Agenda

• Overview of AWWI: Partners & Friends, Board of Directors

• National Research Plan and Research Focus/Overlap with MAFWA States

• Overview of AWWI Program

• Sample Research Projects
  ○ Bats, Eagles, and Grouse

• Outreach – Supporting Midwest States
AWWI’s Mission

To facilitate timely and responsible development of wind energy while protecting wildlife and wildlife habitat
National Research Plan

- Synthesis of what we know and research priorities

- Developed in consultation with:
  - Federal and state agency personnel
  - Other scientists
  - AWWI Partners and Friends

- Highlights priority questions and specific areas of research and outcomes for key species groups (birds, bats, grouse/habitat)
# Research Plan Guides AWWI Research Topic Priorities

## Outcomes:

**Advanced Understanding of Risk**
- Data & Analysis
- New Research as Needed

**Minimization & Mitigation**
- Evaluation at Scale
- Modeling & Validation
- New Research as Needed

## How:

Synthesis, Outreach, and Engagement

## Requirements:

- Scientifically Accepted
- Conservation Results
- Cost Effective
AWWI Priority Species Ranges in MAFWA States
AWWI’s Programs

**Assessing Risk**

**Developing Solutions**

**AWWIC Post-Construction Monitoring Database**
- Analyzing fatality data for different species across multiple sites and regions to better understand wind’s risks to wildlife

**Minimization/Technology Innovation**
- Independent evaluation of technologies and strategies intended to detect, deter, and/or curtail to reduce risk for birds and bats

**Mitigation**
- Develop mitigation strategies/opportunities
American Wind Wildlife Information Center (AWWIC) Database

• AWWIC Post-Construction Monitoring Database:
  ○ Confidential database that incorporates public and confidential data

• AWWI is analyzing fatality data for different species across multiple sites and regions to better understand wind’s risks to wildlife

• First analyses for birds and bats now available

AWWIC By the Numbers

• Estimated percentage of installed MWs (as of Q2 2018): 22%
  • Number of U.S. projects (public and confidential): 157
  • Number of post-construction studies: 243
  • Total number of GWs represented: 18
  • Total number of turbines searched: 6,800
  • Total number of carcass searches: 285,000
Sources

• Partner and Friend pledges
• State funds (CEC, other)
• Federal funding: grants/in-kind, US DOE, USGS
• Electric Power Research Institute (EPRI)
• In-kind from various collaborators
• Industry: Wind Wildlife Research Fund, sponsorships, and other
• Foundations
• Individual donors
New in 2019: Wind Wildlife Research Fund

Industry fund that pools investment and resources to advance research for solutions to wind-wildlife issues

- Launched in 2019; AWWI is secretariat
- 2019 projects underway
- 2020 and beyond: Proposals in response to an RFP
  - Peer review in progress
  - Project selection will be completed this summer
Sample Projects: Bats

- Using AWWIC to model bat fatality risk and improve curtailment strategies at wind facilities *(WWRF)*
  - Modeling bat fatalities in the Midwest using landscape characteristics
  - Modeling bat movement and migration using weather data
  - Comparing effectiveness of varying cut-in speeds
- Ongoing study in Illinois intended to identify actual time of bat fatalities and identify fine-resolution environmental correlates with bat collision risk *(Industry)*
- Upcoming evaluation in Iowa of Vestas Bat Protection System (VBPS), a smart curtailment system for bats *(DOE/match)*
- Upcoming evaluation, potentially in Iowa, of Turbine Integrated Mortality Reduction (TIMR), a smart curtailment system for bats *(DOE/match)*
Sample Projects: Eagles

- Evaluations of DTBird, detection and deterrent technology for eagles
  - Completed pilot test in CA in 2018 (Industry)
  - Ongoing, federally funded, multi-year multi-site study evaluation in CA and WA (DOE/match)

- Evaluations of IdentiFlight, detection and informed curtailment technology for eagles
  - Completed pilot test in WY in 2017 (Industry)
  - Ongoing, federally funded, multi-year multi-site study evaluation in WY and OR (DOE/match)

- Improving carcass persistence estimates (WWRF)

- Improving curtailment algorithms of IdentiFlight technology (WWRF)

- Developing options for compensatory mitigation (AWWI)
  - Lead poisoning reduction (published)
  - Vehicle collision reduction (published)
  - Habitat enhancement (draft report in progress)
Sample Projects: Grouse

Assessment on what’s needed and how to organize research

• Conducted stakeholder interviews to inform next steps for groused (NWCC)

• Grouse white paper and workshop (AWWI/NWCC)
  o White Paper on state-of-science grouse and wind power
  o Workshop - stakeholder feedback on white paper and explore research priorities

Meta-Analysis

• Report drafted: *Effects of Wind Energy Turbines on Grouse: A Review of Survival and Displacement* (WEST, Inc)
  o Expert review and publish as NWCC report
  o Develop manuscript for submission to peer-reviewed journal

