

Other research tools are available to complement the information from acoustic surveys. These methods are not necessarily needed for every project, but may be required to answer particular questions about size, species composition, behavior, and activity patterns of roosts or to further investigate habitat features that might attract bats. Kunz et al. (2007) provides a comprehensive description of bat survey techniques in relation to wind facilities. Methods for assessing colony size, demographics, and population status of bats can be found in O'Shea and Bogan (2003).

**Comment [ejk73]:** Technical Edit #35

Kunz et al. (1996) provide detailed guidelines on capture techniques for bats, including mist-nets and harp traps.

Biologists with training in bat identification, equipment use, and data analysis and interpretation should design and conduct all studies discussed below. Mist-netting and other activities that involve capturing and handling bats may require permits from state and/or federal agencies.

**Mist-Netting.** We do not recommend mist netting as a standard method for assessing risk of wind development to bats for the following reasons: 1) not all proposed or operational wind energy facilities offer conditions conductive to capturing bats and often the number of suitable sampling points is minimal or not closely associated with the project location; 2) capture efforts often occur at water sources offsite or at nearby roosts and the results may not reflect species presence or use on the site where turbines are to be built; and 3) mist-netting isn't feasible at the heights of the rotor-swept zone and captures below that zone may not adequately reflect risk of fatality.

**Comment [ejk74]:** Technical Edit #36

If mist-netting is to be used it is best used in combination with acoustic monitoring to inventory the species of bats present at a site (Kuenzi and Morrison 1998, O'Farrell et al., 1999). If mist-netting is to be used to augment acoustic monitoring data at a project site, trapping efforts should concentrate on potential commuting, foraging, drinking, and roosting sites.

**Exit Counts / Roost Searches**

Pre-permitting survey efforts should include an assessment to determine whether known or likely bat roosts in mines, caves, bridges, buildings, or other potential roost sites could occur near proposed wind turbine sites. If active roosts are detected during this assessment, exit counts and roost searches should be conducted to assess the size, species composition, and activity patterns for any bat-occupied features near project areas. Rainey (1995) provides a guide to options for exit counts.

**Comment [ejk75]:** Technical Edit #37

Roost searches should be performed cautiously because roosting bats are sensitive to human disturbance (Kunz et al., 1996). Known maternity roosts should not be entered or otherwise disturbed. Searches of abandoned mines or caves can be dangerous and should only be conducted by experienced researchers. For mine survey protocol and guidelines for protection of bat roosts, see the appendices in Pierson et al. (1999). Multiple surveys will be required to determine presence of bats in caves and mines (up to 12 or more surveys in some regions; see Sherwin [2003]).

**Other Wildlife**

The distribution and relative abundance of diurnally active animals can generally be determined with systematic observational surveys of the area of interest using point count or line-transect surveys (Anderson et al 1999; Updated M&M), looking for animals, their sign, or both. Protocols and survey methods for reptiles and amphibians are well established (e.g., Corn and Bury 1990, Hobbs et al. 1994, Olson et al. 1997, Ryan et al. 2002, Bailey et al. 2004, Graeter et al. 2008), and specific protocols for specific sites should be determined and agreed upon with state and federal agencies. If absolute abundance is desired then line-transect methods using distance or mark-recapture methods described in (Morrison et al 2006) will be necessary. Sign is

**Comment [ejk76]:** Technical Edit #38

**Comment [ejk77]:** Technical Edit #39

typically used as an indication of use rather than abundance. Sign may be used as an indicator of relative abundance for some species, one must be aware of the potential for differential use of different types of habitat. For example, mammals often leave more feces near feeding, bedding or hiding cover and less during movements. Alternatively, prairie dog relative abundance is frequently based on the number of active burrows in a given unit of study. An active burrow is typically based on the presence of a prairie dog or it sign at the burrow entrance.

Estimation of distribution and relative abundance for nocturnally active species is more difficult as direct observation is difficult. For mammals, surveys of indirect measures of animal abundance, such as track counts, is often required. As with diurnally active species, surveys for sign must recognize the potential for differential use of different types of habitat.

Risk Assessment: In answering the above questions developers should collect sufficient data to enable analysis that answers the following questions:

**What are the potential risks of impacts of the proposed wind energy project to individuals and local populations and their habitat. When appropriate (e.g., rare and/or endangered species) assessment of risk may also include possible impacts to entire species and their habitats**.

Risk can be defined as the likelihood that an adverse effect may occur as a result of exposure to one or more sources of impact, and the consequences of that effect. For example, the risk that a fatality of a particular species will occur can be determined by dividing the number of fatalities (impact) by the number of birds in the zone of risk (exposure). Risk to populations is more complicated and could be considered the likelihood of reduction in the growth rate of the population, either local, metapopulations or entire species.

The potential impacts include individual collision fatalities, habitat loss, habitat fragmentation, and reduction in reproduction and survival. The potential for avoidance, minimization, or mitigation of the potential risks depends on the species.

Methods used for estimation of risk vary with the species of interest. Exposure estimation was covered earlier (e.g., bird use counts). The empirical estimation of fatalities will be covered in the discussion of Tier 4. Estimating potential fatalities in Tier 3 may be accomplished by comparing species distribution and abundance at the proposed site with the distribution, abundance, and fatalities at existing facilities with similar characteristics (e.g., similar technology and landscape).

Estimating potential bird fatalities can also be accomplished through the use of an individual-based mathematical model for the estimation of probability of bird/turbine collisions. Most models incorporate Tucker's (1996) approach for estimating a bird's probability of collision with the rotor blades. Newer models improve on Tucker's model by including an opportunity to collide with the nacelle and support structure and incorporate bird avoidance behavior. The models address the physical and dynamic characteristics of the proposed turbines, as well as the spatial arrangement of the individual turbines within the wind facility. The models should also

**Comment [ejk78]:** Technical Edit #40

include wind characteristics at the site based on historical records. Furthermore, bird characteristics including size, flight speed, and avoidance behaviors should be incorporated. Collision probabilities are assessed by simulating flight paths of individual birds through the wind facility and calculating the proportion of all such paths that resulted in collision. Simulations should be conducted for a variety of conditions including bird taxonomic group, season, and period of the day (diurnal and nocturnal).

Comment [ejk79]: Technical Edit #41

The estimation of displacement impacts requires empirical data on animal behavior in response to wind facilities and would be considered a Tier 5 study. Displacement can be inferred from abundance before and after a facility is constructed. The magnitude of displacement can also be empirically estimated by estimating use as a function of distance to turbines and other facilities. The most direct estimation of displacement requires radio telemetry studies.

Distribution, relative abundance, and behavior of birds and bats using a site interact to influence risk to individual species from a wind facility. If a species has high or low abundance but their behavior does not place individuals within the zone of risk, then they are at low risk of collision with a turbine. If a species has high abundance (e.g., a nocturnal migrating passerine) but its behavior (e.g., flight characteristics) keeps it out of the zone of risk during migration then individuals of the species are at low risk of collision with a turbine blade during migration. If a species has low or high abundance and it frequently occupies the zone of risk, but it effectively avoids collisions (e.g. ravens) then individuals are at low risk of collision with a turbine.

If the behavior of a species frequently places them in the zone of risk and they do not actively avoid turbine blade strikes then individuals of the species are at greater risk of collisions with turbines, regardless of abundance. For a given species (e.g., red-tailed hawk) increased abundance increases the likelihood that individuals will be killed by turbine strikes, although the risk to individuals is relatively the same. The risk to a population increases as the proportion of individuals in the population at risk to collision increases.

If a species occupies the area where a wind facility is proposed, and its behavior causes individuals to avoid areas in proximity to turbines, roads and other components of the facility then there is a high risk that otherwise suitable habitat will be lost to the individuals. The amount of habitat that is lost to displacement will be a function of the sensitivity of individuals to turbines, roads, and other components of the facility, and to the activity levels associated with the project's operations. The significance of the loss of this habitat depends on the amount of habitat available to the affected population. If the loss of habitat results in habitat fragmentation then the risk to the demographic and genetic viability of the isolated animals is increased. Little is known about the exposure risk of bats at turbines and, unlike birds, the issue is complicated by the fact that bats may be attracted to turbines. Research is required to address this question for bats.

**If significant impacts are predicted with respect to wildlife and their habitats, what avoidance, minimization, or mitigation strategies are identifiable?**

In cases where the potential for significant adverse impacts is predicted with respect to a proposed project, and the project's developer wishes to proceed with its construction, then the information collected during Tier 3 studies provides an appropriate basis for the identification of measures for avoiding, minimizing, or providing compensatory mitigation for those impacts. Information on wildlife use of the proposed area is most useful when designing a project to avoid or minimize impacts. For example, in baseline studies of the proposed Wyoming Wind Energy Project, field observations demonstrated that most raptor use of the site was within 50 meters (164 feet) of the edge of the mesa where the project was to be sited (Johnson et al. 2000). Based on this information the developer chose to modify the site development plan to reduce the risk of raptor fatalities. Turbines were sited so that turbines would not be constructed within this zone of high raptor use. Similar avoidance buffers can be placed around other wildlife concentration areas such as breeding display areas (e.g., sage grouse leks), raptor nests, bat hibernacula, and other areas of concentrated use by species of concern. Avoidance buffers require detailed information on animal behavior in relation to wind energy facilities and their components, and this is an area of much needed research (NRC 2007). Other options include changing operational criteria to reduce the risk of impacts. For example, Arnett et al. (2009) and Baerwald and Barclay (2009) evaluated the potential for using varying cut-in speeds for turbines during periods of high risk to reduce bat fatalities. These studies demonstrated substantial reduction in bat fatalities by increasing turbine cut-in speeds to between 5 and 6.5 m/s (between 11.2 and 14.5 mph). Evaluation of these strategies would occur as a Tier 4 or Tier 5 study.

**Comment [ejk80]: (P)** Consider including minimum standards: when is impact minimization sufficient; what is an acceptable level of impact; what amount of information is adequate to determine anticipated level of impact?

When significant adverse ecological impacts cannot be fully avoided or adequately minimized, some impacts may need to be mitigated. For example, it may be possible to mitigate habitat loss or degradation for a species of interest by replacing or restoring nearby habitat comparable to that potentially influenced by the wind project. An example of such an initiative is the 2008 Meridian Way Conservation Project, in central Kansas, under which Horizon Wind, The Nature Conservancy, the Ranchland Trust of Kansas, and state and federal wildlife agencies are cooperating voluntarily to restore and protect grassland landscape to offset prairie ecosystem detriments resulting from Horizon's nearby wind farm. Another example is an agreement through which Oklahoma Gas & Electric will provide funding to the Oklahoma Department of Wildlife Conservation to voluntarily offset impacts to lesser prairie chicken habitat in northwest Oklahoma. The ODWC intends to leverage OG&E's investment with matching funds from multiple federal, foundation and NGO partners, creating the Southern Plains' largest voluntary conservation project for lesser prairie chicken. In both cases, the associated wind energy projects were deemed to have significant, but mitigatable impacts, which are being addressed, in large part, by habitat improvements and long-term protection which are financially supported by the wind energy developers.

Impact avoidance, minimization and mitigation is an area of much needed research (NRC 2007). The technical feasibility and cost of impact avoidance, minimization and mitigation are important factors for companies to consider when evaluating a potential site for development.

**Are there studies that should be initiated at this stage that would be continued in either Tier 4 or Tier 5?**

Not all Tier 3 studies will continue into Tiers 4 and/or 5. For example, surveys conducted in Tier 3 for a threatened, endangered, or species of concern may indicate the species is not present at the proposed site, or siting decisions could be made in Tier 3 that remove identified concerns; thus, continued efforts in later tiers are not necessary. For other species or issues of concerns, Tier 3 studies may be continued in later tiers.

As a part of problem formulation in Tier 3, the need for post-construction impact estimation and/or mitigation should be evaluated. If post-construction impact evaluation is necessary then the design for these studies should be determined based on the specific impact questions being addressed. For example, pre-construction activity data for bats may be used to predict post construction bat fatalities and the evaluation of these predictions will require estimates of the correlation between these two parameters. In this example, Tier 3 studies provide an estimate of bat use and a prediction of bat fatalities, while Tier 4 studies provide the estimate of bat fatalities and an evaluation of the correlation between pre-construction use and post-construction fatalities.

Other questions may require an evaluation of the impact of the wind facility on demographic parameters of local populations, habitat use, or some other parameter(s), requiring data on these parameters prior to and after construction of a wind facility. For example, pre-construction data on spatial distribution of prairie chickens (Tier 3) may suggest that some leks are likely to be abandoned as the result of the construction of a facility. This impact prediction can be confirmed by completing studies of the spatial distribution of prairie chickens after the project is completed (Tier 5) and comparing those results to pre-construction data. Likewise, predicted impacts on prairie grouse population demographics (nesting, nest success, survival, and so on) can be assessed by collecting such data prior to (Tier 3) and after construction of wind facilities (Tier 5). Additionally, project features may be altered to avoid or minimize predicted impacts. Using the prairie chicken example above, measures may be implemented to reduce the impact on leks as the project is constructed. These risk reduction measures may be evaluated using pre- (Tier 3) and post- (Tier 5) construction estimates use of leks by prairie chickens to determine if the risk reduction measures were successful. Finally, the developer may, based on Tier 3 data, determine that unacceptable impacts will be mitigated. Again, using the prairie chicken example, pre-construction information on spatial distribution and demography pre-construction can be compared to post-construction estimates of the same parameters to determine the effectiveness of mitigation measures.

**Comment [ejk81]:** Technical Edit #42

Confirming the relationship between pre- and post-construction parameters so that these relationships can be generalized with confidence to other proposed facilities will require that studies at multiple facilities be combined to determine if there are consistent and predictable patterns. For example, using Tier 3 estimates of use and Tier 4 estimates of fatalities one can evaluate whether the pre-construction prediction of fatalities were accurate for a particular project. Because only one facility is being studied, and this facility is not a random sample of all potential facilities, the use of this relationship in predicting fatalities at other proposed facilities is strictly subjective. Determining the relationship of activity data and fatalities for use in making statistical predictions of potential fatalities at other facilities will require the coalescence of data from multiple sites in a meta-analysis. Notwithstanding the need for methods to accurately predict fatalities at proposed facilities, the studies necessary to confirm these relationships are beyond the scope of an individual project and should be a collaborative effort

among several projects and other stakeholders. These replicated studies are critical for examining methods and the predictability of fatalities for future risk assessments and will benefit wildlife conservation and the wind energy industry.

The BACI design is considered an optimal design for estimating impact and mitigation response (see Anderson et al. 1999 and the revised M&M document). The BACI requires that data be collected pre- (i.e., Tier 3) and post-construction (Tiers 4 and/or 5). Where no preconstruction data exists on treatment and control areas and the impact area is homogenous with respect to vegetation, topography and species of use, an alternate study design may be used such as the impact gradient design (See Anderson et al 1999 and the revised M&M document). The resource selection function (RSF) approach is an alternative method of study that effectively demonstrates impacts such as displacement (see Anderson et al 1999 and the revised M&M document). Habitat selection is modeled as a function of characteristics measured on resource units and the use of those units by the animals of interest. The RSF value of the unit is proportional to the probability of the unit being used. The RSF allows the estimation of the probability of use as a function of the distance to various environmental features, including wind facilities and thus provides a direct quantification of the magnitude of the displacement effect. RSF could be improved with preconstruction and reference area data, nevertheless, it is a relatively powerful approach to documenting displacement and/or a response to mitigation measures designed to reduce displacement even without these additional data.

**Comment [ejk82]:** **Technical Edit #43**

### D. Site Construction: Site Development and Construction Best Management Practices

**Comment [ejk83]:** **(P)** Are the BMPs sufficient as written; are there any additional BMPs needed? Any to delete?

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

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

1. Minimize, to the extent practicable, the area disturbed by pre-construction site monitoring and testing activities and installations.

2. Avoid locating turbines in areas identified as having potentially high risk to birds and bats

3. Avoid using or degrading high value or large intact habitat areas, as identified in state wildlife action plans.

4. Use maps that show the location of sensitive resources and the results of Tier 2 and/or 3 studies to establish the layout of roads, fences, and other infrastructure.

5. Avoid using invasive species when seeding or planting during restoration.

6. To reduce avian collisions, place low and medium voltage connecting power lines associated with the wind energy development underground to the extent possible, unless burial of the lines is prohibitively expensive (i.e., where shallow bedrock exists) or where greater impacts to biological resources would result.

    a. Overhead lines may be acceptable if sited away from high bird crossing locations, such as between roosting and feeding areas or between lakes, rivers and nesting areas.
    b. Overhead lines may be used when they parallel tree lines, employ bird flight diverters, or are otherwise screened so that collision risk is reduced.
    c. Above-ground low and medium voltage lines, transformers and conductors should comply with the 2006 or most recent Avian Power Line Interaction Committee (APLIC) "Suggested Practices for Avian Protection on Power Lines."

7. 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.

8. Use construction and management practices to minimize activities that may attract prey and predators to the wind turbine site.

