



National Wind
Coordinating Collaborative

NWCC Webinar
Wind 101: An Introduction to Wind Energy
Siting and Development

November 7, 2019

www.nationalwind.org

Why Wind 101?

Mission of the NWCC:

- Provide outreach and education on wind energy and wildlife to catalyze information exchange and inform research priorities and decision making; facilitate engagements for problem solving around specific issues
- Hosted 21 webinars since 2011 on wind-wildlife research, tools, and strategies
 - www.nationalwind.org/webinars/

Wind 101:

- Overview of siting and development considerations
- Wildlife is just one factor
- Share context and suite of decision-making
- Second webinar to be scheduled on operational considerations

Relevant Laws and Guidelines

Federal:

- Bald and Golden Eagle Protection Act (BGEPA)
- Endangered Species Act (ESA)
- Migratory Bird Treaty Act (MBTA)
 - Voluntary USFWS Wind Energy Guidelines:
https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf

States:

- Different regulations, guidelines, policies
- More information:
<http://www.ncsl.org/research/energy/state-wind-energy-siting.aspx>
<https://www.fishwildlife.org/>



Potential Types of Wind Impacts to Certain Species



Possible Types of Impacts:

- Collision
- Habitat



Species of Potential Conservation Concern:

- Raptors
- Some species of bats
- Some other migratory birds
- Certain grassland and shrub land birds, including prairie grouse



See the latest findings on bird and bat fatalities at wind facilities in the AWWIC Technical Reports: www.awwi.org/results-catalog

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Summary

- **Wind energy brings an array of benefits to species and habitat, particularly as a critical part of the climate challenge**
- **Siting wind farms and making them economically viable includes multiple factors**
 - **Wildlife is a key factor, but not the only factor**
- **The industry has demonstrated a Legacy of Care when it comes to wildlife, and that is an important part of what we do**
- **The U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines continue provide a meaningful and effective roadmap for responsible development**

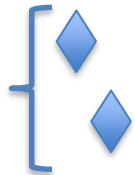
Wind Energy as a Benefit

The **benefits of wind energy** to species and their habitats is critically important

- In 2018, wind energy generated 6.5% of the nation's electricity.
- That is enough to avoid the emissions of 201 million metric tons of CO₂.
- Or, the equivalent of removing 42.7 million cars from the road.
 - The National Audubon Society warns that 2/3 of North American birds are at risk of extinction due to climate change.
- Wind energy has benefits for habitat preservation.
 - When wind developers lease lands, it can provide landowners an alternative to commercial or residential development.
 - Mitigation for bats and birds often includes habitat preservation.
- Other emissions and water conservation.
 - Wind energy prevents the consumption of over 100 billion gallons of water at thermal power plants.
 - Wind also significantly reduces the amount of SO₂, NO_x, and other pollutants.



Wind Project Development: Years Long and Data Intensive Process



Prospecting – Wind/Land Use/Transmission/Topography

Initial Site Assessment and Site Visit (Fatal Flaw Analysis)

