WINDExchange
U.S. DEPARTMENT OF ENERGY

Northeast Wind Resource Center

Northeast Wind Resource Center Webinar

Interactions between Wind Turbines and Wildlife

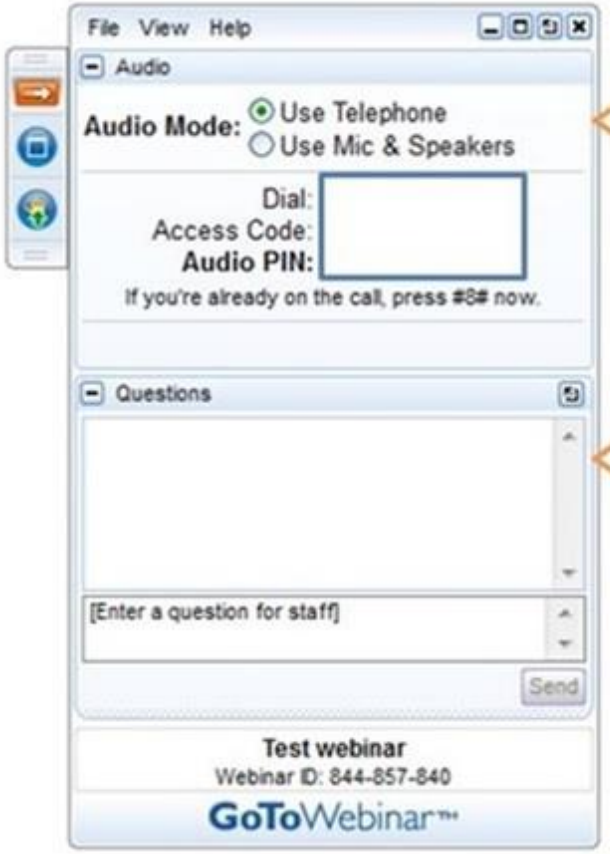
Hosted by
Warren Leon, Clean Energy Group
March 1, 2017

CleanEnergyGroup
Innovation in Finance, Technology & Policy

Sustainable Energy Advantage, LLC

MAINE OCEAN & WIND INDUSTRY INITIATIVE

Housekeeping



All participants are in "Listen-Only" mode. Select "Use Mic & Speakers" to avoid toll charges and use your computer's VOIP capabilities. Or select "Use Telephone" and enter your PIN onto your phone key pad.

Submit your questions at any time by typing in the Question Box and hitting Send.

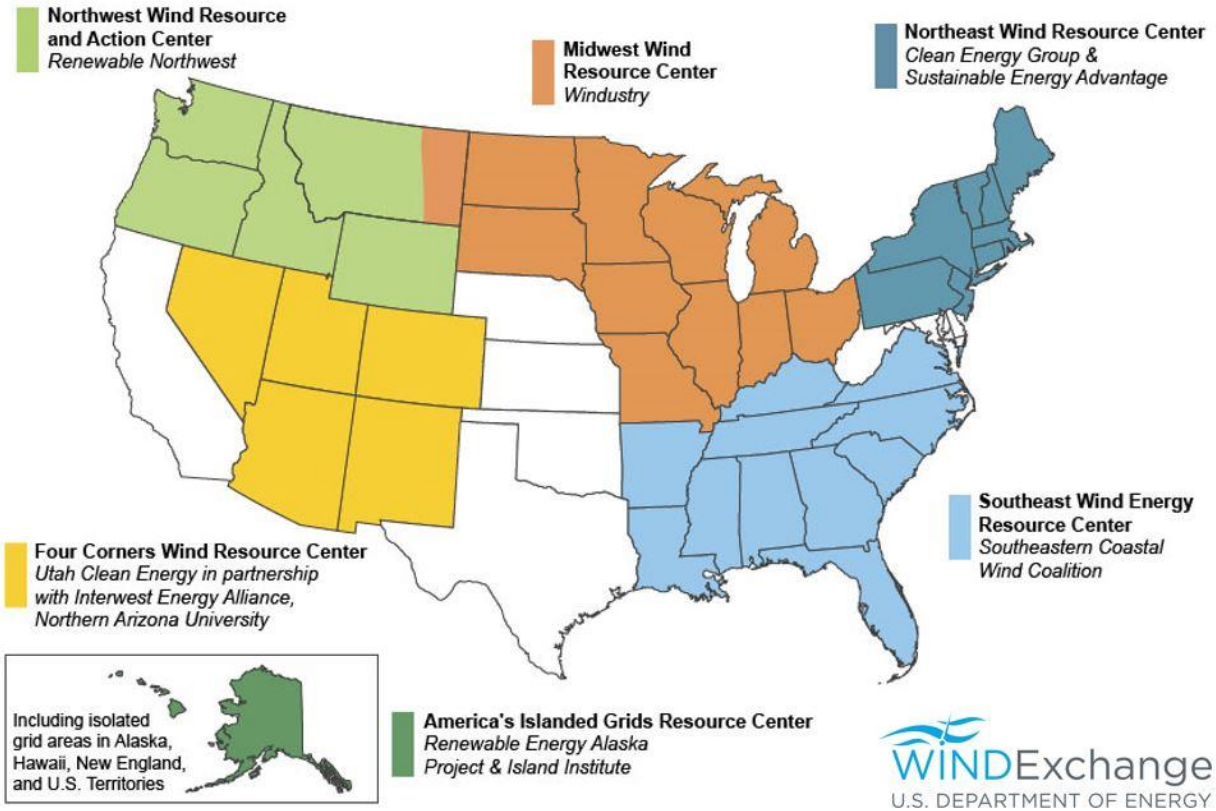
This webinar is being recorded.