9. FAA visibility lighting of wind turbines should employ only red, or dual red and white strobe, strobe-like, or flashing lights, not steady burning lights.

10. Keep lighting at both operation and maintenance facilities and substations located within ½ mile of the turbines to the minimum required.

    a. Use lights with motion or heat sensors and switches to keep lights off when not required.
    b. Lights should be hooded downward and directed to minimize horizontal and skyward illumination.
    c. Minimize use of high intensity lighting, steady-burning, or bright lights such as sodium vapor, quartz, halogen, or other bright spotlights.

11. Establish non-disturbance buffer zones to protect raptor nests, bat roosts, areas of high bird or bat use, or specials-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).

12. 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.

13. 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.

14. Minimize the number and length of access roads, use existing roads when feasible.

**E. Site Operation - Conduct Tier 4 and Tier 5 Studies, as Appropriate (Post-construction fatality studies and other post-construction studies)**

**1. Tier 4 Methods for Post-Construction Fatality Studies**

These methods focus specifically on post-construction fatality monitoring and involve searching for bird and bat carcasses beneath turbines to determine overall fatality rates, and to answer other questions regarding species composition of fatalities, relationships with site characteristics, comparison of fatalities among facilities, comparison of actual and predicted fatality rates estimated in previous tiers, and determining if fatality rates warrant corrective management or mitigation measures. The level of effort and seasonality of studies may vary depending on several factors, including site sensitivity and risk level, amount and quality of existing data from nearby sites, seasons of occupancy, and affected species of interest. The questions and methods described here generally assume at least two years of post construction data. We recommend two years of fatality monitoring, which is consistent with most state guidelines and provides some indication of variation among years. Two years of monitoring can be adjusted if appropriate, following discussions with the USFWS, state wildlife agency, permitting agency and other stakeholders. For example, if a site had been determined to be low-risk, and first-year Tier 4 studies indicate that impacts are low, suspension of monitoring may be appropriate.

**Methods for Estimating Fatality Rates**

Fatality monitoring results should be of sufficient statistical validity to answer Tier 4 questions, to allow comparisons with pre-construction impact predictions and comparisons with other sites, and to provide a basis for determining if corrective management or mitigation measures at the site are appropriate. Protocols should be standardized to the greatest extent possible, especially for common objectives and species of interest, and they should included methods for adequately accounting for sampling biases (search efficiency and scavenger removal). However, some situations warrant exceptions to standardized protocol, and the responsibility of demonstrating that an exception is appropriate and applicable should be on the stakeholder attempting to justify increasing or decreasing the duration or intensity of operations monitoring.

We recommend that each search plot should be divided into oblong subplots or belt transects and that each subplot be searched. The objective is to find as many carcasses as possible so the width of the belt will vary depending on the ground cover and its influence on carcass visibility. In

**Comment [ejk84]:** Technical Edit #44

**Comment [ejk85]:** (P) Level of detail and prescription is under review in Tiers 3-5;

The Guidelines need to clarify "trigger points," which will require better articulated off-ramps for terminating projects (i.e. what information determines when to decide to abandon a project, move to a different tier, or permit/construct).

**Comment [ejk86]:** Technical Edit #45

most situations a search radius of 3 meters should be adequate. Notwithstanding, search radii may vary from 1.5-5 meters depending on ground cover.

More detailed descriptions and methods of fatality search protocols and can be found in the California (California Energy Commission 2007) and Pennsylvania (PGC 2007) state guidelines and the following publications: Kunz et al. (2007), Smallwood (2007), and the revised methods and metrics document (citation coming soon).

*Duration and Frequency of Monitoring.* Duration and frequency of fatality searches within a year will vary depending on the questions to be answered, the species of interest, season of searching, and estimated carcass removal rates. As a general rule the search interval should be no greater than twice the mean removal rate. Consequently, a search interval of 7 days is typically adequate to answer Tier 4 questions. Notwithstanding, larger or smaller search intervals may be justified. If the primary objective is fatalities of large raptors and carcass removal is low, then a longer interval between searches (e.g., 14-28 days) and larger subplots (3-5 meters radius) are sufficient. However, if the focus is fatalities of bats and small birds and carcass removal is high, then a search interval of < 7 days will be necessary. For example, if the mean removal rate established by carcass removal trials is 2 days, then the search interval should be no more than 4 days and subplots should be smaller (e.g., 1.5-3 m).

**Comment [ejk87]:** Technical Edit #46

There are situations in which studies of higher intensity (e.g., daily searches at individual turbines within the sample) may be appropriate in the first year of post-construction monitoring. These would be considered Tier 5 studies because of the greater complexity and level of effort. These Tier 5 studies could include evaluation of specific measures that have been implemented to mitigate potential impacts to threatened or endangered species, or species of particular concern identified during pre-construction studies.

*Number of Turbines to Monitor.* Data from existing facilities in similar conditions in the same region should be used, if available, to determine variability among turbines to determine needed sample size (see M&M). If data are not available, then a sufficient number of turbines should be selected via a systematic sample with a random start point. Sampling plans can be varied (e.g., rotating panels [M&M update]) to increase efficiency as long as a probability sampling approach is used. If the project contains less than 10 turbines, all turbines in the project area should be searched unless otherwise agreed to by the regulating agencies. When selecting turbines, it is recommended that a systematic sample with a random start be used when selecting search plots to ensure interspersion among turbines. Also stratification among different habitat types is recommended to account for differences in fatality rates among different habitats (e.g., grass versus cropland or forest); a sufficient number of turbines should be sampled in each strata.

*Delineation of Carcass Search Plots, Transects, and Habitat Mapping.* Evidence suggests that >80% of bat fatalities fall within ½ the maximum distance of turbine height to ground (Erickson 2003 a, b), and a minimum plot radius of 60 m from the turbine should be established at sample turbines. Plots will need to be larger for birds, with a radius of the maximum distance of turbine height to ground. Decisions regarding search plot size should be determined in discussions with the USFWS, state wildlife agency, permitting agency and other stakeholders Searchable area within the theoretical maximum plot size varies and heavily

vegetated areas (e.g., eastern mountains) often do not allow surveys to consistently extend to the maximum plot radius; thus, the searchable area of each turbine must be delineated and mapped to adjust fatality estimates based on the actual area searched. If needed, habitat visibility classes should be established in each plot to account for differential detectability. It may be necessary to develop visibility classes for different landscapes (e.g., rocks, vegetation) within each search plot. For example, PGC (2007) identified 4 classes based on the percentage bare ground.

The use of visibility classes will require that detection and removal biases be estimated for each class. Fatalities estimates should be made for each class and summed for the total area sampled. Global positioning systems (GPS) are useful for accurately mapping the actual total area searched and area searched in each habitat visibility class, which can be used to adjust fatality estimates. The width of the belt or subplot searched may vary depending on the habitat and species of interest; the key is to determine actual searched area and area searched in each visibility class regardless of transect width. An adjustment may also be needed to take into account the density of fatalities as a function of the radius of the search plot.

*General Search Protocol Guidance.* Trained searchers should look for bird and bat carcasses along transects or subplots within each plot and record and collect all carcasses located in the searchable areas. A complete search of the area should be accomplished and subplot size (e.g., transect width) should be adjusted to compensate for detectability differences in the search area. Subplots should be smaller when vegetation makes it difficult to detect carcasses; subplots can be wider in open terrain. Subplot width can vary depending on the size of the species being looked for. For example, small species such as bats may require smaller subplots than larger species such as raptors. Data to be recorded includes date, start time, end time, observer, which turbine area was searched and weather data for each search. When a dead bat or bird is found, the searcher should place a flag near the carcass and continue the search. After searching the entire plot, the searcher returns to each carcass and records information on a fatality data sheet, including date, species, sex and age (when possible), observer name, turbine number, distance from turbine, azimuth from turbine, habitat surrounding carcass, condition of carcass (entire, partial, scavenged), and estimated time of death (e.g., ≤1 day, 2 days). Rubber gloves or an inverted plastic bag should be used to handle all carcasses to reduce possible human scent bias for carcasses later used in scavenger removal trials. Carcasses should be placed in a plastic bag and labeled. Fresh carcasses, those determined to have been killed the night immediately before a search, should be redistributed at random points on the same day for scavenging trials.

**Comment [ejk88]:** Technical Edit #47

*Field Bias and Error Assessment.* It has long been recognized that during searches conducted at wind turbines, actual fatality is incompletely observed and that carcass counts must be adjusted by some factor that accounts for imperfect detectability. Important sources of bias and error include: 1) fatalities that occur on a highly periodic basis; 2) carcass removal by scavengers, 3) detectability by different searcher, 4) failure to account for the influence of site (e.g. vegetation) conditions in relation to carcass removal and searcher efficiency, and 5) fatalities or injured bats that may land or move outside search plots.

To address biases sources 2-4 above, all fatality studies must conduct carcass removal and searcher efficiency trials using accepted methods discussed in the revised methods and metrics document (citation coming soon). Bias trials should be conducted throughout the entire study period and

searchers should be unaware of which turbines are to be used or the number of carcasses placed beneath those turbines during trials. Prior to a study's inception, a list of random turbine numbers and random azimuths and distances (m) from turbines should be generated for placement of each bat or bird used in bias trials. Data recorded for each trial carcass prior to placement should include date of placement, species, turbine number, distance and direction from turbine, and visibility class surrounding the carcass. Trial carcasses should be distributed as equally as possible among the different visibility classes throughout the study period and study area. Studies should attempt to avoid "over-seeding" any one turbine with carcasses by placing no more than one or two carcasses at any one time at a given turbine. Before placement, each carcass must be uniquely marked in a manner that does not cause additional attraction and have its location recorded. There is no agreed upon sample size for bias trials, though some state guidelines recommend 200 carcasses, and we recommend a minimum of 50 be used seasonally (PGC 2007). Most researchers agree that sample size of carcasses used for bias trials should be maximized to the greatest extent practical.

**Comment [ejk89]:** Technical Edit #48

Some fatalities may occur on a highly periodic basis creating a potential sampling error, error number 1 above. We recommend that sampling be scheduled so that some turbines are searched most days so that episodic events are more likely detected, regardless of the search interval.

Carcasses or injured individuals may land or move outside the search plots, error number 5 above. This potential sampling error could be estimated by sampling outside the standard search plot for a subsample of turbines, but it is unlikely that this error will ever be accurately estimated. Additionally, based on the distribution of carcasses in plots this error is considered to be small and studies that expand the standard search plot could be used to evaluate the magnitude of the error.

*Estimators of Fatality.* If there were a direct relationship between the number of carcasses we observe and the number that were killed, there would be no need to develop a complex estimator that adjusts observed counts for detectability, and observed counts could be used as a simple index of fatality. But the relationship is not direct and raw carcass counts recorded using different search intervals and under different carcass removal rates and searcher efficiency rates are not directly comparable. Only the most contemporary equations for estimating fatality should be used, as some original versions are now known to be extremely biased under many commonly encountered field conditions; the revised methods and metrics document should be used as a current source for estimators of fatality (citation coming soon).

**Objectives and Metrics used for Fatality-Related Questions**

1. What is the bird and bat fatality rate for the project?

The primary objective of fatality searches is to determine the overall estimated fatality rate for birds and bats for the project. These rates serve as the fundamental basis for all comparisons of fatalities and if studies are designed appropriately they allow the development of relationships with site characteristics and environmental variables, and evaluation of mitigation measures. At a minimum, fatality rates should be expressed on a per turbine and per MW basis, and other metrics may be used if the information is available, such as rotor swept hour or area.

**Comment [ejk90]:** Technical Edit #49

2. What are the fatality rates of those species determined to be of special interest?

This analysis simply involves calculating fatalities per turbine of all species of interest at a site when sample sizes are sufficient to do so. These fatalities should be expressed on a per MW basis if comparing species fatality rates among facilities.

3. How do the estimated fatality rates compare to the predicted fatality rates?

There are a several ways that predictions can be assigned and later evaluated with actual fatality data. During the planning stages in Tier 2, predicted fatalities may be based on existing data at similar facilities in similar landscapes used by similar species. In this case, the assumption is that use is similar and therefore fatalities may be similar at the proposed facility. Alternatively, use metrics derived from pre-construction assessments for an individual species or group of species, usually an index of activity or abundance at a proposed facility, could be used in conjunction with use and fatality estimates from existing facilities to develop a model for predicting fatalities at the proposed facility. Finally, physical models can be used to predict the probability of a bird of a particular size striking a turbine and the probability, in conjunction with estimates of use and avoidance behavior can be used to predict fatalities.

Several statistical methods can be found in the revised methods and metrics document (citation coming soon) and used to evaluate fatality predictions. Metrics derived from Tier 3 pre-construction assessments may be correlated with fatality rates, and using the facility as the experimental unit, in Tier 5 studies it should be possible to determine if different preconstruction metrics can in fact accurately predict fatalities and, thus, risk.

4. How do the fatality rates compare to the fatality rates from existing facilities in similar landscapes with similar species composition and use?

Comparing fatality rates among facilities with similar characteristics is useful to determine patterns and broader landscape relationships and is discussed in some detail above for predicting fatalities at a proposed facility. Fatality rates should be expressed on a per MW or some other standardized metric basis for comparison with other facilities, and may be correlated with site characteristics such as proximity to wetlands, riparian corridors, mountain-foothill interface, or other broader landscape features using regression analysis. Comparing fatality rates from one project to fatality rates of other projects provides insight into whether a project has relatively high, moderate or low fatalities.

5. Do bird and bat fatalities vary within the facility in relation to site characteristics?

Turbine-specific fatality rates may be related to site characteristics such as proximity to water, forest edge, or other key resources and this relationship may be estimated using regression analysis. This information is particularly useful to determine future micro-siting options when planning a facility or, at a broader scale, in determining the location of the entire facility.

6. What is the composition of fatalities in relation to migrating and resident birds and bats at the site?

The most simplistic way to address this question is to separate fatalities per turbine of known resident species (e.g., big brown bat, prairie horned lark) and those known to migrate long distances (hoary bat, red-eyed vireo). These data are useful in determining patterns of species composition of fatalities and possible mitigation measures directed at either residents, migrants, or perhaps both and can be used in the assessment of potential population effects. More detailed investigations using stable isotope and genetic analyses may be conducted in Tier 5.

7. Do fatality data suggest the need for mitigation measures to reduce risk?

Fatality rates that trigger specific mitigation measures have not yet been established, but should be on a more local scale such as the state or by broad habitat types with similar risk levels (e.g., forested ridges) and related to local population effects. Evaluation of mitigation methods would occur in Tier 5, if there was uncertainty about whether the mitigation measure would meet the objective of reducing risk of fatalities.

### 2. Tier 5 – Other Post-construction Studies

**Comment [ejk91]:** **(P)** Level of detail and prescription is under review in Tiers 3-5;

The Guidelines need to clarify "trigger points," which will require better articulated off-ramps for terminating projects (i.e. what information determines when to decide to abandon a project, move to a different tier, or permit/construct).

Tier 5 studies are intended to assess both direct and indirect project-specific impacts, and may include: 1) estimating the direct and indirect effects (e.g., displacement) of habitat alteration, habitat loss, or habitat fragmentation on species of special interest, including birds, bats, and Federal or state-listed species; 2) analyzing factors associated with impacts, particularly direct impacts, in those cases in which impacts significantly exceed pre-construction predictions; 3) determining whether the avoidance, minimization, and mitigation measures implemented for a project were adequate or whether additional action is warranted; and 4) assessing demographic effects on local populations of species of special interest, including birds, bats, and Federal or state-listed species.

Studies to assess direct impacts may include quantifying species' habitat loss (e.g., acres of lost grassland habitat for grassland songbirds), and habitat modification. For example an increase in edge may result in greater nest parasitism and nest predation. Indirect impacts may include two important components. The first involves indirect effects to wildlife resulting from displacement, due to habitat fragmentation, loss, and alteration. The second involves demographic effects that may occur at the local, regional or population-wide levels. Such demographic effects may result from reduced nesting and breeding densities, loss of population vigor and/or decline in population density, habitat and site abandonment, increased isolation of species between habitat patches, loss of refugia for wildlife, attraction to modified habitats, effects on behavior (e.g., stress, interruption, and modification), disturbance, site avoidance, and displacement of species, and habitat unsuitability. These factors can individually or cumulatively affect wildlife, although some species may be able to habituate to some or perhaps all habitat changes. Indirect impacts may be difficult to quantify but their effects may be significant (e.g., Stewart et al. 2007, Pearce-Higgins et al. 2008, Bright et al. 2008, and Drewitt and Langston 2008).

Tier 5 studies may also be used by a developer to evaluate the effectiveness of a risk reduction measure (e.g., changes in turbine cut-in speed) before deciding to continue the measure permanently and/or whether to use the measure when implementing future phases of a project.

Occasionally, additional turbines may be proposed for an existing project resulting in site expansion. Results from Tier 4 and Tier 5 studies and the decision-making framework contained in the tiered approach can be employed to determine whether the project should be expanded and whether additional information, should be collected. It may also be necessary to evaluate whether additional measures to reduce impacts to species are necessary.