Land Rights

Anchor

Fill Out

Connect

Wind Resource – On-site Measurement

Environmental Studies - WEGs

Permit Acquisition

Offtake Agreement

Equipment Procurement/Delivery

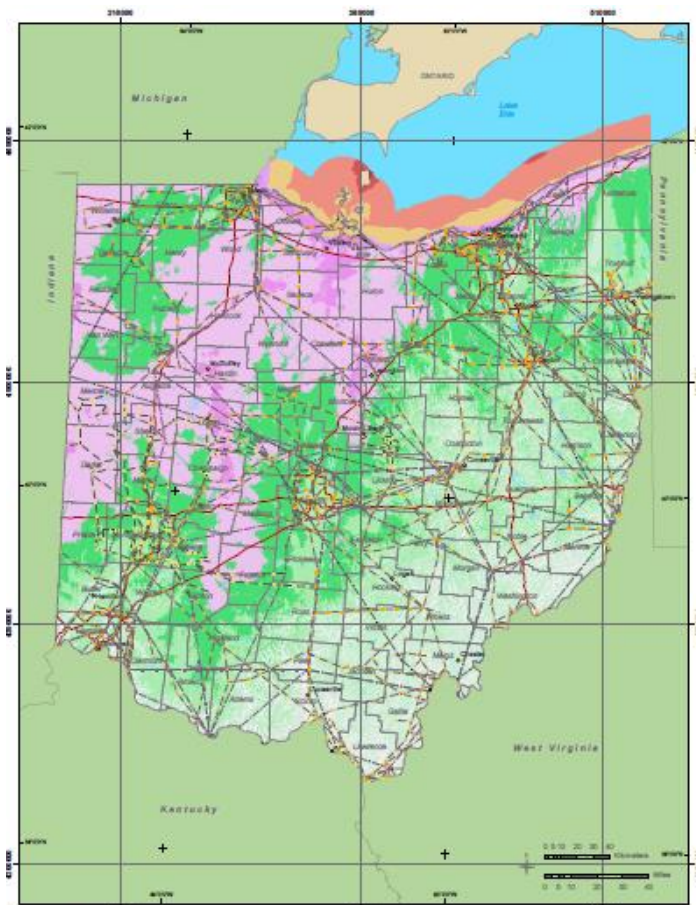
Construction

Community engagement is critical and occurs throughout this process.