• Multi-year assessment of species response at a KS wind energy facility (WWRF)
Results Catalog

www.awwi.org/results-catalog/

<table>
<thead>
<tr>
<th>Publication</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWWIC Bird Technical Report</td>
<td>Published</td>
</tr>
<tr>
<td>Technology Integration White Paper</td>
<td>Published</td>
</tr>
<tr>
<td>Bat White Paper</td>
<td>Published</td>
</tr>
<tr>
<td>Eagle Mitigation Model: Reducing Vehicle Strikes Publication</td>
<td>Published</td>
</tr>
<tr>
<td>AWWIC Bat Technical Report</td>
<td>Published</td>
</tr>
<tr>
<td>IdentiFlight Publication and DTBird Technical Report</td>
<td>Published</td>
</tr>
<tr>
<td>Wind-Wildlife Technology Catalog <em>AWWI Partner &amp; Friend Exclusive</em></td>
<td>Updated for 2019</td>
</tr>
<tr>
<td>Issues in Ecology issue on Wind &amp; Wildlife</td>
<td>Summer 2019</td>
</tr>
<tr>
<td>Bat Deterrent Technology Tests</td>
<td>Submit Summer 2019</td>
</tr>
<tr>
<td>Eagle Mitigation Model: Habitat Enhancement Technical Report</td>
<td>Summer 2019</td>
</tr>
<tr>
<td>Bayesian Risk Analysis of AWWIC Database</td>
<td>Submit Summer 2019</td>
</tr>
<tr>
<td>Bat Landscape Risk Model</td>
<td>Submit Summer 2019</td>
</tr>
<tr>
<td>Grouse and Wind Energy White Paper</td>
<td>Fall 2019</td>
</tr>
</tbody>
</table>
Enabling Application

• Webinars
  • AWWIC, Wind 101, Technology Innovation, Updates on WWRM Research, Grouse Paper Results

• State-Specific Training
  • Curriculum on state-of-the-science; cross-sector perspectives and dialogue
  • Can provide in your state!

• Opportunities to support Midwest Landscape Initiative?

• Biennial Wind Wildlife Research Meeting (WWRM) - 2020
Thank You!

AWWI Board Members Representing AFWA

Current:
  Brad Loveless, KS
Former:
  Roy Elicker, formerly OR
  Paul Johansen, WV
  Kelley Myers, formerly IA
  Jeff Vonk, formerly SD

AWWI 10th Anniversary Video:
www.vimeo.com/304420920
AWWI Program Updates: Summer 2019

AWWI is producing the results for wind energy to achieve full conservation value through innovative programs and unprecedented collaboration.

AWWI'S PROGRAM AREAS

Assessing Risk

The AWWIC database is a confidential database of post-construction monitoring data from wind projects across the U.S. Using AWWIC, AWWI is analyzing fatality data for different species across multiple sites and regions to better understand wind's risks to wildlife and reduce uncertainty; inform permitting, siting, and operation; and improve conservation.

Developing Solutions

The Technology Innovation Program is a catalyst that brings together creative ideas and informed investment. It provides independent evaluation of technologies and strategies intended to detect, deter, and/or curtail, making it possible to reduce risk for birds and bats. AWWI research also develops tools and mitigation options for eagles, bats, and grouse.

Enabling Application

AWWI synthesizes results and collaborates with experts from the wind industry, the conservation/science community, and state and federal decisionmakers to ensure tools and solutions are applied to maximize conservation outcomes.

RECENT AND UPCOMING RESULTS: www.awwi.org/results-catalog

<table>
<thead>
<tr>
<th>Title</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWWIC Bird Technical Report and Bat Technical Report</td>
<td>Published</td>
</tr>
<tr>
<td>Bats and Wind Energy: Impacts, Mitigation, and Tradeoffs White Paper</td>
<td>Published</td>
</tr>
<tr>
<td>Eagle Mitigation Model: Reducing Vehicle Strikes Publication</td>
<td>Published</td>
</tr>
<tr>
<td>IdentiFlight Publication and DTF Bird Technical Reports</td>
<td>Published</td>
</tr>
<tr>
<td>Wind-Wildlife Technology Catalog &quot;AWWI Partner &amp; Friend Exclusive&quot;</td>
<td>Updated for 2019</td>
</tr>
<tr>
<td>Bat Deterrent Technology Tests</td>
<td>Submit Summer 2019</td>
</tr>
<tr>
<td>Eagle Mitigation Model: Habitat Enhancement Technical Report</td>
<td>Summer 2019</td>
</tr>
<tr>
<td>Bayesian Risk Analysis of AWWIC Database</td>
<td>Submit Summer 2019</td>
</tr>
<tr>
<td>Bat Landscape Risk Model</td>
<td>Submit Summer 2019</td>
</tr>
<tr>
<td>Grouse and Wind Energy White Paper</td>
<td>Winter 2020</td>
</tr>
</tbody>
</table>
SAMPLE PROJECTS: BATS

- Using AWWIC to model bat fatality risk and improve curtailment strategies at wind facilities
  - Modeling bat fatalities using landscape characteristics
  - Modeling bat movement and migration using weather data
  - Comparing effectiveness of varying cut-in speeds
- Ongoing study to identify environmental correlates with bat collision risk
- Evaluation of Vestas Bat Protection System (VBPS), a smart curtailment system for bats
- Evaluation of Turbine Integrated Mortality Reduction (TIMR), a smart curtailment system for bats

SAMPLE PROJECTS: EAGLES

- Evaluation of DTBird, a detection and deterrent technology for eagles
- Evaluation of IdentifiFlight, a detection and informed curtailment technology for eagles
- Improving carcass persistence estimates
- Improving curtailment algorithms of IdentifiFlight technology
- Develop options for compensatory mitigation
  - Lead poisoning reduction (published)
  - Vehicle collision reduction (published)
  - Habitat enhancement (draft report in progress)

SAMPLE PROJECTS: GROUSE

- Developing grouse white paper on the state-of-science of grouse and wind power
- Conducting workshop for stakeholder feedback on white paper and to explore research priorities
- Meta-Analysis: Effects of Wind Energy Turbines on Grouse: A Review of Survival and Displacement (NWCC report and manuscript in progress)
- Multi-year assessment of lesser prairie-chicken response at an operating wind energy facility

LEARN MORE ABOUT AWWI

Watch our 10th Anniversary Video at: www.vimeo.com/304420920

AWWI PARTNERS AND FRIENDS