Adaptive management as defined earlier in this document may be useful in evaluating alternatives when design modifications and operational activities whether avoidance, minimization or mitigation measures fail to met desired goals. That is, Tier 5 studies may be proposed to test additional design and operation adjustments.

For example, if Tier 4 fatality studies document that a particular turbine or set of turbines exhibits greater bird or bat collision mortality than originally predicted, an appropriate response is an effort to identify the factors which cause or contribute to this higher level of impact, with a goal of identifying possible mitigation measures which might be tested in order to reduce the mortality. In this example, the decision to implement mitigation measures would be based on the likelihood of success in reducing mortality, the availability of alternative more cost effective measures, and the magnitude of concern over the increased level of fatalities.

Post-Construction Study Designs

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. Many Tier 5 studies will be a continuation of studies begun in Tier 3, and the decision to continue these studies in Tier 5 will reflect an assessment of the results of these Tier 3 studies. Like Tier 4 studies, results from Tier 5 studies should also lead to improved predictability and reduced cost of pre-construction risk assessment for future projects.

In the context of wind energy development, an alternate design for assessing displacement and/or other habitat-related impacts involves pre- and post-construction data collection on both project areas and reference areas, and this alternate design is most like the classic manipulative experiment[8]. The Before-After-Control-Impact (BACI) design is often considered an alternate design; the Impact Gradient Design is a modification of the classic BACI design (Morrison et al. 2008). The BACI, and perhaps the Impact Gradient Design, are initiated in Tier 3 and allow the strongest test of the impact of the wind project on the wildlife variables of interest, such as species displacement as a result of the project construction. Under the assumption that habitat and species use is homogenous in the assessment area prior to development, the Impact Gradient Design can provide an alternative to the BACI when before-data are lacking. Such designs will allow stronger inferences if multiple years of data collection occur in both pre- and post-

[8] In this context, such designs are not true experiments in that the treatments (project development and control) are not randomly assigned to an experimental unit, and there is often no true replication. Such constraints are not fatal flaws, but do limit statistical inferences of the results.

construction, and as a consequence post-construction studies utilizing alternate designs will be the most expensive type of study.

In many cases project impacts occur unexpectedly, and in such cases studies intended to understand these unexpected impacts would utilize alternate designs because relevant pre-construction data and/or reference areas may not be available. We recommend the use of alternate designs, such as BACI, if there is little information available from wind projects in similar landscapes involving similar species of concern. Alternative designs may be sufficient if there is post-construction data available from other sites involving similar landscapes and species.

**Tier 5 questions**

Tier 5 questions primarily focus on studies intended to evaluate impact predictions developed during the pre-construction risk assessment. For example, pre-construction studies focus on estimating the potential impacts of a wind project on wildlife, especially to species that are of special concern (e.g., state or Federally listed species), or species that are known to be at risk to wind development and are determined to be present in the proposed project area. As a result of these studies, design modifications to avoid or minimize predicted impacts and mitigation measures may be proposed. A goal of Tier 5 studies is to determine whether those modifications and measures have been effective in reducing predicted impacts, or whether estimated impacts exceed predictions requiring further mitigation and study.

Tier 5 questions typically fall in three major categories:

1. Do post-construction impacts equal or exceed pre-construction predictions for direct and indirect impacts on wildlife and their habitat determined to be of interest in Tier 3?

In the Tier 3 risk assessment, predictions of collision fatalities and habitat impacts (direct and indirect) are developed. Post-construction studies in Tiers 4 and 5 evaluate the accuracy of those predictions by estimating impacts.

2. Have avoidance, minimization and /or mitigation measures implemented as part of the project to avoid unacceptably high direct and indirect habitat and fatality impacts been effective?

If collision fatalities and habitat impacts exceed predictions, and/or they are unacceptably high, there may be additional or alternative avoidance, minimization and/or mitigation measures which should be explored. One objective of Tier 4 studies is to assess the effectiveness of mitigation measures implemented as part of the project and to identify such alternative or additional measures as are necessary. Question 2 refers to Tier 5 studies intended to evaluate the effectiveness of these measures.

3. Do the estimated impacts of the proposed wind energy project lead to local population declines in species of interest, and for selected species (e.g., rare and/or endangered species) to entire species and their habitats?

For species of interest identified in Tier 3 studies it is important to determine whether the estimated impacts of the wind project have population-level effects, typically measured as resulting in a population decline (lambda (λ) of less than 1). In most projects, this will be difficult to do beyond the local population, but in some cases, especially for listed species, the assessment of impact should include impact assessments for the entire species.

**Tier 5 Methods**

The specific Tier 5 questions and methods for addressing the above questions will depend on the specific project and the concerns raised during pre-construction studies and during operational phases. Because many of the Tier 5 studies are continuations of Tier 3 studies, the same techniques described in our description of Tier 3, e.g., avian use surveys, will be utilized. The case studies listed below provide examples of studies that have attempted to answer Tier 5 questions. Some of these examples are drawn from the updated Methods and Metrics document (*in preparation*) where more detailed discussion and case studies of alternate designs are available.

**1. Indirect Impacts - Displacement Studies**

Displacement refers to the indirect loss of habitat if birds avoid otherwise suitable habitat due to turbine operation and maintenance/visitor disturbance. Displacement can also result from fragmentation of habitat when birds are deterred from using normal routes to feeding or roosting grounds or large blocks of suitable habitat are broken into smaller blocks of less suitable habitat or where habitat fragmentation reduces reproductive success or survival of a wildlife species of special concern. As described in the methods for Tier 3, before-after/control-impact (BACI), resource selection function (RSF) and impact gradient, are the best study designs to estimate displacement effects, and the reader should refer to that section of the guidelines for more detail. The following example illustrates the use of alternate designs for the study of displacement.

Schaffer and Johnson (2008) examined displacement of grassland birds in the northern Great Plains. Intensive transect surveys were conducted within grid cells that contained turbines as well as reference areas. By using a grid, rather than a single transect, they were able to maximize the area surveyed associated with each turbine. Depending on the study area, distances out to 700 m to 1000 m from turbines were sampled. Surveys were conducted in both impact and reference areas prior to construction, so a BACI design was used to assess impacts. All focal species were mapped during the transect surveys. The authors compared observed versus expected distances to identify displacement effects. The study focused on five species at two study sites, one in South Dakota and one in North Dakota. Based on this analysis, killdeer (*Charadrius vociferous*), western meadowlark (*Sturna neglecta*), and chestnut-collared longspur (*Calcarius ornatus*) did not show any avoidance of wind turbines. However, grasshopper sparrow and clay-colored sparrow (*Spizella pallida*) showed avoidance out to 200 m.

**2. Operational Modifications to Reduce Collision Mortality**

Tier 5 studies may include more intensive post-construction mortality studies to determine, for example, relationships between fatalities and weather (e.g., wind speed) or turbine (revolutions-per-minute) covariates, which usually require daily carcass searches. Fatalities determined to have occurred the previous night can be correlated with that night's weather or turbine characteristics to establish important relationships that can then be used to evaluate the most effective times to implement operational modifications to reduce collision fatality. Other studies may use tools such as thermal imaging (Horn et al. 2008) or acoustic detectors (Kunz et al. 2007) to quantify post-construction bat activity in relation to weather and turbine characteristics for improving operational mitigation efforts. For example, at the Mountaineer project in 2003, Tier 4 studies (weekly searches at every turbine) demonstrated unanticipated and high levels of bat mortality (Kerns and Kerlinger 2004). Daily searches were instituted in 2004 and revealed that mortality was strongly associated with low-average-wind-speed nights, thus providing a basis for testing operational modifications (Arnett 2005, Arnett et al. 2008). The program also included behavioral observations using thermal imaging that demonstrated higher bat activity at lower wind speeds (Horn et al. 2008). These studies at Mountaineer and at a Pennsylvania site confirmed that wind projects located on Mid-Atlantic ridge-top could reasonably be expected to experience significant bat mortality (Arnett 2005). As a result, the Pennsylvania Game Commission has recommended more frequent carcass searches characteristic of Tier 5 studies (see PGC 2007).

Findings from intensive post-construction fatality studies can be used to determine optimal periods to implement operational modifications such as changes in turbine cut-in speed or real-time shutdowns to reduce collision fatalities. For example, Arnett et al. (2009) conducted studies on the effectiveness of changing turbine cut-in speed on reducing bat fatality at wind turbines at the Casselman Wind Project in Somerset County, Pennsylvania. Their objectives were to 1) determine the difference in bat fatalities at turbines with different cut-in-speeds relative to fully operational turbines, and 2) determine the economic costs of the experiment and estimated costs for the entire project area under different curtailment prescriptions and timeframes. Arnett et al. (2009) reported substantial reductions in bat fatalities with relatively modest power losses.

**Comment [ejk92]:** **(P)** Where should curtailment studies be included in the Guidelines and in the development process?

Iberdrola Renewables' Penascal project and Babcock & Brown's Gulf Wind project, both in Kenedy County, Texas, are collaboratively refining and testing a real-time curtailment protocol. The projects use a MERLIN avian profiling radar system to detect approaching "flying vertebrates" (birds and bats), primarily during spring and fall bird and bat migrations. The blades automatically idle when risk reaches a certain level and weather conditions are particularly risky. Feathering (real-time curtailment) experiments are underway in Tehuantepec, Mexico, where raptor migration through a mountain pass is extensive.

**3. Assessment of Population-level Impacts**

The Altamont Pass Wind Resource Area (APWRA) has been the subject of intensive scrutiny because of high avian mortality, especially mortality of raptors in an area encompassing more than 5,000 wind turbines (e.g., Orloff and Flannery 1992; Smallwood and Thelander 2004, 2005), and efforts to reduce mortality have met with limited success. Now about to begin the third year of a settlement agreement at APWRA, efforts to reduce avian mortality by 50% have as yet not been attained. Given the high mortality of certain long-lived raptors such as Golden

Eagle, concern has focused on the population-level impacts of this consistently high number of fatalities. To assess population-level effects, Hunt (2002) completed a four-year radio telemetry study of golden eagles at the APWRA and concluded that while the population is self-sustaining, fatalities resulting from wind-energy production were of concern because the population apparently depends on floaters from the local population and/or immigration of eagles from other subpopulations to fill vacant territories. Hunt conducted follow-up surveys in 2005 (Hunt and Hunt 2006) and determined that all 58 territories occupied by eagle pairs in 2000 were also occupied in 2005. Hunt (2002) hypothesized that this could be a sink population.

**4. Displacement and Demographic Studies in Prairie Chickens**

Researchers at Kansas State University, as part of the NWCC Grassland Shrub Steppe Species Collaborative (GS3C), have begun a multi-year radio telemetry study to evaluate effects of three proposed wind energy facilities on displacement and demographic parameters (survival, nest success, brood success, fecundity) of greater prairie chickens (*Tympanuchus cupido*) in Kansas. Studies are intended to evaluate whether 1) lek attendance is affected by wind-power development; 2) greater prairie-chickens avoid wind-towers and/or other anthropogenic features; and 3) wind energy development reduces nest success or chick survival. The study combines use of data collected at three proposed wind energy facilities and reference areas so that the BACI design can be used to assess effects on demographic parameters. Several hundred birds have been radio marked on all sites combined to obtain baseline data on both the reference areas and wind energy facilities. Birds are located frequently to determine home ranges and habitat use prior to wind energy developments so that displacement can be measured once the facilities are constructed. In addition, data are collected on survival of radio marked birds as well as nest success, fledgling success, and fecundity (the number of female offspring produced per adult female). The first post-construction data will be collected in 2009. Similar studies are being initiated to evaluate effects of wind energy development on greater sage-grouse in Wyoming.

### F. Retrofitting

Comment [ejk93]: (P) Are the BMPs sufficient as written; are there any additional BMPs needed? Any to delete?

Retrofitting is defined as replacing portions of existing wind turbines or project facilities so that at least part of the original turbine, tower, electrical infrastructure or foundation is being utilized.

1. Retrofitting of turbines should use installation techniques that minimize new site disturbance, soil erosion, and removal of vegetation of habitat value
2. Retrofits should employ shielded, separated or insulated electrical conductors that minimize electrocution risk to avian wildlife
3. Retrofit designs should prevent nests or bird perches from being established in or on the wind turbine or tower
4. FAA visibility lighting of wind turbines should employ only red, or dual red and white strobe, strobe-like, or flashing lights, not steady burning lights.
5. Keep lighting at both operation and maintenance facilities and substations located within ½ mile of the turbines to the minimum required.
   a. Use lights with motion or heat sensors and switches to keep lights off when not

required.

b. Lights should be hooded downward and directed to minimize horizontal and skyward illumination.

c. Minimize use of high intensity lighting, steady-burning, or bright lights such as sodium vapor, quartz, halogen, or other bright spotlights.

6. Remove wind turbines when they are no longer cost effective to retrofit so they cannot present a collision hazard to birds and bats.

### G. Repowering Existing Wind Projects

Comment [ejk94]: (P) Are the BMPs sufficient as written; are there any additional BMPs needed? Any to delete?

Repowering may include removal and replacement of turbines and associated infrastructure.

1. To the greatest extent practicable, existing roads, disturbed areas and turbine strings should be re-used in repower layouts.
2. Roads and facilities that are no longer needed should be stabilized and re-seeded with native plants appropriate for the soil conditions and adjacent habitat and of local seed sources where feasible, per landowner requirements and commitments.
3. Existing substations and ancillary facilities should be re-used in repowering projects to the extent practicable.
4. Existing overhead lines may be acceptable if located away from high bird crossing locations such as between roosting and feeding areas, or between lakes, rivers and nesting areas. Overhead lines may be used when they parallel tree lines, employ bird flight diverters, or are otherwise screened so that collision risk is reduced.
5. Above-ground low and medium voltage lines, transformers and conductors should comply with the 2006 or most recent Avian Power Line Interaction Committee (APLIC) "Suggested Practices for Avian Protection on Power Lines."
6. Guyed structures should be avoided unless guy wires are treated with bird flight diverters or high visibility marking devices, or are located where known low bird use will occur.
7. FAA visibility lighting of wind turbines should employ only red, or dual red and white strobe, strobe-like, or flashing lights, not steady burning lights.
8. Keep lighting at both operation and maintenance facilities and substations located within ½ mile of the turbines to the minimum required.

    a. Use lights with motion or heat sensors and switches to keep lights off when not required.

    b. Lights should be hooded downward and directed to minimize horizontal and skyward illumination.

    c. Minimize use of high intensity lighting, steady-burning, or bright lights such as sodium vapor, quartz, halogen, or other bright spotlights.

### H. Decommissioning

Comment [ejk95]: (P) Are the BMPs sufficient as written; are there any additional BMPs needed? Any to delete?

Decommissioning is the cessation of wind power operations and removal of associated equipment, roads, and other infrastructure. The land is then used for another activity. During decommissioning, contractors and facility operators should apply BMPs for road grading and native plant reestablishment to ensure that erosion and overland flows are managed to restore pre-construction landscape conditions. The facility operator, in conjunction with the landowner

and state and federal wildlife agencies, should restore the natural hydrology and plant community to the greatest extent practical.

1. Decommissioning methods should minimize new site disturbance and removal of native vegetation, to the greatest extent practicable.
2. Foundations should be removed to a depth of two feet below surrounding grade, and covered with soil to allow adequate root penetration for native plants and so that subsurface structures don't substantially disrupt ground water movements.
3. If topsoils are removed during decommissioning, they should be stockpiled and used as topsoil when restoring plant communities. Once decommission activity is complete, topsoils should be restored to assist in establishing and maintaining preconstruction native plant communities to the extent possible
4. Soil should be stabilized and re-vegetated with native plants appropriate for the soil conditions and adjacent habitat and of local seed sources where feasible, per landowner requirements and commitments.
5. Surface flows should be restored to pre-disturbance conditions, including removal of stream crossings, roads, and pads.
6. Surveys, by qualified experts, should be conducted to detect invasive plants, and comprehensive approaches to controlling any detected plants should be implemented and maintained as long as necessary.
7. Overhead pole lines that are no longer needed should be removed.
8. After decommissioning erosion control measures should be installed in all disturbance areas where potential for erosion exists.
9. Fencing should be removed unless the land owner will be utilizing the fence
10. Petroleum product leaks and chemical releases that constitute a Recognized Environmental Condition should be remediated prior to completion of decommissioning.

## Chapter Four: Compensatory Mitigation

The objectives of the activities described in Chapter Three are to avoid and minimize impacts to fish, wildlife and their habitats. However, if these measures are insufficient in avoiding or minimizing significant adverse impacts, then additional measures such as compensatory mitigation may be needed.

**Comment [ejk96]: (P)** Make it clearer here and in previous chapter that the goal of Ch.3 is to recommend effective measures to avoid or minimize, and Ch.4 focuses on "compensatory mitigation."

What level of impact is acceptable, when is mitigation recommended, and how much impact is too much?