2-4 Years



Considerations and Approaches

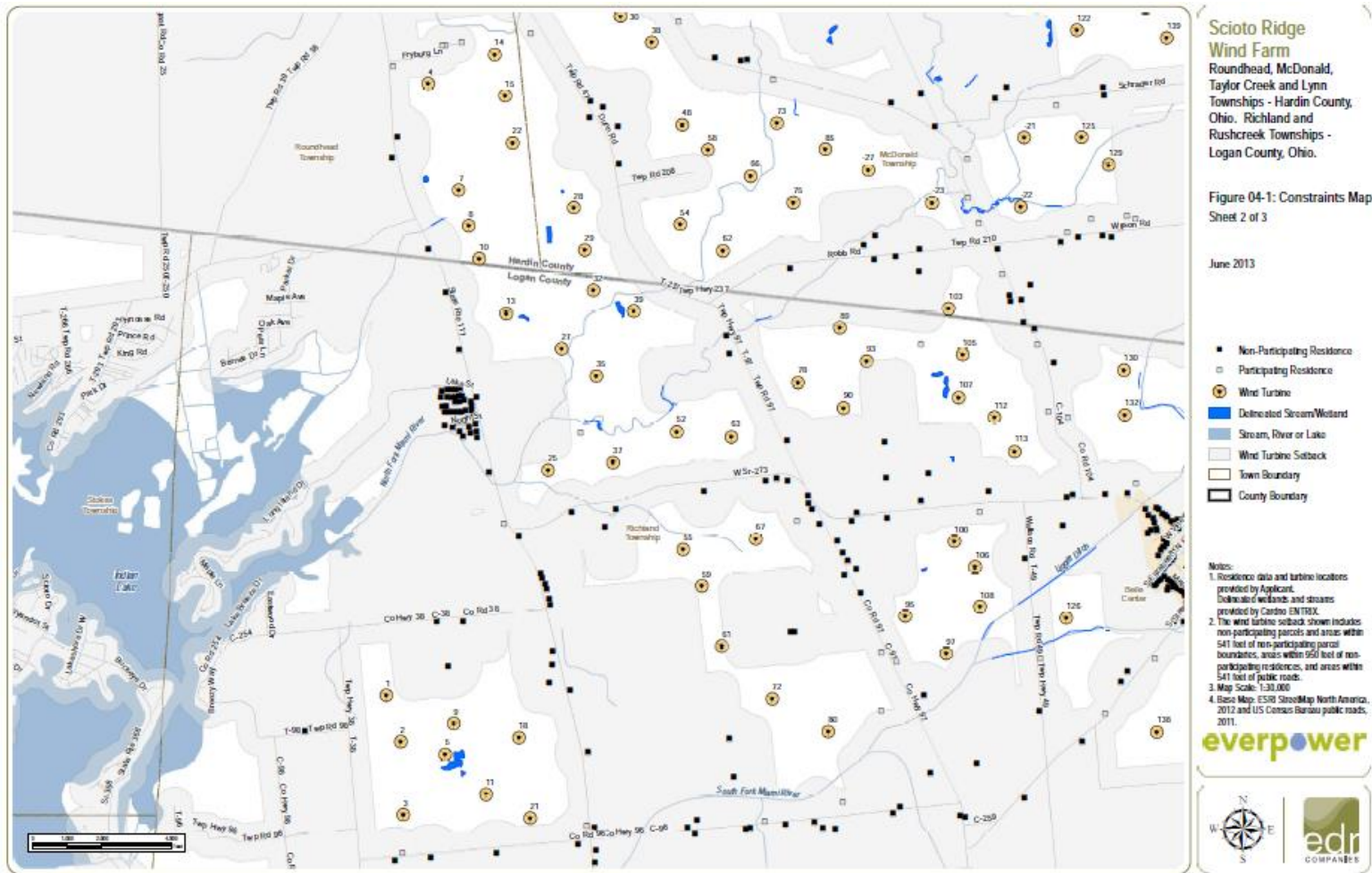


Wind Resource of Ohio Mean Annual Wind Speed at 100 Meters

- Adequate wind resource
- Adequate access to bulk transmission system
- Willing land lease participants
- Site accessibility (adequate road quality and dimensions)
- Appropriate geotechnical conditions
- Population density
- Compatible land use
 - Economic use (farming, commercial, residential, recreational, etc.)
 - Ecological resources (habitat, wetlands, species)
 - Cultural resources



