Facilitating timely and responsible development of wind energy

AMERICAN WIND WILDLIFE INSTITUTE

while protecting wildlife and wildlife habitat

Wind Energy and Raptors

July 18, 2017

Overview

- Summary (and Context) of Impacts
  - Songbirds
  - Raptors
- Reducing Impacts to Raptors
  - Avoidance
  - Minimization
  - Compensation
- Research Needs

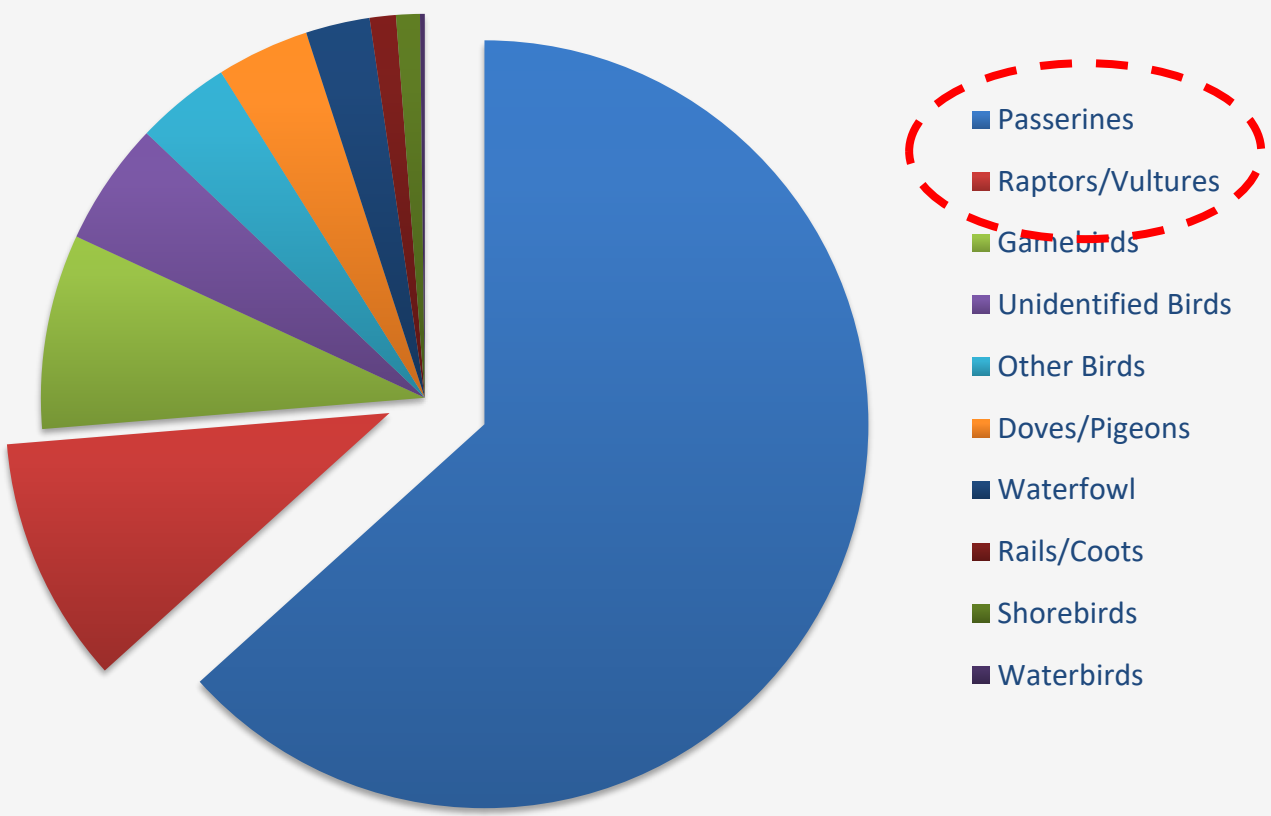
Impacts to Birds

- Birds collide with anthropogenic structures (buildings, towers, transmission lines, wind turbines)
- Fatalities of ~250 species found at wind turbines
- Collision risk likely species-dependent and difficult to assess
  - Unable to relate radar/point count activity in most species to mortality
  - Evidence that collision mortality is related to activity/abundance in raptors (summary in Strickland et al. 2011)
- Issues with fatality estimation (e.g., Huso et al. 2016)
  - Representation
  - Detection