### A. Compensatory Mitigation

Development of effective compensatory mitigation measures and recommendations should consider the USFWS Mitigation Policy and involve coordination with appropriate state agencies. Because a project's construction impacts on wildlife habitat cannot always be forecast with precision, it may not be feasible to make compensatory mitigation decisions until monitoring data is collected. However, the application, general terms, and commitments for potential future compensatory mitigation and the level of impact required for implementing such mitigation should be determined before a project goes forward, if possible. The method for implementing compensatory mitigation (e.g. fee title acquisition, in-lieu fee, conservation easement) should be determined early in the process if possible. If construction impacts exceed the expected and acceptable levels, additional compensatory mitigation may be necessary. Additional compensatory mitigation beyond that recommended prior to project construction should be well

defined and feasible to implement, so that the developer will have an understanding of any potential future mitigation requirements.

The following potential compensatory mitigation options may appropriate for consideration:

- Offsite and on-site habitat restoration
- Offsite and on-site habitat creation
- Offsite and on-site habitat enhancement (and sometimes protection)

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

### B. Compensatory Mitigation Plans

For wind energy projects that pose significant adverse impacts to wildlife and their habitat, development of a formal compensatory mitigation plan may be warranted. These plans should be completed prior to project construction. Compensatory mitigation plans may not be necessary for low-risk projects or common species. If justified by the project's characteristics, a compensatory mitigation plan should include some or all of the following elements: mitigation measures, goals and objectives, implementation plan, performance standards, operation and maintenance plans, and monitoring and evaluation plans. Compensatory mitigation plans directed at bird and bat habitat may be included in an Avian and Bat Protection Plan (ABPP) designed to address project impacts to birds, bats and their habitats. A sample ABPP can be found in Appendix X.

### C. Operational Modifications

The tiered approach incorporates post-construction fatality studies. These studies may indicate that a particular species has experienced significant adverse impacts (direct or indirect) greater than originally anticipated. This situation may result in additional or modifications to turbine operation. While many facilities may not require changes in operation, project locations that are considered high risk, as determined by the pre-construction studies, may require potential operational modifications, if feasible and supported by research. The facility operator can always coordinate with USFWS or states if operational modifications are not included initially as part of the project discussions.

## Chapter Five: Advancing Use, Cooperation, and Effective Implementation of the Guidelines

The Committee recommends that USFWS collaborate and coordinate with other federal and state agencies to streamline and encourage consistent review of wind energy projects. USFWS should develop, maintain, and publish on their website a directory of BMPs that can be adopted by other federal and state agencies, and encourage consistent data collection and reporting while also addressing individual site circumstances and practical limitations. USFWS should also establish a process to allow the national guidance to be used by interested state and local governments.

### A. Recommendations on Incentives for Use of Guidelines *(currently being drafted by Subcommittee):*

The Committee recommends that the USFWS establish several specific mechanisms to promote wind industry use of the recommended guidelines, as follows:

- ESA
- MBTA
- BGEPA
- Other?

The USFWS should contact the state wildlife agency prior to issuing any incentives or written assurance to give the state agency the opportunity to ensure project developers are considering state resources that may be at risk and state regulatory processes or mitigation requirements are being considered during project development.

### B. Federal Interagency Coordination and Cooperation

USFWS should employ the following strategies to streamline the review and permitting process for wind projects by federal agencies:

1. Establish an interagency working group to optimize federal coordination and use of the USFWS national guidelines to the greatest extent possible, to advance consistency and avoid duplication in the federal review and permitting process as it relates to wind development.

2. USFWS should work with other federal agencies to provide incentives for adopting and using USFWS national guidelines, encourage early coordination for projects that may affect wildlife resources, and use interagency meetings to promote consistency.

3. USFWS should establish and maintain a readily accessible national repository of BMPs for wind/wildlife interactions to increase efficiency, interagency coordination, and state and industry use of best management practices.

4. USFWS should coordinate with other agencies that require data collection at a wind energy site to promote consistent methodology and reporting requirements, while also accommodating individual site conditions and practical limitations.

### C. USFWS-State Coordination and Cooperation

USFWS should work with states to increase compatibility between state guidelines and these Guidelines, protocols, data collection methods, and requirements relating to wildlife and wind energy. While these Guidelines contain recommendations that are generally applicable at the federal, state and local levels across the country, some specific recommendations contained herein may not be accepted practices in all states. States that desire to or that have formally adopted wind energy siting, permitting or environmental review regulations or guidelines are encouraged to cooperate with USFWS to achieve consistency and to streamline wind project review. USFWS should confer, coordinate and share its expertise with interested states when a state lacks its own guidance or program to address wind/wildlife interactions.

USFWS should establish a voluntary state/federal program to advance cooperation and compatibility between USFWS and interested state and local governments for coordinated review of wind projects under both federal and state wildlife laws. USFWS and interested states are encouraged to reach formal agreements to foster consistency in review of wind projects using the following tools:

- Cooperation agreements with interested state governments.

- Joint agency reviews to reduce duplication and increase coordination in project review.

- A communication mechanism
  - ✓ to share information about prospective wind projects,
  - ✓ to coordinate project review, and
  - ✓ to ensure that state and federal regulatory processes, and/or mitigation requirements are being adequately addressed.

- Identification of a lead state agency designated to work with the USFWS field office reviewing the project.

- Establishing consistent and predictable joint protocols, data collection methodology, and study requirements to satisfy wind project review and permitting.

- Designating a USFWS management contact within each regional office (or nationally) to assist field offices working with states and local agencies to resolve significant wildlife-related issues that cannot be resolved at the field level.

- Cooperative USFWS and state law enforcement efforts to identify and resolve violations of state and federal wildlife law applicable to wind projects.

- Cooperative state/federal/industry research agreements relating to wind project-wildlife interactions.

- **Additional Optional Arrangements between States and USFWS:**
  The Committee has developed a more formal model state/federal agreement document for possible use by states and USFWS (see appendix).

In administering this state/federal partnership program, the Committee recommends that USFWS and the states play differing but complementary roles:

USFWS Role

- Provide training to states
- Support a national database for reporting of mortality data on a consistent basis.
- Establish national BMPs for wind development projects
- Develop recommended guidance on study protocols, study techniques, and measures and metrics for use by all jurisdictions

- Assist in identifying and obtaining funding for national research priorities

States and Local Role

- Employ national guidance as a minimum foundation for state review of wind projects
- Report project monitoring data and results received from the project developer to a national database.

See Appendix --: *Sample Memorandum of Understanding Between USFWS and State*

### D. USFWS-Tribal Coordination and Cooperation
***(Currently being drafted)***

### E. USFWS-Developer Coordination and Cooperation (incomplete section: remainder is being drafted)

- Project-Specific Agreements

USFWS should encourage the negotiation of memoranda of understanding with interested project proponents in which USFWS could endorse a project plan in exchange for a developer's commitment to implement the voluntary guidelines, best management practices, and/or a plan to protect wildlife and their habitats (e.g. an ABPP). The agreement would provide written assurances by USFWS that compliance with the guidelines, best management practices, and/or ABPP will result in the focus of enforcement efforts on those who take migratory birds with disregard for their actions and the law, especially when conservation measures have been developed but are not properly implemented.

**Comment [ejk97]: (P)** What constitutes "compliance" with the Guidelines?

.

While each agreement would be tailored to the particular project, an agreement could include:

- A developer commitment to share all relevant information about wildlife resources in the project area and the potential impacts to these wildlife resources, including pre- and post construction study results related to the proposed project.

- A developer commitment to use due diligence to comply with USFWS guidelines and best management practices, subject to appropriate modification in consultation with USFWS.

- A USFWS commitment to focus its enforcement efforts on those who take migratory birds with disregard for their actions and the law, especially when conservation measures have been developed but are not properly implemented, provided the developer remains in compliance with the terms and conditions of the agreement and has made a good faith effort to avoid and minimize potential adverse impacts to wildlife and their habitat.

**Comment [ejk98]: (P)** What constitutes "compliance" with the Guidelines?

- A developer commitment to provide access, upon prior notice, to the wind energy project as requested by USFWS staff in order to ensure compliance with the agreement.

**Comment [ejk99]: (P)** Same comment as above.

### F. Avian and Bat Protection Plans

USFWS should encourage use of Avian and Bat Protection Plans (ABPPs) as one of the important tools available to reduce risk to birds and bats and associated habitat in a project specific and/or company wide context (see Appendix ---- for further explanation). Based on compliance with an approved ABPP, USFWS would agree to focus its enforcement efforts on those who take migratory birds with disregard for their actions and the law, especially when conservation measures have been developed but are not properly implemented.

### G. NGO Actions

There are a variety of non-governmental organizations that have an interest in improving siting procedures for wind energy projects, including supporting expanded wind energy development, and reducing wildlife impacts of wind energy development. Such groups do not have a formal role in assessing specific projects but can provide information that can (i) be useful to identify sensitive sites at the preliminary site screening phase, (ii) help to design mitigation or offset strategies that lead to faster project review and approval, or (iii) help define and fund research priorities that lead to improve predictions of risk and impact assessment and ultimately more cost-effective evaluation of wind project development that minimizes impact to wildlife.

**Comment [ejk100]:** This section is a placeholder.

## Chapter Six: Revisions to the Guidelines

This document reflects the current state of knowledge about the interactions of wind turbines with birds, bats and wildlife in general. Ongoing and future research and actual experience in preliminary evaluation or screening of potential sites, site characterization, field studies to document site wildlife conditions and predict project impacts, and post-construction studies of wind energy projects will refine, expand and alter that knowledge. The Guidelines will be reviewed and revised, as necessary, approximately every five years. If substantive new information becomes available sooner, it should be used immediately and an addendum will be posted on the web-site updating the USFWS guidelines. Interested parties will have the opportunity to participate in the update and revision process. Consult the USFWS web page for information about proposed updates, revisions and participation: (*www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee.html*.). For questions about this document or to contribute information to the current body of knowledge, please contact the U. S. Fish and Wildlife Service at 703-358-2161.

## Chapter Seven: Recommendations for Effective USFWS Administration of the Guidelines

### A. Consistent Application

The Committee recommends that USFWS inform all Regional and Field staff of the premises and principles with which these Guidelines were developed. USFWS should provide guidance and training to the field for implementation of final USFWS guidelines to promote their consistent application, and to facilitate agency and industry understanding of recommended actions. Guidance should include the need for flexibility to address diverse geographic regions, habitat types, and wind energy development projects. USFWS should ensure that Regional and/or Washington office staff are available to provide guidance to the field for consistent application of the guidelines. Guidance also will be provided to assist in addressing developer concerns that cannot otherwise be resolved in a timely fashion at the field level.

USFWS should continue to be involved with the development of BMPs for project design, operation and compensatory mitigation, based on best available science, to minimize impacts to wildlife and their habitat from wind projects. BMPs will be reviewed periodically and revised as necessary to reflect new knowledge gained from current science, monitoring results, and experience with wind projects. All USFWS staff involved in review of wind projects should be trained in use of BMPs.

### B. Training

USFWS should provide training to ensure that all Regional and Field staff have the knowledge, skill, and ability to implement the USFWS Guidelines. Training will be provided through hands-on workshops conducted in each USFWS Region, with priority for the first workshops to be scheduled in areas of high wind energy development activity. Each workshop should be open to participants from USFWS, industry, states, tribes and other appropriate participants, with the goal of developing partnerships to minimize impacts to wildlife and their habitat while allowing flexibility for wind energy development.

### C. Staff support

USFWS should work within its budget constraints to provide staff support to review wind energy development projects in a timely and efficient manner. To supplement its staff efforts, USFWS should encourage state cooperative arrangements and participation in review of potential wind energy projects. USFWS encourages project proponents to coordinate early in the project development process to facilitate timely involvement and feedback. USFWS should also explore the collocation of additional staff in Bureau of Land Management Pilot Offices for renewable energy, and the creation of new collocated renewable offices. USFWS should continue to explore cutting edge technology to further streamline the review process.

### D. Research

Bird and bat interactions with wind turbines is an area of active research and collaboration. USFWS should promote collaboration and information sharing with research efforts to advance science on wind/wildlife interactions. Subject to funding, USFWS should work with other federal agencies, stakeholders, and states to develop a national research plan to identify research priorities to reduce impacts to wildlife resources while allowing wind energy development. The research plan should include major research issues and recommendations for support of specific research activities. The plan can be used to identify leveraging opportunities and support collaborative research efforts.

List of Appendices (*Appendices are in a separate handout for FAC review)*

Please see the FAC website for the Other Models Subcommittee Matrix from October 21-23, 2008: *www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee.html*

A. WTGAC Legal Subcommittee White Paper October 21-23, 2008

B. WTGAC Landscape/Habitat Subcommittee, "Mapping Tools Case Studies" October 21-23, 2008

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

D. WTGAC Existing Guidelines Subcommittee Recommendations, October 21-23, 2008

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

F. Glossary

# PowerPoint Presentation for the June 12, 2009 Webcast, on Draft v.3 of the Synthesis Workgroup One-Text

# Technical Edits to the Synthesis Workgroup Draft v.3

**Technical Edit (TE) 1. Chapter 3.A. Tier 1: Preliminary Evaluation or Screening of Potential Sites. *Inserted* at Page 20, Line 849.**
conduct a systematic and comprehensive (…review of the publicly available data).

**TE 2. Chapter 3.B. Tier 2: Site Characterization. *Inserted* at Page 21, Line 872.**
Because Tier 2 studies are preliminary normally one reconnaissance level site visit will be adequate as a 'ground-truth' of available information. Notwithstanding, Tier 2 studies should include enough site visits during the appropriate times of the year to adequately assess conditions and address key issues associated with the prospective site(s).

**TE 3. Chapter 3.C. Tier 3: Field Studies to Document Site Wildlife Conditions and Predict Project Impacts. *Replace* Page 22, Lines 930 – 938 with the following:**
As with the prior tiers, Tier 3 begins with a re-evaluation of the problem formulation. Information gained during the Tier 2 analyses can be reviewed and used to update or modify the questions and to determine the need for specific Tier 3 field studies.

Tier 3 studies provide pre-construction information that can be used in several ways including:

- Evaluation of a site prior to determine whether the project should be developed or be abandoned
- The design of a site to avoid or minimize impacts if a decision is made to develop;
- The design of mitigation measures if significant impacts cannot be acceptably avoided or minimized;
- Determine if post-construction studies are necessary; and,
- As the pre-construction component of Tier 5 studies necessary to estimate impacts.

Tier 3 studies should focus on the site proposed for development and the resources potentially affected by the development. Most field studies will be conducted within the wind resource area, but some studies may extend beyond resource area boundaries when necessary to detect impacts. The distance beyond the boundary of the wind resource area is subjective with little empirical data for support. Our recommendations for the boundaries of individual studies are discussed below.

Tier 3 studies should be designed to answer the following questions:

**TE 4. Chapter 3.C. Tier 3: Field Studies to Document Site Wildlife Conditions and Predict Project Impacts. *Replace* Page 22, Lines 942 – 944 with the following:**

2. Do field studies indicate that there are large blocks of habitat needed by species of special interest?

**TE 5. Chapter 3.C. Tier 3: Field Studies to Document Site Wildlife Conditions and Predict Project Impacts. *Inserted* at Page 23, Line 960.**

The decision to conduct a Tier 3 study depends on whether or not additional data are necessary to answer questions of interest. For example, if adequate data are available from nearby sources and/or from studies of the site being evaluated, then additional studies may be unnecessary. Additionally, a reduced level of survey effort may be warranted for certain projects, such as infill development, some repowering projects, or projects contiguous to existing low-impact wind facilities provided these projects have sufficient credible information regarding impacts. When additional studies are warranted, the selected protocols will need to be adjusted to accommodate unique, site-specific conditions such as the species of birds and bats using the site, the frequency and type of bird and bat use, landscape characteristics of the site including terrain and vegetation. The protocols must also accommodate the potential for use of pre-construction data in post-construction studies of fatalities (Tier 4) and habitat impacts (Tier 5).

**TE 6. Chapter 3.C. Tier 3: Methods and Metrics. *Replace* Page 23, Lines 963 - 981 with the following:**

The recommended Tier 3 methods are designed to be flexible to accommodate local and regional concerns. One year of pre-permitting surveys may be adequate to answer Tier 3 questions. One year of pre-permitting surveys also may be adequate to provide pre-construction data if Tier 4 and 5 studies are contemplated.

**TE 7. Chapter 3.C. Tier 3: Methods and Metrics. *Inserted at* Page 25, Line 1065.**

The following methods for answering Tier 3 questions are stated generally, but in some cases greater detail is given regarding more common methods and metrics.

> 1. Do field studies indicate that threatened, endangered, federal "sensitive", state listed species, or other special status species are present on or likely to use the proposed site? (*Moved from Page 24, Line 1042)*

In many situations this question can be answered based on information accumulated in Tier 2 and specific presence/absence studies are not required and protocol development will focus on answering the remaining Tier 3 questions. Nevertheless, it may be necessary to conduct field studies to determine the presence, or likelihood of presence when little information is available for a particular site.