You will find a recording of this webinar in the NWRC Resource Library at: www.northeastwindcenter.org/resource-library/

About WINDExchange

WINDExchange is the U.S. Department of Energy (DOE) Wind Program's platform for disseminating credible information about wind energy. The purpose of WINDExchange is to help communities weigh the benefits and costs of wind energy, understand the deployment process, and make wind development decisions supported by the best available information.

On March 11, 2014, the U.S. Department of Energy (DOE) announced six Wind Energy Regional Resource Centers that were selected through a competitive process administered by the National Renewable Energy Laboratory (NREL).



The Northeast Wind Resource Center

The Northeast Wind Resource Center (NWRC) is the regional epicenter for salient, unbiased information on land-based and offshore wind energy in the Northeastern United States. Published research, studies, and analyses associated with the issues impacting public acceptance of wind deployment are available in the NWRC Resource Library.

The NWRC is supported in part by a grant from the U.S. Department of Energy's WINDExchange program, and is managed by Clean Energy Group, with participation from Sustainable Energy Advantage and the Maine Ocean & Wind Industry Initiative.

www.northeastwindcenter.org

Panelists

Taber Allison

Director of Research and Evaluation
American Wind Wildlife Institute

Warren Leon

Executive Director
Clean Energy States Alliance

Facilitating timely and responsible development of wind energy while protecting wildlife and wildlife habitat

AMERICAN WIND WILDLIFE INSTITUTE

Wind Energy and Wildlife

Presentation to the Northeast Wind Resource Center

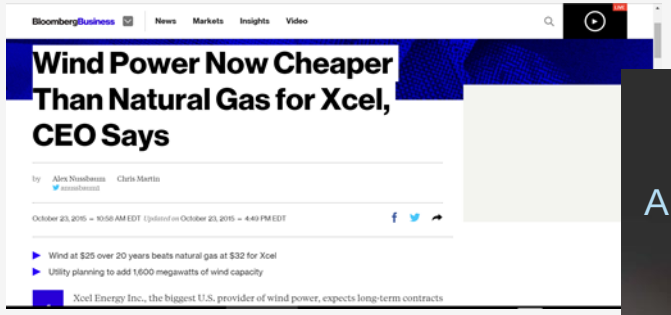
March 2017

Outline

- Drivers and benefits
- What do we know about wind energy and wildlife?
- What uncertainties remain?
- Current research focus – review of 2016 Wind-Wildlife Research Meeting
- Overview of the American Wind Wildlife Institute (AWWI) – Structure and Mission

Benefits and Drivers

- Reduced carbon emissions
- No emissions of air pollutants (NOx, SOx, Mercury)
- No water consumption/withdrawals