Considerations and Approaches





Considerations and Approaches

- **Land Use Constraints**

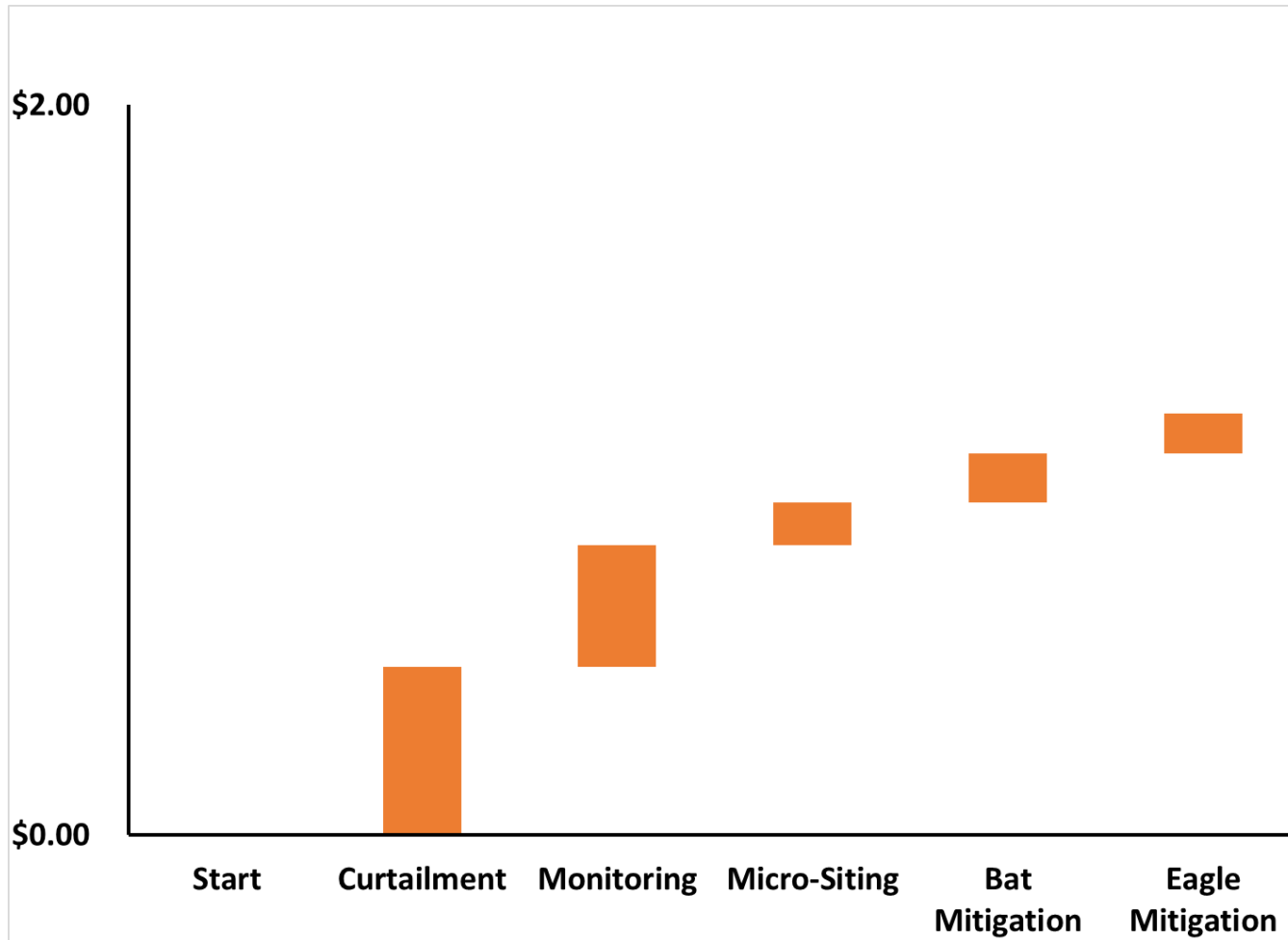
- Setbacks from:
 - Right-of-ways
 - Non-participating parcels
 - Residences
- Minimize tree clearing
- Avoid wetlands and surface waters
- Landowner preferences
- Turbine engineering
 - Separation distances
 - Slope/grade
- Shadow flicker
- Noise
- Aviation surfaces
- Impacts to agricultural lands
- Cultural resources