**TE 8. Chapter 3.C. Tier 3: Methods and Metrics. *Replace* Page 26, Lines 1095 – 1099 with the following:**

While mist-netting bats is required in some situations by state agencies and the USFWS to determine the presence of threatened, endangered or otherwise rare species, we generally do not recommend mist-netting as a standard method for assessing risk of wind development to bats for the following reasons: 1) not all proposed or operational wind energy facilities offer conditions conductive to capturing bats and often the number of suitable sampling points is minimal or not closely associated with the project location; 2) capture efforts often occur at water sources offsite or at nearby roosts and the results may not reflect species presence or use on the site where turbines are to be built; and 3) mist-netting isn't feasible at the heights of the rotor-swept zone and captures below that zone may not adequately reflect risk of fatality.

**TE 9. Chapter 3.C. Tier 3: Methods and Metrics. *Replace* Page 26, Lines 1110 – 1113 with the following:**

2. Do field studies indicate that there are large blocks of habitat needed by species of special interest?

**TE 10. Chapter 3.C. Tier 3: Methods and Metrics. *Inserted at* Page 27, Line 1138,** *after "where they are likely to occur…"*
(i.e., where their habitat is) within a project site, when they might occur and in what abundance. The level of effort normally contemplated for Tier 3 studies should detect common species and species that are relatively rare but visit a site regularly (i.e., every year). In the event a species of concern is very rare and only occasionally visits a site (e.g., whooping crane) a determination of likely to occur would be inferred from the habitat at the site and historical records of occurrence on or near the site.

**TE 11. Chapter 3.C. Tier 3: Methods and Metrics. *Delete* Page 27, Lines 1154 – 1164:**
Because absolute abundance is difficult to determine for most species, surveys typically should estimate use as an index of abundance, for example, the relative abundance of breeding song birds can be considered the number of detections per period of survey per survey plot. Survey periods are typically 3-10 minutes for small bird surveys, depending on the site characteristics, and 20 minutes for raptors, or when all birds are the target of a survey. These statistics can be compared from plot to plot within the area of interest and from site to site where similar data exist. Relating use to site characteristics requires that samples of use also measure site characteristics thought to influence use (i.e., covariates such as vegetation and topography) in relation to the location of use. The statistical relationship of use to these covariates can be used to predict occurrence in unsurveyed areas during the survey period and for the same areas in the future.

**TE 12. Chapter 3.C. Tier 3: Methods and Metrics. *Replace "is the bird use count"* at Page 27, Line 1169 with the following:**
includes counts of birds seen or heard at specific survey points (point count) or along transects (transect surveys). Both methods result in estimates of bird use, which is assumed to be an index to abundance in the area surveyed. Surveys for raptor and other large bird use should be done using point counts. Surveys for passerines and other small birds can use either point counts for line transect surveys.

**13. Chapter 3.C. Tier 3: Methods and Metrics. *Delete at* Page 28 Line 1186:**
BUCs estimate the spatial and temporal use of the site by all birds, including large birds such as raptors, vultures, corvids, and waterfowl, as well as songbirds and other small species. BUC for passerines.
***And insert***: "Avian point counts should" (follow the methodology…).

**TE 14. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 28 Line 1190.**
These methods are most useful for pre- and post-construction studies to quantify avian use of the WRA by habitat, determine the presence of sensitive species, and to provide a baseline for assessing displacement effects and habitat loss.

*(next paragraph):*
Raptors are often the primary species of interest at a proposed wind development site. Point counts for large birds (e.g., raptors) follows the same point count method described by Reynolds et al. (1980), although the radius of the survey can be much larger in open terrain, typically 800 meters. In heavily forested terrain, such as the eastern mountain ridge tops the larger survey radius is not practical. Surveys for large birds are obtained with a combination of the smaller radius point counts and observations from open vantage points during the migration season using the Hawk Watch protocol (Dunn et al. 2008).

**TE 15. Chapter 3.C. Tier 3: Methods and Metrics. *Delete at* Page 28 Line 1196:**
The BUC provides information regarding bird species and their use of the project site during the period of interest.

**TE 16. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 28 Line 1198:**
At some locations small birds (i.e., songbirds and other small birds (less than 10 inches [25 centimeters] in length)) may be the avian group of primary interest. Diurnal estimates of small bird use using point or line transect counts conducted with a greater density of smaller-radii point count circles or transects than used in surveys of large birds. Point count surveys are especially appropriate in forested areas where most birds are detected by sound alone, but they are routinely used in all habitat types. Point count sampling plots for small birds have a smaller radius than recommended for large birds, typically 50 meters, although plots up to 100 meters can be used in open areas with little vegetation. Savard and Hooper (1995) found that 100-meter radius plots yielded nearly as many songbird detections as an unlimited radius for most species of birds. To date, small bird counts have not been demonstrated to be correlated to total small bird fatality rates and thus have limited use for predicting fatality rates. Nevertheless, it may be possible to use small bird counts to predict the fatality rates for resident birds if residency can be established (see the NWCC's revised M&M document 2009).

**TE 17. Chapter 3.C. Tier 3: Methods and Metrics. *Delete at* Page 28 Lines 1203 – 1206:**
We recommend using the BUC protocol for large birds unless there is a specific interest in abundance and distribution of small birds. Nevertheless, all birds seen during these surveys, large or small, should be recorded during BUCs. Small Bird Counts (SBC) are discussed in more detail in a later section.

**TE 18. Chapter 3.C. Tier 3: Methods and Metrics. At Page 28 Lines 1210 – 1216, *Replace:* "** In areas where large birds (e.g., corvids, waterfowl, raptors) exhibit relatively high month to month variation in use but little distinct migration, surveys should be conducted at each plot for 20 minutes once a week, for a year, or the period of occupancy if less than a full year. In areas where month to month variation is relatively small but there is a distinct migration season each plot should be surveyed once a week during the migration periods and twice per month during other periods of occupancy. The large BUCs should cover most daylight hours and weather conditions."

**With the following:**
Because absolute abundance is difficult to determine for most species, surveys typically should estimate use as an index of abundance, for example, the relative abundance of breeding song birds can be considered the number of detections per period of survey per survey plot. These statistics can be compared from plot to plot within the area of interest and from site to site where similar data exist. Relating use to site characteristics requires that samples of use also measure site characteristics thought to influence use (i.e., covariates such as vegetation and topography) in relation to the location of use. The statistical relationship of use to these covariates can be used to predict occurrence in unsurveyed areas during the survey period and for the same areas in the future.

Typically, abundance and use will vary from season to season and surveying an area weekly for a year, or the period of occupancy if less than a full year provides the best estimate of species composition and relative abundance. The goal of Tier 3 studies is usually to estimate risk and not absolute abundance so surveys at different intervals based on the amount expected bird activity are adequate. For example, it may be possible to estimate species composition and relative abundance by surveying at biweekly intervals during the breeding season, weekly intervals during the migration seasons and monthly during the winter if bird abundance is very low. Migration events can be episodic and to increase the likelihood that migration events are captured, weekly surveys should be designed so that some plots are being surveyed most days during the week. The surveys focused on large diurnally active birds should cover most daylight hours and weather conditions. Survey periods are typically 20 minutes for raptors, or when all birds are the target of a survey.

**TE 19. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 28 Line 1219:**
To determine which small birds are breeding on the project site, surveys for small birds should be conducted at least two times (Dettmer et al. 1999) during the breeding season (April through July is the breeding season in much of the nation). Surveys should be conducted no earlier than a half-hour before and no later than four hours after sunrise. Time spent at each count station for most species except those with low detection rates, should be 5 or 10 minutes (Dettmer et al. 1999).

If a precise estimate of density is required for a particular species (for example, when the goal is to determine densities of a special-status breeding bird species), the researcher will need more sophisticated sampling procedures including estimates of detection probability and should refer to the NWCC revised M&M document (2009) for sample design and protocol development.

**TE 20. Chapter 3.C. Tier 3: Methods and Metrics. *Replace* Pages 28–29 Lines 1224 – 1229:**
For the complete coverage of an area sites should be approximately 5,200 feet (1,600 meters) apart throughout the proposed facility, coinciding with proposed turbine sites, if they are known. In the case of small birds the plot radius or observational distance from the line transect should be approximately 50 m and a sample survey of the development site will be required (see discussion below for small bird counts).

***With the following:***
… in open terrain. In the case of small birds or raptors in heavily forested areas the plot radius or observational distance from the line transect should be much less, typically 50 meters, and complete coverage of the area is impractical, requiring a sample survey to estimate distribution and relative abundance of the development site (see discussion below for small bird counts). For surveys of small bird use the points should be at least 250 meters apart to reduce the probability of double-counting individual birds (Ralph et al., 1995). As an alternative to a probability sample, the plots or transects for small bird use may be along the turbine strings if turbine locations are known; although, turbine locations are seldom certain during Tier 3 studies so the area where turbines potentially could be located should be sampled.

**TE 21. Chapter 3.C. Tier 3: Methods and Metrics. *After* "**Methods for these surveys are fairly standard…"

***Insert at Page 29 Line 1255:***
and will vary with the species, terrain, and vegetation within the survey area.

**TE 22. Chapter 3.C. Tier 3: Methods and Metrics. *Replace* at Page 29 Lines 1262 - 1263*:***
"within at least one mile of wind resource area boundary."

***With:***
Raptor breeding territories can be quite large and the area surveyed should include a buffer around the wind resource area. The size of the buffer should be based on the landscape surrounding the wind resource area boundary and the species of interest. While there is no consensus on the recommended buffer zones around nest sites to avoid disturbance (Sutter and Jones 1981), a nest search within a minimum of at least one mile of the wind resource area boundary should locate most raptor nests potentially affected by the development.

**TE 23. Chapter 3.C. Tier 3: Methods and Metrics. *Delete* Page 30 Lines 1270 – 1302.**

**TE 24. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 30 Line 1305:**
Prairie grouse are considered sentinel species in the prairies and cold deserts of the central and western U.S. Because much of the native habitat important to these species has been lost to changes in land use and because excellent wind resources and the remaining habitat for these species frequently coincide, there is a great deal of concern about the potential impact of wind development on these birds.

**TE 25. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 31 Line 1324: Prairie Grouse Brood Surveys**
While lek surveys are considered the best assessment tool for breeding populations of prairie grouse, we recommend documenting potential brood rearing habitat within the area potentially affected. Potential brood rearing habitat can be mapped based on habitat

preferences of individual species. The distribution and abundance of brood rearing habitat can be used to help in the assessment of impacts of the proposed wind project to prairie grouse and assist in identifying approaches that could be used to avoid or minimize impacts to prairie grouse when siting wind energy facilities.

**TE 26. Chapter 3.C. Tier 3: Methods and Metrics. *Move* Page 31 Lines 1335 – 1349 to Page 32 Line 1397.**

**TE 27. Chapter 3.C. Tier 3: Methods and Metrics. *Delete* Page 31 Line 1355 – Page 32 Line 1361:**
Perfect control sites, which exactly replicate the conditions at the proposed wind turbine site, usually do not exist in a field setting because of inherent natural variation. Thus, "controls" are reference sites that most closely match topographic, wind, and both on-site and adjacent habitat conditions at the proposed wind turbine site. Collecting data at both reference and assessment areas using the same protocol during both pre- and post-impact periods can help answer questions relating to construction and operation effects on bird abundance and distribution.

**TE 28. Chapter 3.C. Tier 3: Methods and Metrics. *Delete* Page 32 Lines 1365 – 1373**:
BACI designs with replicated reference sites provide a rigorous basis for statistical analysis and supportable scientific conclusions. Multiple references improve discrimination between project impacts and impacts resulting from natural temporal changes or other factors. This replication provides the basis for formal statistical testing on the impacts of the project and estimates of confidence intervals. A before-after study design with a single site, the site that will be developed but no reference site, only provides a comparison of data from before and after construction of the project. Such a weak study design limits the researcher's ability to make inferences and draw conclusions about the impact of the project because natural temporal changes are likely to confound detection of changes due to impacts.

**29. Chapter 3.C. Tier 3: Methods and Metrics. *Replace at* Page 32 Lines 1384 – 1385:** "See the answer to question #5 below for a more detailed explanation of RSF."

***With:***
The RSF allows the estimation of the probability of use as a function of the distance to various environmental features, including wind facilities and thus provides a direct quantification of the magnitude of the displacement effect. RSF could be improved with preconstruction and reference area data, nevertheless, it is a relatively powerful approach to documenting displacement and/or a response to mitigation measures designed to reduce displacement even without these additional data.

**TE 30. Chapter 3.C. Tier 3: Methods and Metrics. *Replace at* Page 32 Lines 1399 – 1401: "**Normally, mist-netting is not recommended as a technique for estimating relative bird abundance. Mist-netting cannot generally be used to develop indices of relative bird abundance, nor does it provide an estimate of collision risk."

***With:***
Mist-netting is not recommended as a standard method for assessing risk of wind development. Mist-netting cannot generally be used to develop indices of relative bird abundance, nor does it provide an estimate of collision risk as mist-netting isn't feasible at the heights of the rotor-swept zone and captures below that zone may not adequately reflect risk.

**TE 31. Chapter 3.C. Tier 3: Methods and Metrics. *Delete* Page 33 Line 1439 – Page 34 Line 1451.**

**TE 32. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 34 Line 1461.**
Generally, for Tier 3 studies of relative abundance of birds that migrate at night can be determined by using marine radar and/or NEXRAD. Unfortunately neither form of radar allows separation of detected targets into birds and bats and data collection using both forms of radar is hampered by weather. Some effort has been made to use night vision equipment to separate the two groups of flying organisms, but these methods have not been evaluated for their relative probability of detection. Auditory surveys have also been used for birds with some success (Kunz et al 2007), although with less success for birds than for bats. Detection probabilities have also not been studied, the range of detection for the equipment is limited, and the data confirm presence but not absence because not all birds vocalize within the range of the equipment and not all species vocalize at the same rate.

**TE 33. Chapter 3.C. Tier 3: Methods and Metrics. *Replace at* Page 35 Line 1513, "**all existing met towers…"

***With:***
**"** a sample of existing met towers well distributed throughout the wind resource areas…"

**TE 34. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 35 Line 1521:**
At potential development sites where potential risk to bats is identified early in the development process developers should evaluate whether it would be cost effective to install detectors when meteorological towers are first established on a site. Doing so might reduce the cost of installation later and might alleviate time delays to conduct such studies.

**TE 35. Chapter 3.C. Tier 3: Methods and Metrics. *Replace at* Page 35 Line 1538*:*** but "may be required…"

***With"***
"and are generally used for Tier 5 level of study"

**TE 36. Chapter 3.C. Tier 3: Methods and Metrics. *Replace* at Page 36 Lines 1551 – 1557:**
"…to bats for the following reasons: 1) not all proposed or operational wind energy facilities offer conditions conductive to capturing bats and often the number of suitable sampling points is minimal or not closely associated with the project location; 2) capture efforts often occur at water sources offsite or at

nearby roosts and the results may not reflect species presence or use on the site where turbines are to be built; and 3) mist-netting isn't feasible at the heights of the rotor-swept zone and captures below that zone may not adequately reflect risk of fatality."

***With:***
Mist-netting alone is inadequate for assessing bat activity at proposed and operational wind energy facilities and for this purpose should be considered a low priority method at most sites (Kunz et al. 2007).

**TE 37. Chapter 3.C. Tier 3: Methods and Metrics. *Replace at* Page 36 Line 1568 – Page 36 Line 1569:** Rainey (1995) provides a guide to options for exit counts.

***With:***
…and acoustic surveys and radar to assess the spatial distribution of direction of movement as bats leave roosts. Rainey (1995) provides a guide to options for exit counts and Kunz et al (2007) describe the use of acoustics and radar.

**TE 38. Chapter 3.C. Tier 3: Methods and Metrics. *Move from Page 36 Lines 1582 - 1585* to Page 37 Line 1592:**
**"…**for reptiles and amphibians are well established (e.g., Corn and Bury 1990, Hobbs et al. 1994, Olson et al. 1997, Ryan et al. 2002, Bailey et al. 2004, Graeter et al. 2008), and specific protocols for specific sites should be determined and agreed upon with state and federal agencies."

**TE 39. Chapter 3.C. Tier 3: Methods and Metrics. *Delete* Page 36 Line 1585 – Page 37 Line 1586:** If absolute abundance is desired then line-transect methods using distance or mark-recapture methods described in (Morrison et al 2006) will be necessary.

***And insert:***
…will exist for most protected species. However, in their absence methods should be determined from the literature and discussions with experts and agreed upon with state and federal agencies.