- Low, stable cost

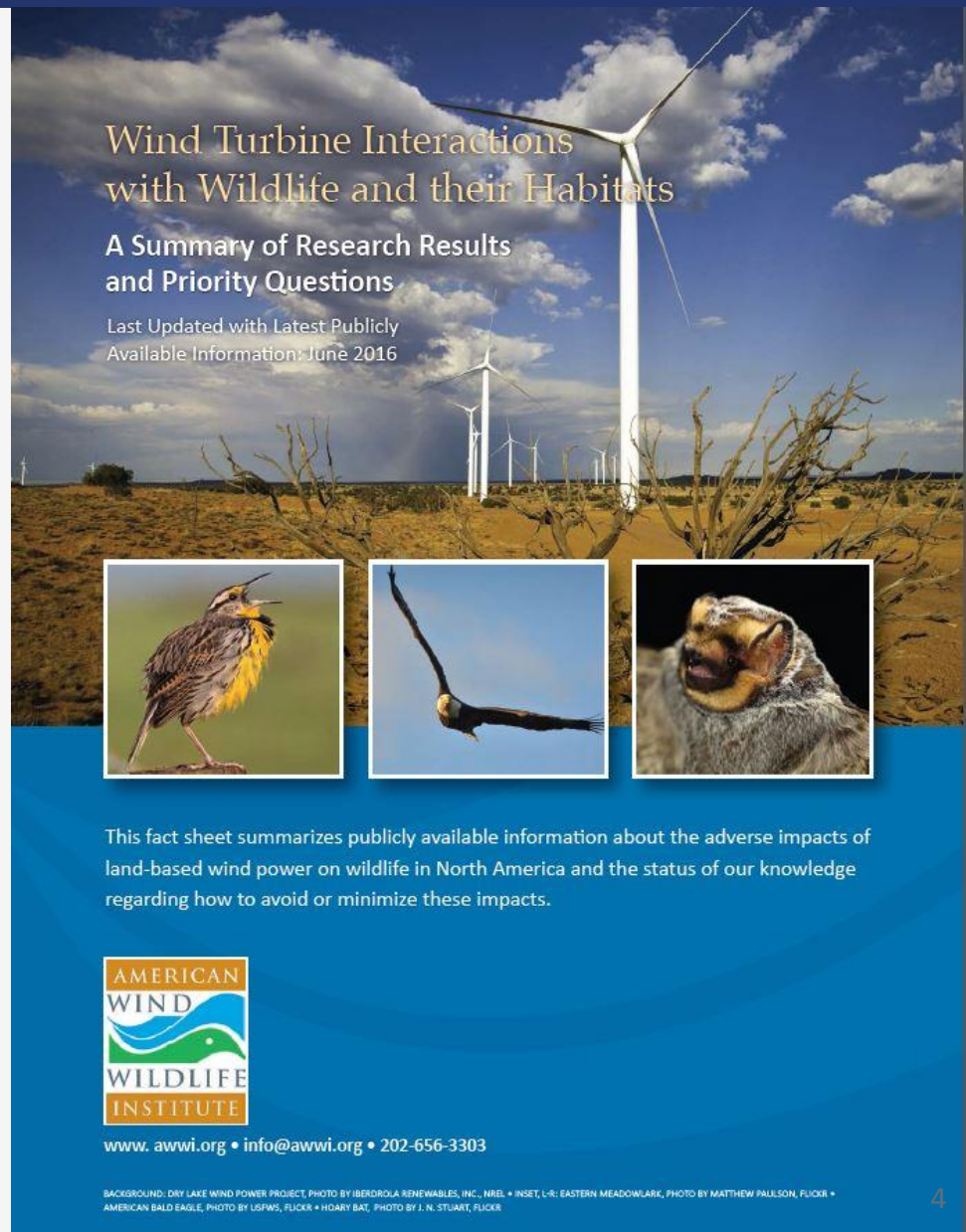
- Scaling up: 20% wind by 2030
  - DOE Wind Vision (2015)
  - 82GW → 224 GW

Status of Research on Wind-Wildlife Interactions

Wind Turbine Interactions with Wildlife and their Habitats

- Collision Mortality
- Direct and Indirect Habitat Effects
- Cumulative Impacts
- Avoiding and Minimizing Impacts

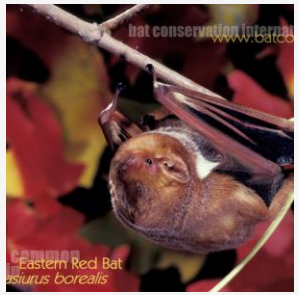
https://awwi.org/resources/summary-of-wind-wildlife-interactions-2/



Overview of Impacts to Birds

	Small Passerines	• Majority of bird fatalities at U.S. wind facilities • Estimated fatality rates <0.02% of population sizes • Fatalities do not appear likely to lead to population declines
	Eagles & Other Raptors	• May be more at risk of collisions • Collision risk predicted by activity
	Grassland Birds	• Few published studies mostly on grassland/shrubland species • Abundance of some species reduced near turbines, but in some cases not consistently observed at all projects.