Minimize species and habitat impacts

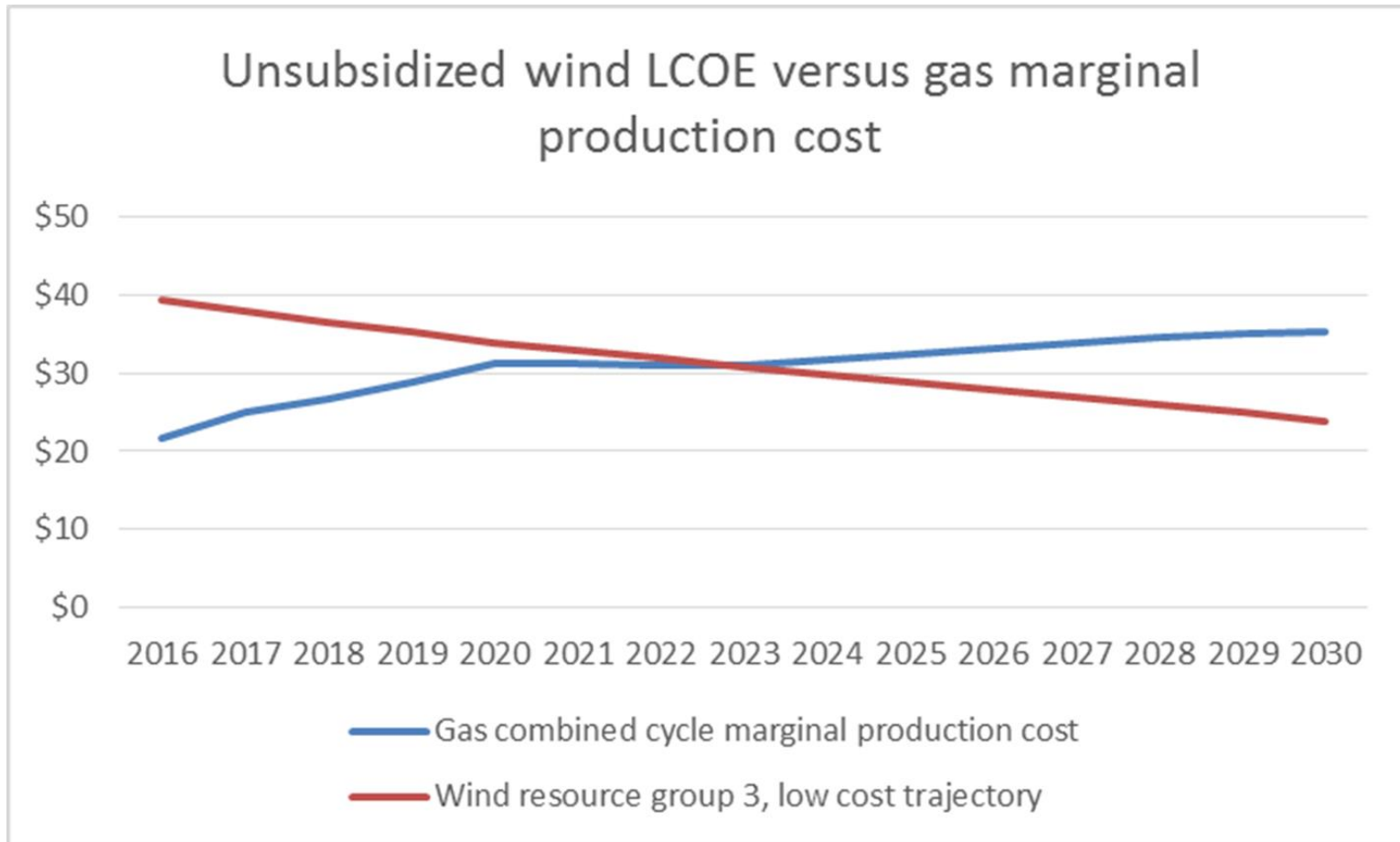


Markets: LCOE and PPAs





Wind Striving to Become Competitive (w/out incentives) by 2020



Legacy of Care: Birds and Wildlife

- Wind energy is responsible for around 0.01% of human-caused (anthropogenic) migratory bird fatalities.
 - Peer reviewed research estimates wind energy is responsible for only 200k-350k. This level of impact does not have population level impacts.
- There is a perception that wind energy has a significant impact on eagles. The vast majority of wind farms have no, or insignificantly low, impact to eagles.
 - Over its four-decade history, reports of bald eagle impacts are extremely rare.
 - Impacts to golden eagles are also relatively low, accounting for less than 3% of all human-caused golden eagle mortality.
 - Other far larger causes of mortality include poaching, transmission lines, pesticides, and lead poisoning.
 - A large portion of the impacts that have occurred are isolated at a 1980s era wind energy area where modern turbines are now replacing older models, reducing impacts by as much as 75%.
- The industry and its partners have been investing in new detection and deterrence technology that would reduce impacts even more.

Legacy of Care: Bats and Wildlife

- About 20 years ago, wind energy operators in West Virginia noticed the presence of bats on the ground below turbines. That kicked off a concerted effort by the industry to work with private and public partners to address the issue head on.
- It was a primary driver behind the formation of the [Bats and Wind Energy Cooperative \(BWEC\)](#).
- It contributed to the formation of the [American Wind Wildlife Institute \(AWWI\)](#).
- It spurred investment to find ways to minimize bat impacts:
 - Increasing cut-in speeds and feathering
 - Deterrent devices
 - Smart curtailment
- These efforts are providing new and more efficient ways to reduce impacts, and the industry continues to be deeply engaged:
 - The [Wind Wildlife Research Fund](#)
 - Bat co-existence workgroups
 - Companies are expending resources at their projects to support development, testing, and verification of technologies and methods to reduce impacts.