**TE 40. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 37 Line 1626, following:** "…for the estimation of probability of bird/turbine collisions."
A statistical model based on the relationship of preconstruction estimates of raptor abundance and post construction raptor fatalities is described in the NWCC's update of the M&M document (2009). Most individual-based …

**TE 41. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 38 Line 1638:**
While fatality predictions are typically made by comparing characteristics of a proposed site to existing sites with estimates of fatalities, models provide an additional tool for use in estimating fatalities. Models have been used in Australia (Organ and Meredith 2004), Europe (Chamberlin et al. 2006), and the U.S. (Madders and Whitfield 2006). As with other prediction tools, model predictions must be evaluated and with post-construction fatality data. Models should be used as a subcomponent of a more comprehensive evaluation of risk.

**TE 42. Chapter 3.C. Tier 3: Methods and Metrics. *Insert at* Page 40 Line 1753:**
Demographic studies commonly require several years of data to account for natural variation, delayed response, and/or habituation and recovery.

**TE 43. Chapter 3.C. Tier 3: Methods and Metrics. *Replace* Page 41 Lines 1771 – 1786 with:**
As described above in reference to displacement studies, the BACI, RSF, and impact gradient designs are currently considered optimal designs for estimating impact and mitigation response (see Anderson et al. 1999 and the NWCC revised M&M document). The use of an optimum study design is not always possible or feasible. The most appropriate design for a particular study will depend on a number of practical considerations including the area being studied, the time period of interest, species of interest, potentially confounding variables, time available to conduct studies, budget, and the magnitude of the anticipated impact (Morrison et al 2008). Study design alternatives are discussed in detail in Morrison et al. (2008) and the NWCC revised M&M document.

**TE 44**. **Chapter 3.D. Site Construction: Site Development and Construction Best Management Practices. *Insert at* Page 43 Line 1863 in front of "use tubular towers:**
Although it is unclear whether tubular or lattice towers reduce risk of collision, when practical

**TE 45. Chapter 3.E. Site Operation - Conduct Tier 4 and Tier 5 Studies, as Appropriate. *Insert at the end of* Page 43 Line 1886:**
We encourage operators of facilities to develop a long-term program for reporting fatalities by their personnel after form studies are terminated.

**TE 46. Chapter 3.E. Site Operation - Conduct Tier 4 and Tier 5 Studies, as Appropriate. *Replace* Page 44 Lines 1913 – 1915: "**the search interval should be no greater than twice the mean removal rate. Consequently, a search interval of 7 days is typically adequate to answer Tier 4 questions."

***With:***
protocols should be designed to minimize adjustments required due to the biases described below. A search interval of 7 days is typically adequate to answer Tier 4 questions. It should be noted that search interval is the interval between searches of individual turbines and protocols should be designed such that some turbines are sampled most days each week of the study.

**TE 47. Chapter 3.E. Site Operation - Conduct Tier 4 and Tier 5 Studies, as Appropriate. *Replace* Page 45 Lines 1978 – 1980:** Rubber gloves or an inverted plastic bag should be used to handle all carcasses to reduce possible human scent bias for carcasses later used in scavenger removal trials.

***With:***

Rubber gloves should be used to handle all carcasses to reduce possible human scent bias for carcasses later used in scavenger removal trials, and leather gloves should be wore when handling live bats found during searches.

**TE 48. Chapter 3.E. Site Operation - Conduct Tier 4 and Tier 5 Studies, as Appropriate. *Replace at* Page 46 Lines 2005 – 2006: …**200 carcasses, and we recommend a minimum of 50 be used seasonally (PGC 2007)

***With:***
From 50 – 200 carcasses.

**TE 49. Chapter 3.E. Site Operation - Conduct Tier 4 and Tier 5 Studies, as Appropriate. *Replace* at Page 46 Lines 2036 – 2038:** At a minimum, fatality rates should be expressed on a per turbine and per MW basis, and other metrics may be used if the information is available, such as rotor swept hour or area.

***With:***
Several metrics are available for expressing fatality rates. Early studies reported fatality rates per turbine, however this metric is somewhat misleading as turbine sizes and there risk to birds vary significantly (NRC 2007). Fatalities are frequently reported per nameplate capacity (ie. MW), a metric that is easily calculated and better for comparing rates for different sized turbines. Nevertheless, the size of the rotor swept area may vary among manufacturers for the same name plate capacity and each site has a unique capacity factor (the average operating capacity). The metrics fatalities per rotor swept hour and per MW of produced power would be superior to the other metrics, but require data that are usually unavailable. Unless better metrics are available, fatality rates should be expressed on a per turbine and per nameplate MW basis.

**Wind Turbine Guidelines Advisory Committee**
**Draft Proposed Revisions to v3 Draft of Recommendations: Policy Issues**

*The Synthesis workgroup has identified a list of policy issues (see Draft v3 Cover Memo). Inserted below are proposed language, provided by Individual FAC members, and where the Synthesis Committee has reviewed, it is noted.*

***Section II of Draft v.3 Committee Draft Policy Recommendations and Language***

***To replace lines 159-170 (page 1-2):***
The Committee recommends that the Secretary instruct USFWS, in consultation with the USGS and state agencies, to assemble and maintain a comprehensive landscape database based on scientifically credible sources on a national scale. This database will assist in identifying and assessing development risks to ecosystems, large-scale habitats, and migratory and resident species that rely on large-landscape or specialized habitats . In developing this database, the USFWS should consult and assess existing and on-going landscape analysis and mapping efforts focused on renewable energy, including , but not limited to: the California RETI, Western Governors' Association Wildlife Habitat Council, The Nature Conservancy, National Audubon Society, and American Wind and Wildlife Institute activities. Such a database should have broad applicability to help guide decisions regarding other types of development, including other energy sources. However, the Committee stresses that the lack of landscape level tools should not in any way delay the use and application of the recommended Guidelines.

*P6, Line 236: (Proposed by Synthesis Committee to FAC)*

**Cumulative Impact Analysis**. The FAC recommends DOI improve its capability to assess cumulative impacts by working with the USFWS Regions to:

- review the range of development-related significant adverse impacts
- review indicator species or habitats within the landscape at the most risk of significant impacts from wind development, in conjunction with other reasonably foreseeable significant adverse impacts.
- develop data that can be used to conduct regional or landscape level analysis

The product of regional analyses of cumulative impacts should be available to inform Tier 1 preliminary site assessment or Tier 2 site characterization and may be useful for designing Tier 3 wildlife surveys. However, the Committee stresses that the lack of tools for cumulative impact analysis should not in any way delay the use and application of the recommended Guidelines.

***Section III of Draft v.3 Committee Draft Guidelines (Guidelines)***
**Chapter One**

*P12, Line 504, insert after "study designs":* "that are proportionate to the risk to wildlife and their habitats" *Suggested to FAC by Synthesis Committee 6/24)*

***Section III of Draft v.3 Committee Draft Guidelines (Guidelines)***
**Chapter Two**

**A. Intended Use of Guidelines**

*P14, Line 560: insert new sentence:* (*Synthesis Committee reviewed/agreed)*

"The Guidelines are currently designed to address current commercial technology."

**B. Use of Mitigation Policies and Principles: See proposed language on mitigation**

***(lang under review by Synthesis Committee***

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

**Adaptive Management (AM): Definition of Active versus Passive AM and Applicability of AM to the Decision Framework and Tiered Approach**.

*P17, Line 725: after "management," insert new sentence: (Synthesis Committee Reviewed/agreed)*
"AM, if necessary, should be explored and applied only when uncertainty exists regarding the approaches to avoiding or minimizing impacts.. The tiered approach is designed to accommodate adaptive management."

## Page 19, Line 790 – Dave Stout/Dale Strickland proposed draft

**Chapter Three: The Tiered Approach for Wildlife Assessment and Siting Decisions**

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

### I. Tier 1: Preliminary Evaluation or Screening of Potential Sites

The first stage in the assessment of potential risk to wildlife is an internal planning process conducted by developers in preparation for coordination with the federal, state, tribal, and/or local agencies that have jurisdiction over the potential project. This preparatory process should include a preliminary regional evaluation of a potential site or sites in order to identify geographic areas of high wildlife sensitivity due to 1) the presence of large blocks of intact native landscapes, 2) intact ecological communities, 3) fragmentation-sensitive species' habitats, or 4) other important landscape-scale wildlife values. These evaluations rely on geographic databases and generally examine areas from a regional rather than a site-specific scale. Tier 1 investigations will utilize existing public or other readily available landscape-level maps and databases from sources such as federal, state, or tribal wildlife or natural heritage programs, the academic community, conservation organizations, or the developer's or consultant's own information. Appropriate Tier 1 preparatory tasks by the project proponent will insure that Tier 2 coordination with the reviewing agencies will be as productive as possible.

The Committee has made a policy recommendation to DOI that USFWS facilitate or participate in the development of a comprehensive landscape database on a national scale

for the purpose of identifying and assessing development risks and cumulative impacts to ecosystems and large-scale habitats.

Tier 1 may be used in any of three ways:

a) to identify regions where wind energy development poses exceptional risks to wildlife or habitats, including the fragmentation of large-scale habitats and threats to regional populations of sensitive species;

b) to "screen" an ecoregion or set of multiple potential sites in order to avoid those that have the highest habitat values; or

c) to begin to determine if a single identified potential site poses serious wildlife or habitat concerns.

While Tier 1 may not be necessary in all situations (for example, for expansion of an existing facility), it offers early guidance about the sensitivity of the site within a larger landscape context, it can help direct development away from sites that will be associated with higher study, mitigation costs, and uncertainty, and facilitates discussions with the federal, state, tribal, and/or local agencies that have jurisdiction over development in a region being considered for development. In some cases, Tier 1 studies could reveal serious concerns indicating that a site should not be developed. In other cases it will raise questions or uncertainties that will guide investigations in further tiers, particularly if the necessary habitat data is deficient or outdated.

Suggested questions to be considered in Tier 1 include:

5. Are there known threatened, endangered, federal "sensitive", state-listed, or other special status species present on the proposed site, and/or is habitat (including designated critical habitat) present for these species?
6. 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 areas for non-government organizations; or other local, state, regional, federal, tribal, or international categorization that may preclude energy development?
7. 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?
8. Are there large areas of intact habitat with the potential for fragmentation, with respect to species with needs for large contiguous blocks of habitat?

Two approaches to triggers:

*A. Decision Framework Approach*

## Tier 1 Decision Process (Decision framework approach)

Regardless of which approach is used the objective of the tiered process is to identify sites that the developer wishes to consider further for development. The process for making a decision regarding which sites qualify for further consideration will likely be unique to each developer. However, Tier 1 allows the responsible developer to avoid sites with obvious serious environmental problems in favor of sites with little known environmental impact. The decision point at the end of Tier 1 involves three potential outcomes:

1. Development of the site or sites has a high probability of unacceptable environmental impact. Development is delayed or abandoned in favor of sites with less potential for environmental impact or evaluation of other sites or landscapes in search for more acceptable sites to develop.
2. Development of the site or sites has a high probability of acceptable environmental impact based on existing information. The decision process proceeds to Tier 2 for more detailed studies.
3. Development of the site has an uncertain probability of unacceptable impacts because of the lack of information about the site. The decision to proceed will be based on multiple factors including the availability of other sites with more certainty about potential impacts, the quality of the wind resource, the potential to adequately mitigate impacts, and the options available to the developer.

## Tier 2 DECISION PROCESS

At the end of Tier 2 the developer, and potentially the permitting authority, must make a decision regarding whether to move forward with the project, either through the permitting process and/or to Tier 3. As with Tier 1, the process for making a decision regarding which sites qualify for permitting or for further consideration will likely be unique to each developer. At the end of Tier 2 site specific information increases the developer confidence that a site is worth considering further and, in some instances, the permitting process may begin. The decision point at the end of Tier 2 involves three potential outcomes:

1. Development of the site or sites has a high probability of unacceptable environmental impact. Development is delayed or abandoned in favor of sites with less potential for environmental impact or evaluation of other sites or landscapes in search for more acceptable sites to develop.

2. Development of the site or sites has a high probability of acceptable environmental impact based on existing information and there is little uncertainly regarding when and how development should proceed and adequate information exists to proceed through permitting. The decision process proceeds to permitting and pre-construction surveys are terminated.
3. Development of the site has an uncertain probability of unacceptable impacts because of the lack of information about the site, there is uncertainty regarding how to develop the site to avoid and/or minimize impacts, and/or the permitting process requires additional information on potential wildlife impacts. The decision to proceed will be based on multiple factors including the availability of other sites with more certainty about potential impacts, the quality of the wind resource, permitting requirements and the options available to the developer.

## Tier 3 DECISION PROCESS

At the end of Tier 3 the developer, and potentially the permitting authority, will make a decision regarding whether and how to develop the project. The decision point at the end of Tier 3 involves three potential outcomes:

1. Development of the site has a high probability of unacceptable environmental impact that cannot satisfactorily be avoided, minimized or mitigated. Development is delayed or abandoned in favor of sites with less potential for environmental impact or evaluation of other sites or landscapes in search for more acceptable sites to develop.
2. Development of the site has a high probability of acceptable environmental impact based on existing and new information and there is little uncertainly regarding when and how development should proceed, and adequate information exists to satisfy any required permitting. The decision process proceeds to permitting and pre-construction surveys are terminated.
3. Development of the site has a relatively high probability of unacceptable impacts without proper measures being taken to avoid, minimize, or mitigate those impacts. However, there is uncertainty regarding how to develop the site to adequately avoid, minimize, or mitigate impacts, and/or the permitting process requires additional information on potential wildlife impacts before permitting future phases of the project. A decision to develop the site is made conditioned on the proper avoidance, minimization and/or mitigation measures being taken and with follow up post-construction studies (Tier 4 and 5).

## Tier 4 DECISION PROCESS

In some cases avian and bat fatality rates will be similar to predicted rates. However, when fatalities are greater than anticipated and exceed acceptable levels several options exist for the facility. Fatality rates may trigger additional mitigation measures above what has already been undertaken prior to the project. In other cases potential risk reduction measures may be identified. In either case, Tier 5 studies will usually be required to evaluate the effectiveness of these additional measures.

## Tier 5 DECISION PROCESS

The decision process at the end of Tier 5 studies is almost entirely based on how a facility will operate in to the future given the outcome of the studies evaluating risk reduction and mitigation. That is, if unacceptable impacts are confirmed through Tier 4 and/or 5 studies, including population impacts, in most cases additional efforts at risk reduction and mitigation will normally follow. This will result in an iterative process much like adaptive management where studies of impact are followed by studies of risk reduction measures and/or mitigation, followed by other studies evaluating additional attempts at reducing the uncertainty surrounding how to reduce risk and/or successfully mitigate for impacts that are unavoidable. This iterative process ends when impacts are adequately avoided, reduced and/or mitigated.

***B. Wildlife and Habitat Risk Profiling Approach:***

The following are examples of classifications that reflect varying levels of risk to wildlife and/or wildlife habitats associated with wind energy development in an area or at a site. This list of classifications begin with areas legally or officially excluded from wind power development – not necessarily for reasons associated with risk to wildlife - and then continues in order of higher to lower risk to wildlife and/or wildlife habitats associated with such development. These classifications are provided as means of assisting developers and agency personnel in framing the question of risk to wildlife at a site at any appropriate point during consideration and analysis of that site through the tiered process presented in this document.

**Officially or Legally Designated Exclusion Areas**

No wind power development will occur on lands where statute, regulation or other legal instrument precludes development.

**High-Risk Areas**

High Risk Areas are areas in which wind power development, based on information available at that point in the tiered process, holds the potential for significant risk to wildlife and/or wildlife habitats. These areas require a level of analysis commensurate with their significant value to wildlife. That value is a consideration in decisions as to whether or in what manner development should proceed. It is also a consideration in any determination with respect to the need for, feasibility of, or extent of compensatory mitigation. These areas may be characterized by the following:

- "Essential Habitat" and associated connecting corridors for endangered, vulnerable or threatened species.
- Habitat with high occupancy of wildlife with high known susceptibility to wind projects.

- Important biodiversity areas as designated on a state-by-state basis (e.g., State Wildlife Action Plan [SWAP] "Focus Areas").
- Conservation Opportunity Areas identified in SWAPs . (These areas account for the needs of multiple species and/or protect ecologically important habitat types.)
- Known important (officially prioritized) corridors for special-status species.