Overview of Impacts to Bats

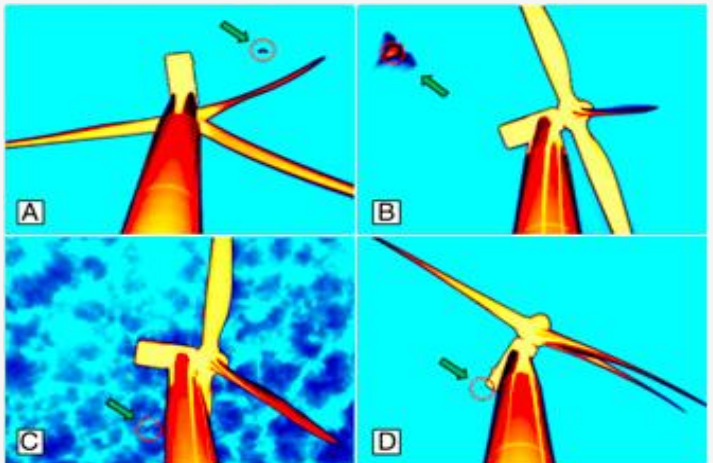


All Bat Species	• Fatalities recorded in 22 species (47 species in US and Canada) • Potential for population-level impacts • Fatality rates variable among projects, regions, and bat species • Highest in central Appalachians and lowest in the Great Basin/southwest open range-desert

Migratory Tree-Roosting Bats	• Three species account for approximately 78% of reported bat fatalities
	  • Hoary bats = 38%
	  • Eastern red bats = 21%
	  • Silver-haired bats = 19%

Why Are Bat Fatalities High?

- Are bats attracted to turbines?
  - Sounds produced by turbines
  - Concentrations of insects near turbines
  - Bat mating/roosting behaviors
- Foraging behaviors that put some species more at risk of collision
- Fatalities positively correlated with turbine height
- Shutting down wind turbines at low wind speeds c fatalities 50% or more



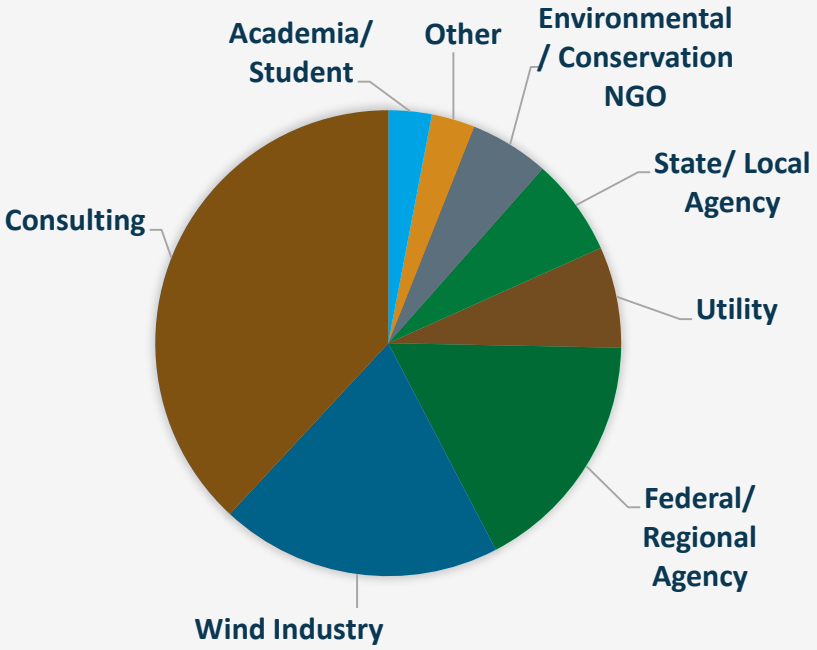
Open Questions

- Will increases in turbine height increase collision risk?
- Can ultrasonic devices effectively deter bats and reduce collisions?
- Can we improve our ability to predict collision risk?
- Is there a way to make turbines more visible to raptors?