Relative Composition of Bird Fatalities

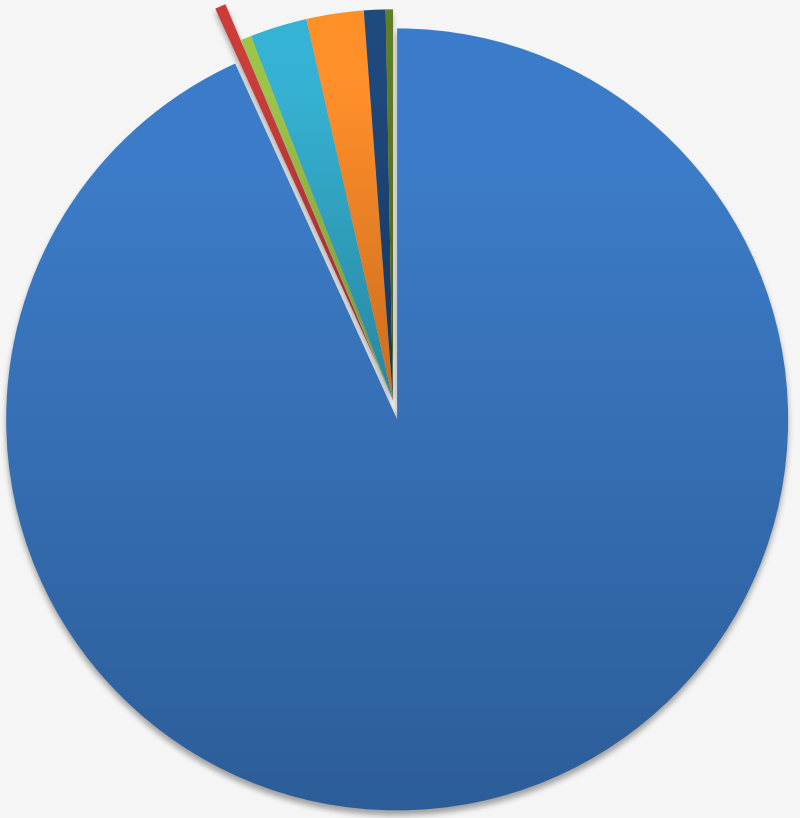
Wind Turbines

(Erickson et al. 2014. PLOSONE)



Communication Towers

(Gehring et al. 2011. JWM)



Impacts to Raptors

- National estimate for raptor fatalities by species and region
  - Review by Howlin et al. (2016 and in progress) (Proceedings of Wind Wildlife Research Meeting 2016)
  - Higher numbers in western U.S.
  - Percentages of populations 0.5% or less (higher percentage than songbirds)
- Concerns about (possible) additive mortality for long-lived, low fecundity group