**Moderate-Risk Areas**

Areas and sites which, based on information available, may exhibit values of moderate significance to wildlife and/or wildlife habitat in general, or values of greater significance for species that are less susceptible to impacts from wind energy development. Further assessment of risk at such area may be appropriate. Or, based on identifiable avoidance, minimization and/or mitigation options, it may be appropriate for development to proceed. These areas may be characterized by the following:

- Generally sensitive environmental resources
- Significant value to wildlife, but for species that are less susceptible to impacts from wind energy development
- Wildlife corridors of significance.
- State Wildlife Action Plan areas
    - Areas where there is a known concentration of species of greatest conservation need.
    - Community conservation areas
- Contiguous, unfragmented habitat of significant value to wildlife
- Designated ecosystems of concern
- Audubon-designated Important Bird Areas
- The Nature Conservancy Eco-regional Portfolio Areas

**Low-Risk Areas**

Areas in which, based on available information, wind energy development is understood to pose comparatively lower risk to wildlife. In such areas, proceeding with development is likely appropriate, and not necessarily requiring measures beyond those indicated in standard industry best management practices, as best management practices are discussed in this document. These areas may be characterized by the following:

Lands criteria:

- Lands of low restoration opportunity and significant human disturbance
- Lands zoned for industrial/commercial uses
- Lands impacted by existing or planned human infrastructure

Wildlife criteria:

- Areas outside of designated Extreme or High Sensitivity Areas
- Areas with an absence of sensitive species
- Habitats with high incidence and concentrations of invasive and noxious species

**Chapter Four**

**A. Compensatory Mitigation** (Synthesis Committee did not review. *Provided by Kathy Boydston and Christy Johnson-Hughes)*

*P55, Line 2435:*

**Chapter Four: Compensatory Mitigation for Habitat Impacts**

The objectives of the activities described in Chapter Three are to avoid and minimize impacts to fish, wildlife and their habitats. However, if these measures are insufficient in avoiding or minimizing significant adverse impacts to habitats, then additional measures such as compensatory mitigation may be needed.

**A. Definition of Mitigation**

A standard definition of mitigation is provided in the National Environmental Policy Act regulations published by the President's Council on Environmental Quality (40 CFR Part 1508.20(a-e)). The term "mitigation" includes:

(a) avoiding the impact altogether by not taking a certain action or parts of an action;
(b) minimizing impacts by limiting the degree or magnitude of the action and its implementation;
(c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
(d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
(e) compensating for the impact by replacing or providing substitute resources or environments.

**B. Compensatory Mitigation**

For projects where there is no federal nexus, the USFWS Mitigation Policy should be used as a model or process to develop compensatory mitigation plans and should involve coordination with appropriate state agencies.

For the purpose of these Guidelines, on projects where there is no federal nexus, compensatory mitigation recommendations are voluntary, and compensatory mitigation recommendations made by the USFWS may or may not be included in the project development plan.

The Service's Mitigation Policy (46 FR 7644-7663), published in 1981, establishes policy for Service recommendations on mitigating the adverse impacts of land and water developments on fish, wildlife, their habitats, and uses thereof. It was written to assure consistent and effective recommendations by outlining policy for the levels of mitigation needed and the various methods for accomplishing mitigation. It allows agencies and private developers to anticipate mitigation recommendations and plan for mitigation measures early, avoiding delays and assuring equal consideration of fish and wildlife with other project features and purposes. The intention of the policy is to protect and conserve fish and wildlife resources while facilitating balanced development of the Nation's natural resources.

Compensatory mitigation is used when impacts to habitats by the proposed development will result in adverse impacts to a species and they cannot otherwise be avoided or minimized. Compensatory mitigation is not used for federally-listed threatened or endangered species. The application, general terms, and commitments for potential future compensatory mitigation and the level of impact required for implementing such mitigation should be determined before a project goes forward, if possible. The method for implementing compensatory mitigation for habitat impacts (e.g. fee title acquisition, in-lieu fee, conservation easement) should be determined early in the process if possible. If construction impacts exceed the expected and acceptable levels, additional compensatory mitigation may be necessary. Additional compensatory mitigation beyond that recommended prior to project construction should be well defined and feasible to implement, so that the developer will have an understanding of any potential future mitigation requirements.

The following potential compensatory mitigation options may appropriate for consideration:

- Offsite and on-site habitat restoration
- Offsite and on-site habitat creation
- Offsite and on-site habitat enhancement (and sometimes protection)
- Mitigation or conservation banks

Regardless of the form of compensatory mitigation, there should be a nexus between the level of impact to habitat and the amount of mitigation. Any compensatory mitigation should be biologically based and reasonable.

### C. Compensatory Mitigation Plans

For wind energy projects that pose adverse impacts to wildlife habitat that cannot be avoided or minimized, development of a formal compensatory mitigation plan may be warranted. These plans should be completed prior to project construction. Compensatory mitigation plans may not be necessary for participation in a mitigation or conservation bank, low-risk projects, or common species not adversely impacted by the wind development. If justified by the project's characteristics, a compensatory mitigation plan should include some or all of the following elements: mitigation measures, goals and objectives, implementation plan, performance standards, operation and maintenance

plans, monitoring and evaluation plans, and reporting requirements. Compensatory mitigation plans directed at bird and bat habitat may be included in an Avian and Bat Protection Plan (ABPP) designed to address project impacts to birds, bats and their habitats. A sample ABPP can be found in Appendix X.

Compensatory mitigation plans should take into consideration mitigation policies that might be required by states or local governments. Some of the state or local government mitigation policies may complement the USFWS compensatory mitigation recommendations and additional compensatory mitigation may not be necessary. However, there may be species and habitats that fall under state or local jurisdiction that are not covered under USFWS authority. Those species and habitats may require additional compensatory mitigation beyond what is recommended by the USFWS.

## Chapter Five Section D. Federal-tribal coordination and cooperation

*P59, Line 2594*

***Tribal coordination is not important only in federal discussions. Many tribal traditional lands and tribal rights extend outside federal lands onto state regulated lands. In addition, tribal interests are impacted in even private land developments. A discussion of tribal input to all projects is important.***

Authorities for Federal-Tribal Coordination

The Federal government maintains a special trust relationship with Indian tribes pursuant to treaties, statutes, Executive Orders, judicial decisions and other legal instruments. Inherent in this relationship is an enforceable fiduciary responsibility to Indian tribes to protect their lands and resources, unless otherwise unencumbered through mutual agreement. Furthermore, the federal government and USFWS affirmed these obligations to Indian tribes in Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments", and Presidential Memorandum "Government-to-Government Relations with Native American Tribal Governments" (April 29, 1994), Joint Secretarial Order 3206 "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act (updated January 16, 2008), and The Native American Policy of the U.S. Fish & Wildlife Service (June 28, 1994).

Tribal Coordination Process

Accordingly, the USFWS shall seek to establish and maintain effective government-to-government working relationships with tribes to achieve the common goal of promoting and protecting the fish, wildlife and their habitat. Whenever the USFWS is aware that their actions and activities may impact tribal trust resources, the exercise of tribal rights, or Indian lands, the USFWS shall consult and coordinate with, and seek the participation of, the affected Indian tribes to the maximum extent practicable. This shall include providing affected tribes adequate opportunities to participate in data collection, consensus seeking, comment, and associated processes. To facilitate the government-to-government relationship, the USFWS may coordinate their discussions with a representative from an intertribal organization, if so designated by the affected tribe(s).

**Jurisdiction on Tribal Lands**: The USFWS recognize that Indian tribes value and take responsibility for the management of their lands and resources. As Indian lands, whether held in trust by the United States for the use and benefit of Indians or owned exclusively by an Indian tribe, are not subject to the controls or restrictions set forth in federal public land laws. Indian lands are not federal public lands or part of the public domain, but are rather retained by tribes or set aside for tribal use pursuant to treaties, statutes, court orders, executive orders, judicial decisions, or agreements. Accordingly, Indian tribes manage Indian lands in accordance with tribal goals and objectives, within the framework of applicable laws.

Except when determined necessary for investigative or prosecutorial law enforcement activities, or when otherwise provided in a federal-tribal agreement, the USFWS, to the maximum extent practicable, shall obtain permission from tribes before knowingly entering Indian reservations and tribally-owned fee lands and shall communicate as necessary with the appropriate tribal officials. If a tribe believes this section has been violated, such tribe may file a complaint with the Secretary of the Interior, who shall promptly investigate and respond to the tribe.

**Tribal Conservation and Manangement Plans:** The USFWS acknowledge that Indian tribes value, and exercise responsibilities for, management of Indian lands and tribal trust resources. As such, the USFWS shall give deference to tribal conservation and management plans for tribal trust resources that: (a) govern activities on Indian lands, including tribally-owned fee lands, and (b) address the conservation needs of tribal resources. The USFWS shall conduct government-to-government consultations to discuss the extent to which tribal resource management plans for tribal trust resources outside Indian lands can be incorporated into actions to address the conservation needs of tribal resources.

**Communication with other Agencies:** USFWS will encourage and facilitate communication and cooperation among Native American governments, States, Federal agencies and others to identify and delineate respective roles and responsibilities and to ensure that issues of common interest and concern are discussed. This may include such activities as taking the initiative, as lead federal agency in this process, to provide the biological or managerial expertise necessary for resolution of conflicts about fish and wildlife resource issues. This may include but is not limited to coordination and cooperation with other fish and wildlife management agencies, such as the National Marine Fisheries Service.

**Intergovernmental Agreements for Sensitive Species:** The USFWS shall, when appropriate and at the request of an Indian tribe, pursue intergovernmental agreements to formalize arrangements involving sensitive species (including candidate, proposed, and listed species) such as, but not limited to, land and resource management, multi-jurisdictional partnerships, cooperative law enforcement, and guidelines to accommodate Indian access to, and traditional uses of, natural products. Such agreements shall strive to establish partnerships that harmonize the USFWS missions with the Indian tribe's own ecosystem management objectives.

**Coordination on Cultural Resources Issues:** Tribes and the USFWS both recognize the relationship between habitat resources and cultural and historic resources. USFWS and its Cultural Resources Program manage the array of cultural resources under its jurisdiction. Therefore the USFWS, shall consult with appropriate Indian Tribe(s) to identify the cultural or religious interests, the traditional practices, aboriginal use areas, historic and sacred sites, artifacts, archaeological sites, and the legal rights of Native American people, which could be affected by USFWS actions on Indian lands held in trust by the federal government. USFWS will be guided in this respect by such legislation as the National Historic Preservation Act, Native American Graves Protection and Repatriation Act, Archaeological Resources Protection Act, and the American Indian Religious Freedom Act.

USFWS should work with Tribes with the goal to promote compatibility between Tribal and federally recommended wildlife protocols, data collection methods, and requirements relating to wildlife and wind energy. These wind energy guidelines contain recommendations that maybe generally applicable at the federal, state, Tribal and local levels across the country, as well as policies, measures and incentives that are focused on USFWS policies, procedures, goals and regulations, and those of other federal agencies. Some of the specific recommendations may not

be applicable at the Tribal government level. Those Indian tribes who desire to or who have formally adopted wind energy siting, permitting or environmental review regulations or guidelines may contact USFWS for technical assistance in order to minimize conflicting or unnecessary requirements resulting from different Tribal versus federal practices. In addition, USFWS should confer, coordinate and share its expertise with interested Indian tribes when a Tribe lacks its own guidance or program to address wind/wildlife interactions.

The Committee recommends that USFWS establish a voluntary Tribal/federal cooperation program to promote cooperation and compatibility between USFWS and interested Tribal governments for coordinated review of wind projects under applicable federal wildlife laws. Formal agreements between USFWS and Indian tribes may be explored. Cooperation between Indian tribes and USFWS may include the following elements:

- Strengthen a cooperative approach to the management of fish and wildlife habitat on federal Indian lands through potential mutually cooperative agreements, memorandum of understanding or memorandum of agreements with interested Tribal governments to promote coordinated, consistent review of wind projects for compliance with applicable federal wildlife laws.

- Provide voluntary joint agency reviews, and other appropriate measures to reduce duplication and increase coordination between Tribal Governments and USFWS in reviewing wind projects.

- Foster communication between Indian tribes and USFWS to ensure that the party first obtaining the information about a prospective wind project will notify the other party to enable joint planning on how to coordinate review of the project.

- Identification of Tribal Representatives of a Tribal Nation who is responsible to work with the USFWS regional office to coordinate review of proposed wind activities under applicable wildlife laws.

- Promote the establishment of consistent and predictable joint protocols, data collection methodology, and study requirements that can be used by USFWS and Indian tribes to satisfy wind project permitting and environmental review requirements.

- Designation of a USFWS management contact within each regional office (or nationally) who is available as a resource to the field offices to work with Indian tribes to resolve significant wildlife-related issues that may arise at wind energy projects that cannot be resolved at the field office.

- Cooperative Tribal/federal/industry research agreements relating to wind project-wildlife interactions.

- Notification by USFWS to the Indian tribes prior to issuing any incentives or written assurance to developers pertaining to the likelihood of enforcement under the ESA, BGEPA, and MBTA . Indian tribes must have the assurance that developers are considering Tribal resources that may be at risk and ensure that Tribal regulatory processes or mitigation requirements are being addressed in project development.

- **Additional Optional Arrangements between Indian tribes and USFWS:**

USFWS should support and promote the establishment of negotiated agreements with interested Indian tribes that specifies additional coordination, review and compliance responsibilities for ensuring wind project compatibility with applicable wildlife laws.

In administering this Tribal /federal partnership program, the Committee recommends that USFWS and the Indian tribes provide differing but complementary services:

USFWS Services

- Provide training to Indian tribes
- Support and/or manage a national database for reporting of mortality data on a consistent basis.
- Establish and maintain national "best management practices" for wind project siting and operation based on project experience and learning
- Establish and revise recommended guidance on study protocols, study techniques, and measures and metrics for use by all jurisdictions
- Assist in identification and pursuit of funding for national research priorities

Indian tribes Services

- Consider the voluntary national guidance as minimum foundation of a Tribal Nation's approach to wind/wildlife review
- Consider sharing information by reporting project monitoring data and results received from the project developer to national database at USFWS

# Revised Tiered Wind Development Flow Chart for FAC Meeting, June 30 – July 2, 2009

**For FAC Review June 30 – July 2, 2009**

**Scalability**
The tiered approach is designed to address wind developments of various sizes. The approach leads to the appropriate amount of research for the anticipated level of risk the development may pose to wildlife and their habitats. Risk is determined by location, not necessarily the size of the project. For example, a small wind power development of 20 turbines located within 2 miles of a known Indiana bat maternity colony can pose a higher risk to the subject wildlife than a project of 100 turbines in a corn field. Therefore, a small project that may pose greater risk to wildlife may require more pre- and post-construction studies than a site that may have lower risk to wildlife. This is why the tiered approach begins with an examination of the potential location of the project, not the size of the project.

**Transmission**
The Recommendations, and the proposed Guidelines, are designed to address all elements of a wind power facility, including the turbine string or array, access roads, ancillary buildings, and transmission connection to a substation. Connection to the substation often requires the use of overhead transmission lines. The project evaluation should include consideration of the potential impact of overhead transmssion lines on wildlife and their habitats. The wildlife conservation plan would include any measures to reduce impacts of transmission lines, such as those outlined in the APLIC Gudelines. The Recommendations are not designed to address transmission beyond the substation connection to the grid system. The national grid and proposed smart grid system are beyond the scope of the Recommendations.

**For FAC Review: Proposed Language For Compensatory Mitigation Chapter**

During the voluntary coordination process between the project developer and the Service, the Service will identify important species and habitats that may occur in the project area, and relevant issues. Where ESA listed species occur, appropriate processes will be identified to resolve the relevant issues. (These processes may or may not be identified in the Guidelines). Compensatory mitigation is not used for federally-listed threatened or endangered species.

Other important habitats may be identified on the project site. These habitats will be evaluated to determine their extent and quality. These attributes will allow the Service to determine the Resource Category of these habitat areas according to the Service's Mitigation Policy. This determination guides the Service toward appropriate recommendations for mitigating the impact of the project on important habitat areas. (The five steps of the NEPA/CEQ definition of mitigation.)

The resource goals for the resource categories are as follows:

Resource Category 1: Avoid habitat loss

Resource Category 2: No net loss of in-kind habitat value

Resource Category 3: No net loss of out-of-kind habitat value

Resource Category 4: Minimize loss habitat value

During coordination with the developer, the Service will recommend ways to avoid and minimize loss of value in these various important habitat types. After impacts are avoided to the extent practical, measures to minimize impacts will be recommended.

If it is not practical to avoid and minimize losses to important habitats, the Service may recommend measures to compensate for those unavoidable losses. Those recommended measures may include, for example, on- or off-site habitat improvement, and may be in-kind or out-of-kind. Compensatory measures may be project-specific or may be part of a mitigation banking scenario.

It is generally the case that project-impact assessment is a cooperative effort involving the developer, the Service and the state (and-or tribe) and therefore, recommended mitigation measures will be consensus measures, and will not be additive. The State and the Service may have different species or habitats of concern, however, according to their responsibilities.

It is recognized that in most situations the Service's comments are non-binding recommendations and adoption of the Service's recommendations by the developer is voluntary.

Attachment J

TO: FWS Wind Turbine Federal Advisory Committee

FROM: Legal Subcommittee - MBTA Subgroup

RE: Summary of Proposed MBTA No-Action Letter Program

DATE: July 1, 2009

*Note: This memo is intended to summarize one option under consideration by a subgroup of the legal subcommittee. No decision or recommendation has been made.*

**POSSIBLE MBTA NO-ACTION LETTER PROGRAM**

**Rationale**

The current approach of the U.S. Fish & Wildlife Service (FWS) to enforcement of the Migratory Bird Treaty Act (MBTA) related to siting, construction and operation of wind-powered electric generating projects is based on the exercise of enforcement discretion. Although a wind energy developer may informally consult with the FWS with respect to a proposed project, currently there is no formal procedural process by which a developer can obtain formal assurances with respect to MBTA enforcement at a project.