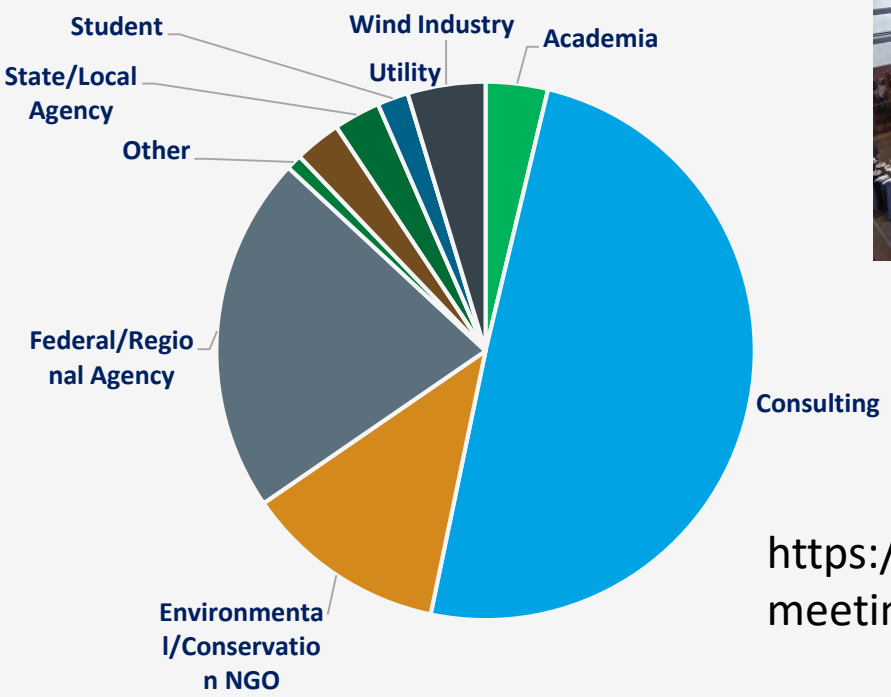
Wind Wildlife Research Meeting XI

- Biennial, scientific conference on wind-energy / wildlife research
- 400+ attendees; ~100 presentations and posters

WWRM XI Attendees by Sector



WWRM XI Presenters by Sector



https://www.nationalwind.org/research/meetings/research-meeting-ix/

Topics from Wind Wildlife Research Meeting XI (Dec. 2016)

- Balancing energy development and wildlife conservation
- Sharing international experiences and data
- Improving efficiency and accuracy of fatality monitoring
- Pioneering offshore studies
- Detecting and deterring raptors and bats
- Optimizing curtailment – reducing power loss while minimizing bat fatalities

https://www.nationalwind.org/research/meetings/wind-wildlife-research-meeting-xi/

WWRM Topic: Minimizing Bat Fatalities

Context: Frick et al. (2017): in the absence of conservation measures, wind energy may pose a substantial threat to migratory bats in North America

Goal: reduce power production losses while minimizing bat fatalities

Research

- Ultrasonic deterrents (DOE: RNRG and others)
- Fine-tuning curtailment to high-risk periods (TIMR)

AWWI

Groundbreaking Collaboration Founded in 2008

Wind Industry

State Wildlife Management Agencies

Science and Environmental Organizations

Shared Mission:

To facilitate timely and responsible development of wind energy while protecting wildlife and wildlife habitat.

33 Partners and Friends

- APEX Clean Energy
- Association of Fish & Wildlife Agencies
- Audubon
- AVANGRID Renewables
- AWEA American Wind Energy Association
- Berkshire Hathaway Energy
- Clean Line Energy Partners
- Defenders of Wildlife
- DTE Energy
- Duke Energy Renewables
- EDF Environmental Defense Fund — Finding the ways that work
- EDF renewable energy
- edp renewables
- enel Green Power
- everpower
- GE
- Geronimo Energy
- Infinity Wind Power
- MAP
- National Wildlife Federation
- The Nature Conservancy — Protecting nature. Preserving life.
- NRDC
- nrg
- Pattern
- Portland General Electric
- Renewable NRG Systems
- res Americas — powering change
- Siemens — Ingenuity for life
- Sierra Club — Founded 1892
- tradewind energy
- Union of Concerned Scientists
- Vestas
- The Wilderness Society

AWWI's Program

Credible, Accurate, Current Scientific Information → Analyze data and develop solutions for avoidance, minimization, and compensation

Innovative Technology → Improve risk assessment and impact minimization

Source and Forum for Trusted Information → Lay groundwork for program implementation, inform policy

What is Needed

Priorities for applied research to examine key issues related to wildlife interactions with wind energy siting and operations in the U.S.

Bald and Golden Eagles

Bats

Prairie Grouse

Migratory Birds

Reducing Risk: Vocabulary

- Avoidance → Siting
- Minimization → Best Management Practices
- Compensation → Offsetting Remaining Impacts

Science for Policy & Practice

Eagle Program

Laying the Groundwork
- Eagle White Paper (2012)
- Eagle Research Framework (2014)

Predicting and Avoiding Take
- Updated Eagle Take Model
- Landscape Assessment Tool