Legacy of Care

- The wind industry has been working for decades to increase understanding of avoiding, minimizing, and mitigating impacts to wildlife.
- In addition to substantial efforts by individual companies, the industry has invested significant capital and other resources into a number of efforts address wildlife impacts, including:
 - [American Wind Wildlife Institute \(AWWI\)](#).
 - [Bats and Wind Energy Cooperative \(BWEC\)](#).
 - [The National Wind Coordination Collaborative \(NWCC\)](#).
 - Compliance with the [U.S. Fish and Wildlife Service Wind Energy Guidelines \(WEGs\)](#).
 - Additional resources toward compliance with the ESA and BGEPA.
- Wind is one of only a handful of industries that has agreed to voluntarily follow guidelines (WEGs) to reduce impacts.
 - Based on unanimous recommendations from a Federal Advisory Committee of state wildlife officials, eNGOs, industry, and tribes.
 - WEGs provide comprehensive recommendations related to pre-construction studies, post-construction monitoring, mitigation/adaptive management, and best practices related to construction, operations and decommissioning.

U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines (WEGs)

- Decision framework for:
 - Collecting information in increasing detail
 - Evaluating risk
 - Making siting and operational decisions (adaptive management)
- Each tier contains
 - Questions
 - Methods and Metrics
 - Decision Points



Background

- 2003 – US FWS publish draft WEGs
- 2007 – Secretary of Interior created a Federal Advisory Committee (FAC) under auspices of the Federal Advisory Committee Act
 - 22 members, including wind energy industry, tribes, federal and state resource agencies, and national environment organizations
- 2010 - FAC sent recommendations to the Secretary of Interior
- 2012 – US FWS publish final WEGs



Wind Energy Guidelines

- Important to Keep in Mind (Scope and Scale)
 - Study plans specifically tailored to each site
There is no “one size fits all”
 - Study plan complexity corresponds to potential for significant adverse impacts to species of concern and their habitat
 - Does NOT require every tier or every element within each tier.



Tier 1 – Preliminary Site Selection

- **Questions:**
 - Are species of concern or their habitat present?
 - Are there areas where development is precluded by law, or sensitive areas (as determined by sound science)?
 - Know areas of congregations (migration corridors, hibernacula, leks, etc.)?
 - Large areas of intact habitat (fragmentation concern)?
- **Methods and Metrics**
 - Use existing public data or other landscape maps.
 - **Check with FWS FO and other sources.**
- **Decision Points**
 - If “no” to all each Q, continue to Tier 2
 - If “yes” to one or more Q, continue to Tier 2
 - Consider abandoning or modification
 - If data insufficient to answer “yes” or “no” continue to Tier 2.

Tier 1 – Preliminary Site Selection

- **Takeaways for Tier 1**
 - First interaction with FWS, states, and relevant conservation groups – at least looking at available public data (e.g., Natural Heritage programs, web portals, etc.)
 - Many developers may not do this for specific projects. Rather, for example, they would have a database for all federally/state protected areas, federal/state parks, Indiana bat hibernacula, Audubon IBAs, etc.
 - Potential “non-starters” (examples):
 - Federally protected lands (parks, nature preserves)
 - ESA designated critical habitat
 - Potential areas of concern:
 - Presence of ESA protected species
 - Proximate to known hibernacula
 - Winter ranges
 - **It is hard to quantify how many projects are “abandoned” or even “modified” because of Tier 1 review, because anything that would cause abandonment would be applied as a course filter in prospecting**
 - **That is, these are macro-siting decisions**