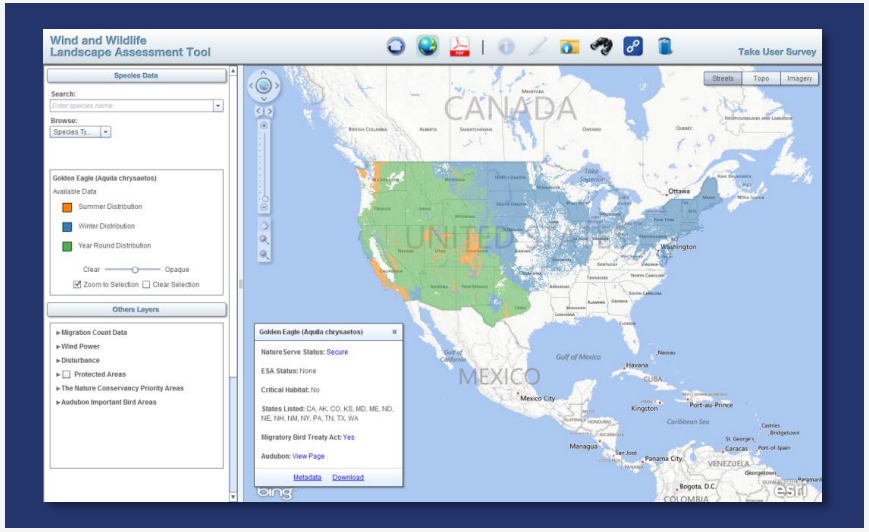
Estimating Impacts to Raptors

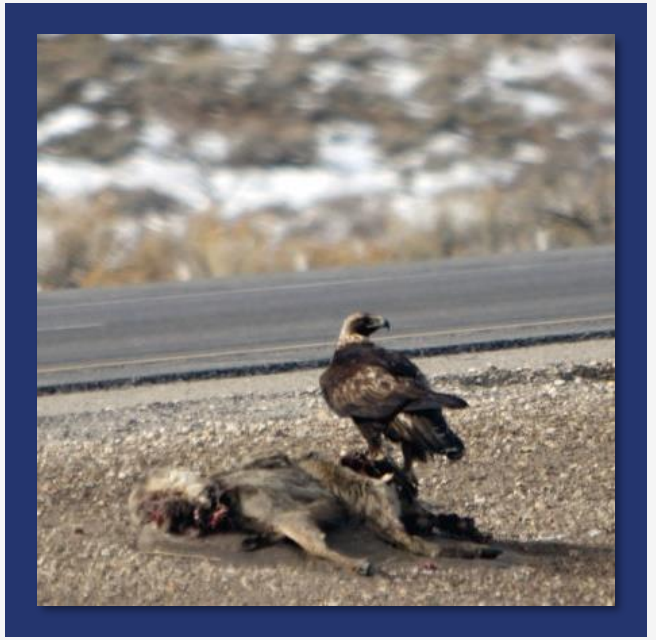
2016 NWCC Research Meeting

- Generalized Fatality Estimator (Hein et al. 2016)
- Innovative fatality search protocols (e.g., Rabie et al. 2016; Hallingstad et al. 2016)
- “Raptor-appropriate” correction factors (Howlin et al. 2016
- Technology to record collision impacts (Albertani et al. 2016)

Analysis of increased available data – American Wind Wildlife Information Center (AWWIC)

Reducing Impacts to Raptors





Avoidance

Minimization

Compensation

Avoiding Impacts to Raptors

Macro- and Micro-Siting – effects of topography on use of airspace

- California Condor (Poessel et al. 2016)
- Golden Eagle (Todd Katzner, Tricia Miller; e.g., Katzner et al. 2012)

Minimization Strategies

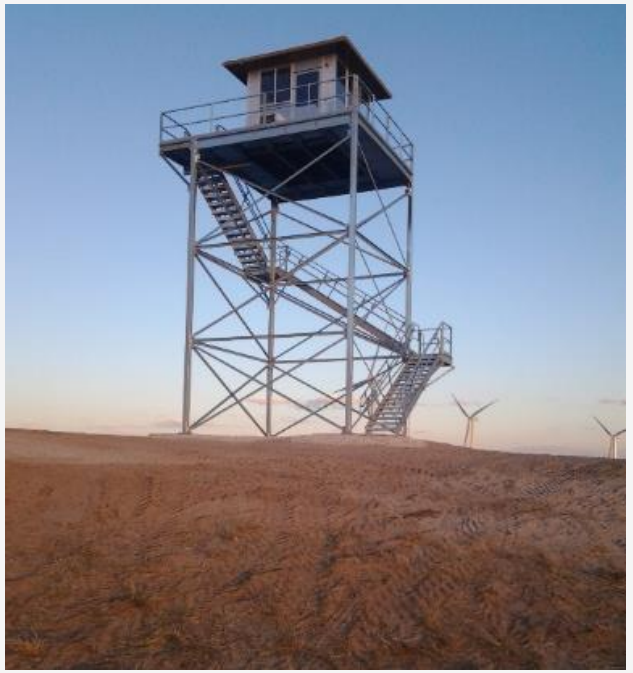
Impact Reduction

- Increase turbine visibility?
  - UV blade painting: no effect detected (Young et al. 2013; Foote Creek Rim, WY)
- Repowering? (Altamont Pass)
  - Substantial reduction in raptor mortality: 67-96% (Smallwood and Karas 2009)
- Removal of “problem turbines” (Altamont Pass e.g., Smallwood et al. 2009)

Minimization Strategies

Curtailment: Informed vs. Blanket

- Seasonal (Altamont Pass, Nov - Feb)
  - Goal: reduce focal species mortality by 50%
  - Successful in reducing mortality of large raptors (ICF International 2016)
- Night migrants (Gulf of Mexico/TX, radar)
- Target species (e.g., condors, whooping cranes, eagles)
  - Radar/VHF Tracking
  - Biomonitors (various Eagle Conservation Plans)
  - Camera-based systems