There also is no regulation under the MBTA pursuant to which a developer can obtain an incidental take permit under the MBTA. Moreover, there are significant practical issues in promulgating such a regulation given the difficulty in establishing individual incidental take thresholds for the over 800 bird species covered by this law and the inherent difficulties in predicting and controlling incidental take at wind energy projects.

The FWS Federal Advisory Committee (FAC) is currently drafting voluntary wind energy guidelines as part of possible recommendations to the Secretary of the Interior. In light of the above, there is no mechanism by which a developer that complies with the draft FAC voluntary wind energy guidelines may obtain a formal enforcement commitment under the MBTA with respect to incidental take. The FAC asked the Legal Subcommittee to propose options for legal incentives to increase the likelihood that developers will voluntarily comply with these guidelines. This memo summarizes one possible option: an MBTA no-action letter program.

**MBTA No-Action Letter Program**

In order to encourage voluntary compliance by wind energy developers with FWS wind energy guidelines, the Legal Subcommittee is considering a procedure by which the FWS would supplement its current enforcement discretion approach under the MBTA through the adoption of a formal no-action letter program. Through this program, a developer that followed the voluntary FWS wind energy guidelines with respect to a

proposed wind energy project could obtain formal enforcement assurances under the MBTA. As proposed, the FWS, based on a written request by a wind energy developer with respect to a proposed wind energy project, may issue a formal letter to the wind energy developer which states that based on the facts presented and commitments made by the developer, the FWS will not recommend to the U.S. Department of Justice that an enforcement action be brought against the developer under the MBTA for unauthorized incidental take of protected migratory birds at the project.

Under a typical federal agency no-action letter program, such as those adopted by the Securities and Exchange Commission, Commodity Futures Trading Commission and Federal Energy Regulatory Commission, the enforcement assurances contained in an agency no-action letter are based on the facts presented in the applicant's submission to the agency, and any change in these facts, an applicant's commitments to the agency or in applicable law, regulation, interpretation or policy could affect the validity of the no-action commitment. Moreover, no-action letters are solely enforcement decisions and do not express any legal conclusions regarding the questions presented.

Federal agency no-action letters are not binding on any party. Their purpose is to alleviate the concerns of an applicant that proposed circumstances might lead to enforcement activity, but they do not bind the issuing agency or any other party. A no-action letter represents the strongest form of enforcement assurances which are given by federal agencies, however, and it is believed that a no-action letter would provide a developer with significant regulatory protection under the MBTA.

**Certain Matters**

Certain matters which are currently being considered by the MBTA Subgroup include the following, in no particular order:

<u>FWS Authority to issue no-action letters</u>

- In general, the extent to which the guidelines as currently written provide an adequate basis for a compliance decision in a no-action letter context, and in addition, whether issuance of a no-action letter can be conditioned on compliance with guidelines relating to non-MBTA issues;
- The degree to which it is appropriate for the FWS to rely on commitments by the developer to comply with FWS wind energy guidelines in the future;
- Whether it is necessary or advisable for the FWS to adopt a (new) regulation which sets forth the appropriate procedural requirements to be followed by a developer in requesting a no-action letter;

<u>Procedural issues:</u>

- The appropriate procedural requirements to be followed by a developer in requesting a no-action letter (early consultation, written application, etc.);

- The stage of development to be reached before requesting a no-action letter (e.g., completion of all Tier 2 requirements vs. completion of all Tier 3 pre-construction studies);
- The time it takes for FWS to issue a no-action letter after the developer requests one (for example, whether FWS staff will substantively review the estimated impacts on resources or whether FWS comments would be limited to accuracy of the developers attestations that it followed the guidelines);
- The degree to which information provided to the developer could be held confidential;

Post-Issuance Concerns:

- The information reporting (avian and bat mortality) and certification requirements (with respect to ongoing compliance with FWS wind energy guidelines) which are applicable to recipients of no-action letters; especially to the extent they would exceed the information reporting requirements of the guidelines themselves;
- The potential consequences in the event that, notwithstanding the developer's compliance with the guidelines prior to and during construction of a project, and the FWS's prior issuance of a no-action letter of a project, there is a significant unanticipated level of incidental take of migratory birds or other species during operation of the project;
- Making every no-action letter subject to future changes in FWS interpretation and policy.

**Opportunity for Using Tiered Approach to Facilitate Development of an HCP**

*Note: This memo is intended to summarize one option under consideration by a subgroup of the legal subcommittee. No decision or recommendation has been made.*

This paper describes how use of the guidelines could facilitate ESA compliance with a goal of expedited take authorization.

A HCP is a planning document that is a mandatory component of an incidental take permit application under section 10(a)(1)(B) of the ESA. The tiered approach is a decision support system that can provide baseline information for an HCP. The HCP process can allow development to proceed in a manner consistent with the conservation of a federally-listed threatened or endangered species and their habitats. An incidental take permit may be sought by an applicant if the project occurs on private land or with no federal nexus and if take of a federally-listed threatened or endangered species is likely to occur.

Habitat conservation plans are required to meet the permit issuance criteria of section 10(a)(2)(B) of the Act:
• (i) taking will be incidental;
• (ii) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking;
• (iii) the applicant will ensure that adequate funding for the plan will be provided;
• (iv) taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and,
• (v) other measures, as required by the Secretary, will be met.

The initial step for developing an HCP is early coordination with the local FWS field office. The developer/applicant can prepare the HCP using publicly available existing information and information gathered in the pre-construction portion of the tiered process (Tiers 1 through 3). It would be helpful to coordinate with FWS periodically to avoid last minute changes and issues.

**HCP Contents**
Section 10 of the Act and its implementing regulations define the contents of HCPs. They include:
• an assessment of impacts likely to result from the proposed taking of one or more federally listed species;
• measures that the permit applicant will undertake to monitor, minimize, and mitigate for such impacts, the funding available to implement such measures, and the procedures to deal with unforeseen or extraordinary circumstances;
• alternative actions to the taking that the applicant analyzed, and the reasons why the applicant did not adopt such alternatives; and,
• additional measures that the Fish and Wildlife Service may require.

HCPs are also required to comply with the Five Points Policy by including:

1. biological goals and objectives, which define the expected biological outcome for each species covered by the HCP;
2. adaptive management, which includes methods for addressing uncertainty and also monitoring and feedback to biological goals and objectives;
3. monitoring for compliance, effectiveness, and effects;
4. permit duration which is determined by the time-span of the project and designed to provide the time needed to achieve biological goals and address biological uncertainty; and,
5. public participation according to the National Environmental Policy Act.

**Getting an incidental take permit**
The applicant decides whether to seek an incidental take permit. While FWS staff members provide detailed guidance and technical assistance throughout the process, the applicant develops an HCP and applies for a permit. The components of a completed permit application are a standard application form, an HCP, an Implementation Agreement (if applicable), the application fee, and a draft National Environmental Policy Act (NEPA) analysis. A NEPA analysis may result in a categorical exclusion, an environmental assessment, or an environmental impact statement. While processing the permit application, the FWS prepares the incidental take permit and a biological opinion under section 7 of the Act and finalizes the NEPA analysis documents. Consequently, incidental take permits have a number of associated documents.

**Mitigation**
Mitigation measures are actions that reduce or address potential adverse effects of a proposed activity on species included in an HCP. They should address specific conservation needs of the species and be manageable and enforceable. Mitigation measures may take many forms, including, but not limited to, payment into an established conservation fund or bank; preservation (via acquisition or conservation easement) of existing habitat; enhancement or restoration of degraded or a former habitat; establishment of buffer areas around existing habitats; modifications of land use practices, and restrictions on access. Which type of mitigation measure used for a specific HCP is determined on a case by case basis, and is based upon the needs of the species and type of impacts anticipated.

**Legal commitment of a HCP**
Incidental take permits make binding the elements of HCPs. While incidental take permits have expiration dates, the identified mitigation may be in perpetuity. Violating the terms of an incidental take permit may constitute unlawful take under section 9 of the ESA.

**Monitoring**
The developer/applicant can assist in compliance with the HCP using information gathered in the post-construction portion of the tiered process (tiers 4 and 5).

# PowerPoint Presentation on Integrating Wind Energy in ERCOT, by Warren Lasher

## Endnotes

[i] **Tier 1, "Early Coordination"**

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

### A. Tier 1: Preliminary Evaluation or Screening of Potential Sites

For some wind energy projects, a useful first stage can be a preliminary evaluation of a general ecological context of a potential site or sites. If it is conducted, this is an internal process conducted by developers in preparation for coordination with the federal, state, tribal, and/or local agencies, This process begins to identify geographic areas of high wildlife sensitivity due to 1) the presence of large blocks of intact native landscapes, 2) intact ecological communities, 3) fragmentation-sensitive species' habitats, or 4) other important landscape-scale wildlife values. It is anticipated that developers who choose to conduct Tier 1 investigations will probably utilize existing public or other readily available landscape-level maps and databases from sources such as federal, state, or tribal wildlife or natural heritage programs, the academic community, conservation organizations, or the developer's or consultant's own information. The Committee has made a policy recommendation to DOI that USFWS facilitate or participate in the development of a comprehensive landscape database on a national scale for the purpose of identifying and assessing development risks and cumulative impacts to ecosystems and large-scale habitats.

Tier 1 may be used in any of three ways:

a) to identify regions where wind energy development poses exceptional risks to wildlife or habitats, including the fragmentation of large-scale habitats and threats to regional populations of sensitive species; and/or

b) to "screen" an landscape or set of multiple potential sites in order to avoid those that have the highest habitat values; or

c) to begin to determine if a single identified potential site poses serious wildlife or habitat concerns.

Tier 1 can offer early guidance about the sensitivity of the site within a larger landscape context, it can help direct development away from sites that will be associated with higher study, mitigation costs, and uncertainty. This may facilitate discussions with the federal, state, tribal, and/or local agencies in a region being considered for development. In some cases, Tier 1 studies could reveal serious concerns indicating that a site should not be developed. In other cases it will raise questions or uncertainties that will guide investigations in further tiers, particularly if the necessary habitat data is deficient or outdated.

Suggested questions to be considered in Tier 1 include:

1. Are there known threatened, endangered, federal "sensitive", state-listed, or other special status species present on the proposed site, and/or is habitat (including designated critical habitat) present for these species?
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 areas for non-government organizations; or other local, state, regional, federal, tribal, or international categorization that may preclude energy development?

3. 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?
   Are there large areas of intact habitat with the potential for fragmentation, with respect to species with needs for large contiguous blocks of habitat?

[ii] **Proposed Decision framework approach *(under revision)*:**

Tier 1 DECISION PROCESS

Regardless of which approach is used the objective of the tiered process is to identify sites that the developer wishes to consider further for development. The process for making a decision regarding which sites qualify for further consideration will likely be unique to each developer. However, Tier 1 allows the responsible developer to avoid sites with obvious serious environmental problems in favor of sites with little known environmental impact. The decision point at the end of Tier 1 involves three potential outcomes:

1. Development of the site or sites has a high probability of unacceptable environmental impact. Development is delayed or abandoned in favor of sites with less potential for environmental impact or evaluation of other sites or landscapes in search for more acceptable sites to develop.
2. Development of the site or sites has a high probability of acceptable environmental impact based on existing information. The decision process proceeds to Tier 2 for more detailed studies.
3. Development of the site has an uncertain probability of unacceptable impacts because of the lack of information about the site. The decision to proceed will be based on multiple factors including the availability of other sites with more certainty about potential impacts, the quality of the wind resource, the potential to adequately mitigate impacts, and the options available to the developer.

Tier 2 DECISION PROCESS

At the end of Tier 2 the developer, and potentially the permitting authority, must make a decision regarding whether to move forward with the project, either through the permitting process and/or to Tier 3. As with Tier 1, the process for making a decision regarding which sites qualify for permitting or for further consideration will likely be unique to each developer. At the end of Tier 2 site specific information increases the developer confidence that a site is worth considering further and, in some instances, the permitting process may begin. The decision point at the end of Tier 2 involves three potential outcomes:

1. Development of the site or sites has a high probability of unacceptable environmental impact. Development is delayed or abandoned in favor of sites with less potential for environmental impact or evaluation of other sites or landscapes in search for more acceptable sites to develop.
2. Development of the site or sites has a high probability of acceptable environmental impact based on existing information and there is little uncertainly regarding when and how development should proceed and adequate information exists to proceed through permitting. The decision process proceeds to permitting and pre-construction surveys are terminated.

3. Development of the site has an uncertain probability of unacceptable impacts because of the lack of information about the site, there is uncertainty regarding how to develop the site to avoid and/or minimize impacts, and/or the permitting process requires additional information on potential wildlife impacts. The decision to proceed will be based on multiple factors including the availability of other sites with more certainty about potential impacts, the quality of the wind resource, permitting requirements and the options available to the developer.

Tier 3 DECISION PROCESS

At the end of Tier 3 the developer, and potentially the permitting authority, will make a decision regarding whether and how to develop the project. The decision point at the end of Tier 3 involves three potential outcomes:

1. Development of the site has a high probability of unacceptable environmental impact that cannot satisfactorily be avoided, minimized or mitigated. Development is delayed or abandoned in favor of sites with less potential for environmental impact or evaluation of other sites or landscapes in search for more acceptable sites to develop.
2. Development of the site has a high probability of acceptable environmental impact based on existing and new information and there is little uncertainly regarding when and how development should proceed, and adequate information exists to satisfy any required permitting. The decision process proceeds to permitting and pre-construction surveys are terminated.
3. Development of the site has a relatively high probability of unacceptable impacts without proper measures being taken to avoid, minimize, or mitigate those impacts. However, there is uncertainty regarding how to develop the site to adequately avoid, minimize, or mitigate impacts, and/or the permitting process requires additional information on potential wildlife impacts before permitting future phases of the project. A decision to develop the site is made conditioned on the proper avoidance, minimization and/or mitigation measures being taken and with follow up post-construction studies (Tier 4 and 5).

Tier 4 DECISION PROCESS

In some cases avian and bat fatality rates will be similar to predicted rates. However, when fatalities are greater than anticipated and exceed acceptable levels several options exist for the facility. Fatality rates may trigger additional mitigation measures above what has already been undertaken prior to the project. In other cases potential risk reduction measures may be identified. In either case, Tier 5 studies will usually be required to evaluate the effectiveness of these additional measures.

Tier 5 DECISION PROCESS

The decision process at the end of Tier 5 studies is almost entirely based on how a facility will operate in to the future given the outcome of the studies evaluating risk reduction and mitigation. That is, if unacceptable impacts are confirmed through Tier 4 and/or 5 studies, including population impacts, in most cases additional efforts at risk reduction and mitigation will normally follow. This will result in an iterative process much like adaptive management where studies of impact are followed by studies of risk reduction measures and/or mitigation, followed by other studies evaluating additional attempts at reducing the uncertainty surrounding how to reduce risk and/or successfully mitigate for impacts that are unavoidable. This iterative process ends when impacts are adequately avoided, reduced and/or mitigated.

[iii] **For Chapter 4 - "Compensatory" Mitigation (*under revision)*:**

During the voluntary coordination process between the project developer and the Service, the Service will identify important species and habitats that may occur in the project area, and relevant issues. Where ESA listed species occur, appropriate processes will be identified to resolve the relevant issues. (These processes may or may not be identified in the Guidelines). Compensatory mitigation is not used for federally-listed threatened or endangered species.

Other important habitats may be identified on the project site. These habitats will be evaluated to determine their extent and quality. These attributes will allow the Service to determine the Resource Category of these habitat areas according to the Service's Mitigation Policy. This determination guides the Service toward appropriate recommendations for mitigating the impact of the project on important habitat areas. (The five steps of the NEPA/CEQ definition of mitigation.)

The resource goals for the resource categories are as follows:

Resource Category 1: Avoid habitat loss

Resource Category 2: No net loss of in-kind habitat value

Resource Category 3: No net loss of out-of-kind habitat value

Resource Category 4: Minimize loss habitat value

During coordination with the developer, the Service will recommend ways to avoid and minimize loss of value in these various important habitat types. After impacts are avoided to the extent practical, measures to minimize impacts will be recommended.

If it is not practical to avoid and minimize losses to important habitats, the Service may recommend measures to compensate for those unavoidable losses. Those recommended measures may include, for example, on- or off-site habitat improvement, and may be in-kind or out-of-kind. Compensatory measures may be project-specific or may be part of a mitigation banking scenario.

It is generally the case that project-impact assessment is a cooperative effort involving the developer, the Service and the state (and-or tribe) and therefore, recommended mitigation measures will be consensus measures, and will not be additive. The State and the Service may have different species or habitats of concern, however, according to their responsibilities.

It is recognized that in most situations the Service's comments are non-binding recommendations and adoption of the Service's recommendations by the developer is voluntary.