Minimizing Take (ACPs)
- Technology Verification Program

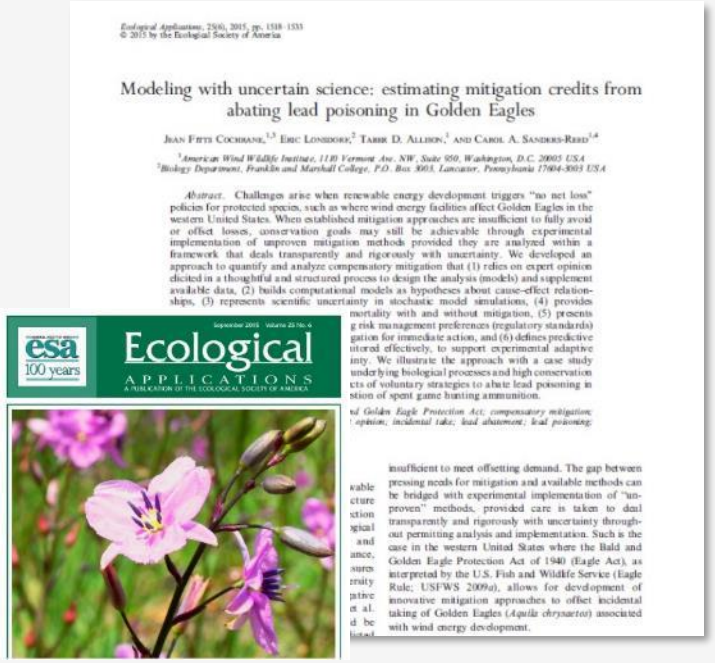
Mitigating Unavoidable Take
- Mitigation Toolbox

Science for Policy and Practice

Eagle Program

A comprehensive program that provides an understanding of the risk of wind to eagles and strategies to address this risk.

Compensatory Mitigation Models



Ecological Applications, 25(6), 2015, pp. 1518–1533
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Modeling with uncertain science: estimating mitigation credits from abating lead poisoning in Golden Eagles

Jean Fitts Cochrane,[1,5] Eric Lonsdorf,[2] Tabbr D. Allison,[1] and Carol A. Sanders-Reed[3,4]

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[2]Biology Department, Franklin and Marshall College, P.O. Box 3003, Lancaster, Pennsylvania 17604-3003 USA

Abstract. Challenges arise when renewable energy development triggers "no net loss" policies for protected species, such as where wind energy facilities affect Golden Eagles in the western United States. When established mitigation approaches are insufficient to fully avoid or offset losses, conservation goals may still be achievable through experimental implementation of unproven mitigation methods provided they are analyzed within a framework that deals transparently and rigorously with uncertainty. We developed an approach to quantify and analyze compensatory mitigation that (1) relies on expert opinion elicited in a thoughtful and structured process to design the analysis (models) and supplement available data, (2) builds computational models as hypotheses about cause-effect relationships, (3) represents scientific uncertainty in stochastic model simulations, (4) provides mortality with and without mitigation, (5) presents g risk management preferences (regulatory standards) gation for immediate action, and (6) defines predictive itored effectively, to support experimental adaptive inty. We illustrate the approach with a case study underlying biological processes and high conservation cts of voluntary strategies to abate lead poisoning in stion of spent game hunting ammunition.

d Golden Eagle Protection Act; compensatory mitigation; opinion; incidental take; lead abatement; lead poisoning;

insufficient to meet offsetting demand. The gap between pressing needs for mitigation and available methods can be bridged with experimental implementation of "unproven" methods, provided care is taken to deal transparently and rigorously with uncertainty throughout permitting analysis and implementation. Such is the case in the western United States where the Bald and Golden Eagle Protection Act of 1940 (Eagle Act), as interpreted by the U.S. Fish and Wildlife Service (Eagle Rule; USFWS 2009*a*), allows for development of innovative mitigation approaches to offset incidental taking of Golden Eagles (*Aquila chrysaetos*) associated with wind energy development.

September 2015 Volume 25 No. 6
esa 100 years
Ecological Applications
A PUBLICATION OF THE ECOLOGICAL SOCIETY OF AMERICA

Lead Model: Published

Vehicle Model: In Revision

Habitat Model: In Progress – Completion by End of Year

Technological Verification: Eagles/Raptors

Current and Ongoing Projects

- Raptors and Ultraviolet Light (2015 – published)
- Eagle Detection/Deterrent Technology (Winter 2016 – Summer 2017)
- IdentiFlight – detection technology (Fall – Winter 2016)

DOE FOA

- Two proposals accepted: DTBird and IdentiFlight
- Completing award negotiations with DOE

LETTER

J. Raptor Res. 49(3):342–343

DO RAPTORS REACT TO ULTRAVIOLET LIGHT?