Tier 2 – Site Characterization

- **Questions:**
 - Tier 1 questions, plus:
 - Are there plant communities of concern?
 - Is there potential presence of species of habitat fragmentation concern?
 - What species of birds and bats – especially of collision risk – likely to use the area?
 - Is there potential for significant adverse impacts to species?
- **Methods and Metrics**
 - Use existing public data or other landscape maps
 - **Check with FWS FO and other sources**
 - One or more reconnaissance site visits
 - General framework for evaluating habitat fragmentation
- **Decision Points**
 - If “inconclusive” to one or more Qs, continue to Tier 3
 - If “no” to all Qs, potentially proceed to permitting, implement BMPs
 - If answer to one or more indicate a moderate probability of significant adverse impacts, continue to Tier 3
 - If answer to one or more indicate high probability of significant adverse impact that:
 - Cannot be adequately mitigated: abandon
 - Can be adequately mitigated: proceed to Tier 3



Tier 2 – Site Characterization

- **Takeaways for Tier 2**
 - Continued interaction with FWS, states, and relevant conservation groups – at least looking at available public data (e.g., Natural Heritage programs, web portals, etc.)
 - Can be combined with Tier 1
 - Will likely include a site visit, to “ground truth”
 - **Often results in changes to turbine arrays or individual turbines, or consideration of certain operational measures**
 - That is, these are “micro-siting” decisions

Tier 3 – Field Studies

- **Conduct rigorous studies to assess potential risk; specifically, these studies provide info to:**
 - Further evaluate to determine if project should be abandoned
 - Design and operate a project to avoid and minimize impacts
 - Design compensatory mitigation, if impacts can't be avoided and minimized
 - Determine/design post-construction monitoring
- **Questions: Studies should be designed to answer:**
 - Are species of concern present, or likely to use the proposed site?
 - Is there potential for significant adverse impact on population of species of habitat fragmentation concern?
 - Distribution, relative abundance, behavior, and site use of species of concern? To what extent are those species exposed to risk?
 - What are potential risks of adverse impacts to individuals and local populations, and habitats?
 - How can adverse impact be mitigated?
 - Any studies that should be initiated and continue to post-construction?



Tier 3 – Field Studies

- **Design Considerations:**
 - Which species present?
 - How species are using the area?
 - What risks are posed by the project?
 - Collision, habitat loss/degradation, habitat fragmentation, displacement, indirect effect
- **Decision Points:**
 - Low probability of significant adverse effect, continue to permitting and/or Tier 4 – with mitigation measures
 - Moderate to high probability of significant adverse effect:
 - High certainty regarding how to develop and mitigate adverse impacts: continue to permitting and/or Tier 4 – with mitigation measures
 - Uncertainty regarding how to develop and mitigate adverse impacts, or more information is needed: continue to permitting and/or Tier 4 – with mitigation measures
 - High probability of significant impact:
 - Impacts cannot be adequately mitigated: delay plans until satisfactory mitigation measures
 - Impacts can be adequately mitigated: implement mitigation and continue Tier 4.



Tier 4 & 5 – Post-Construction Studies

- **Tier 4a: Fatality studies, searching for carcasses under turbines**
 - All projects at least one year
- **Tier 4b: Assess impacts of habitat loss, degradation and fragmentations**
 - If species of habitat concern is present, or Tier 3 indicates significant adverse impact
- **Tier 5: Conducted when realized fatality levels reach a level of significant adverse impact; when mitigation that does not seem to be working**
 - Not expected to be necessary for most projects...Tiers 1-4 should steer away from this need

What Else is in the WEGs?

- **Best Management Practices (Chapter 7)**
 - Site Construction and Operation
 - Retrofitting, Repowering and Decommissioning
 - Decommissioning
- **Mitigation (Chapter 8)**
 - Defined as avoiding and minimizing significant adverse impact, compensating for unavoidable impacts
- **Advancing Use, Cooperation and Effective Implementation (Chapter 9)**
 - Policies and procedure that affect the way developers work with FWS, state agencies, tribes, NGOs...
 - Bird and Bat Conservation Strategies (BBCS)
 - Collaborative research (NWCC, AWWI, BWECA...)
 - NGOs: page 58



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Questions?

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