W. GRAINGER HUNT[1] AND CHRISTOPHER J.W. MCCLURE
The Peregrine Fund, 5668 West Flying Hawk Lane, Boise, ID 83709 U.S.A.

TABER D. ALLISON
The American Wind Wildlife Institute, 1110 Vermont Avenue, NW, Suite 950, Washington, DC 20005

KEY WORDS: *Golden Eagle;* Aquila chrysaetos; *raptor; ultraviolet light; UV; wind power.*

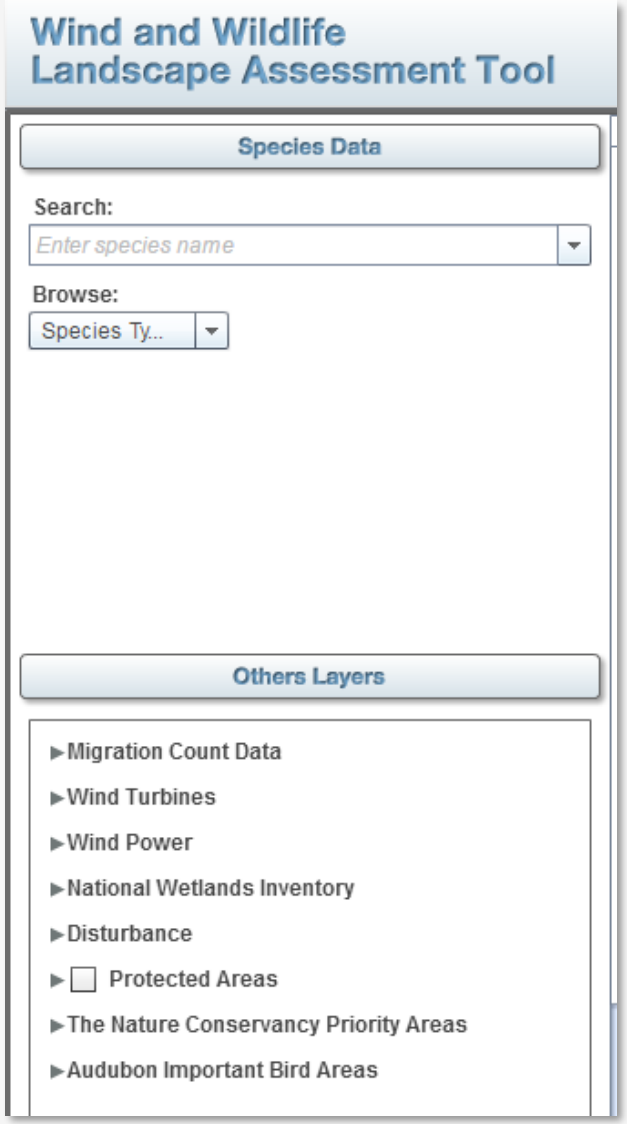
Birds are renowned for their excellent vision, including the sensitivity of many species to ultraviolet light (UV; Birkhead 2012). Bird color vi
gle-cone types, one of which
determine whether a species
in wavelength) or only to lon
Hart 2001). Field observation
certain raptors might use the
to aid in hunting (Viitala et
1999), although others have
between UV reflectance of w
strates were likely indistingui
netic studies by Odeen and
raptors generally lacked UV-
sequencing of a Golden Eag
by Doyle et al. (2014) revealed
to the violet spectrum and n
of the spectrum. In field test
tance in reducing the incide
wind turbine blades, Young e
blades painted with UV refle
A remaining question regard
to deter raptors from enteri
possible sensitivity to projecte
light. Here we recount obser

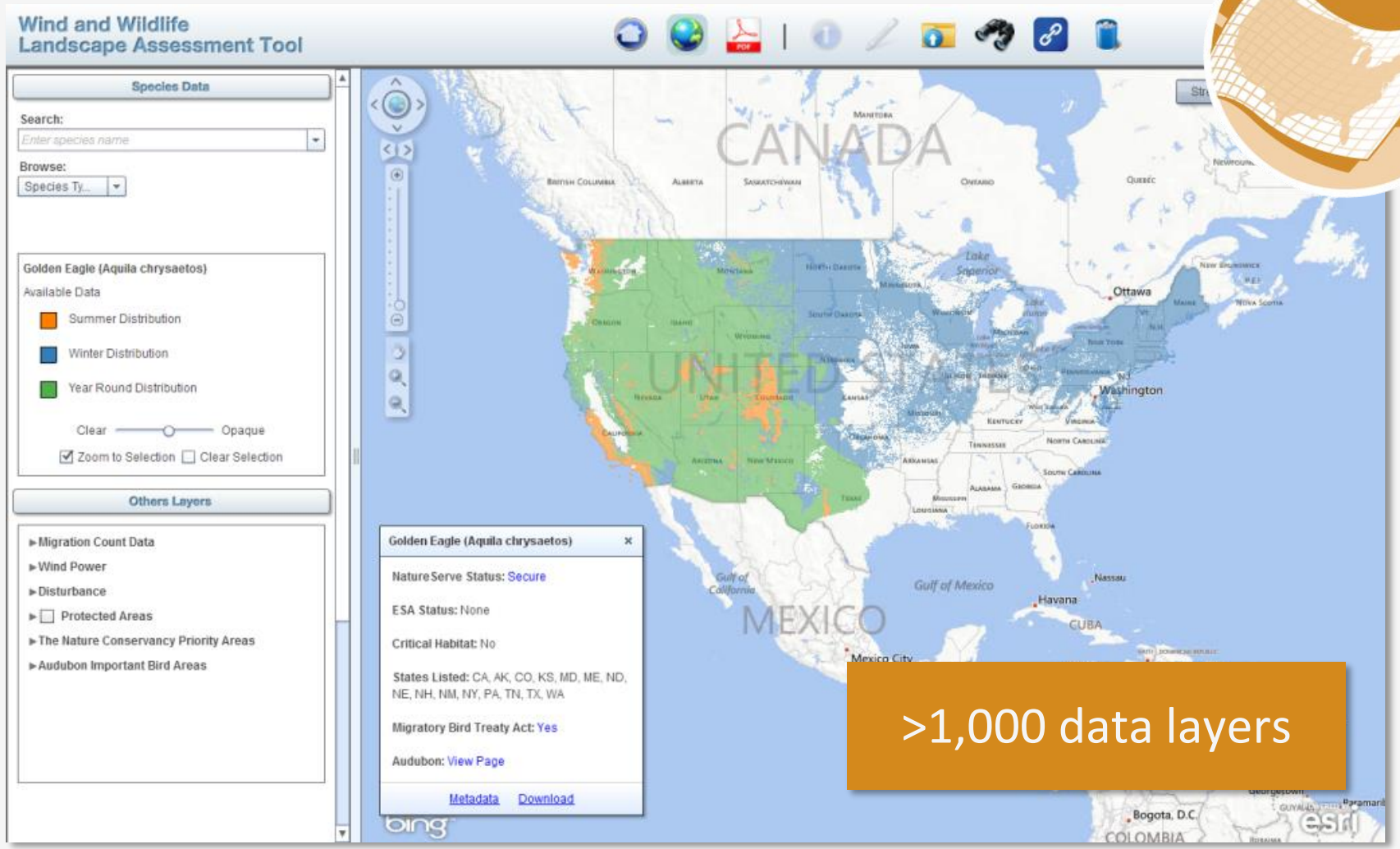
calculated intensity of 0.3 mW/cm² at a distance of 10 m to 0.013 mW/cm² at 50 m. Both devices required 120V AC power provided by a quiet 5-kW portable generator removed ca. 30 m by an extension cord.

Test subjects included three adult Golden Eagles, one

Technological Innovations

Landscape Assessment Tool





>1,000 data layers

Technological Innovations

AWWIC

A fully functioning Wind Wildlife Information System
that improves wildlife risk assessment resulting in reduced impacts

		Your data goes in this column
Project/Study Information	Study type	Fatality survey
	Project ID	
	Phase ID	
	Study start date	
	Study end date	
	Did you feather or curtail any turbines during the course of this study?	
Fatality Estimate	Group estimated	
	Description for "other"	
	Estimator Used	
	Fatalities /MW	
	Fatalities /turbine	
	Confidence level	
	Estimation comments	
Survey protocol	Survey timing/frequency	
	Total # searches	
	Full/partial search	
	# Turbines searched	
	All turbines searched?	
	# Dog searches	
	Protocol comments	
Plot	Plot Dimensions	
	Plot-clearing method	
	Transect notes	
	Time spent	
	Search rate	
	Search complete?	
	Plot Comments	

National Wind Wildlife Research Plan: Goals

- Outlines wind-wildlife research needed to achieve DOE Wind Vision (30% wind by 2030) and minimize impacts to wildlife
- Highlights parties best equipped to lead research priorities
- Highlights strategies to ensure results and tools generated are used
- Discusses importance of sharing data and information

- Reflects input from broad base of stakeholders and aim for widespread acceptance
- Published on our website April-May 2017

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U.S. DEPARTMENT OF ENERGY

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Thank you for attending our webinar

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Northeast Wind Resource Center: www.northeastwindcenter.org

DOE Wind Exchange: http://energy.gov/eere/wind/windexchange

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