Technologies to Minimize Impacts

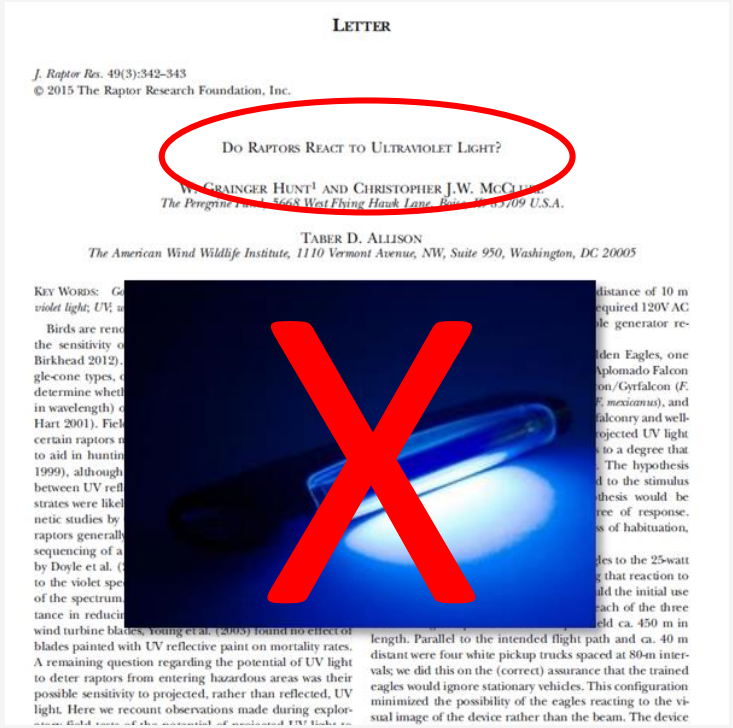
Detection

- Visual cameras ?
- Radar ?

Deterrence

- Light (visual & UV) ? X
- Sound ?

Evaluating effectiveness, e.g., Hunt et al. 2015



LETTER

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DO RAPTORS REACT TO ULTRAVIOLET LIGHT?

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KEY WORDS: *violet light; UV,*

Birds are rend… the sensitivity o… Birkhead 2012)… gle-cone types, … determine whet… in wavelength) … Hart 2001). Fiel… certain raptors … to aid in huntin… 1999), although… between UV refl… strates were likel… netic studies by … raptors generall… sequencing of a … by Doyle et al. (… to the violet spe… of the spectrum… tance in reducin… wind turbine blades, Young et al. (2003) found no effect of blades painted with UV reflective paint on mortality rates. A remaining question regarding the potential of UV light to deter raptors from entering hazardous areas was their possible sensitivity to projected, rather than reflected, UV light. Here we recount observations made during explor-

…distance of 10 m …equired 120V AC …le generator re-… …lden Eagles, one …Aplomado Falcon …on/Gyrfalcon (*F. … F. mexicanus*), and …falconry and well- …rojected UV light …s to a degree that … The hypothesis …d to the stimulus …thesis would be …ree of response. …ss of habituation, …les to the 25-watt …g that reaction to …ild the initial use …ach of the three …eld ca. 450 m in length. Parallel to the intended flight path and ca. 40 m distant were four white pickup trucks spaced at 80-m intervals; we did this on the (correct) assurance that the trained eagles would ignore stationary vehicles. This configuration minimized the possibility of the eagles reacting to the visual image of the device rather than the beam. The device

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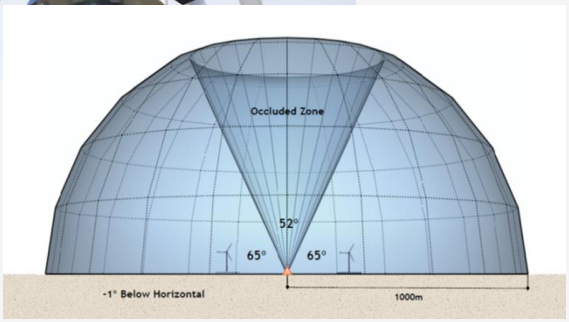

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AWWI's Technology Verification Program

AWWI Technology Verification Services

Catalog of Available Technologies

- Wind Industry
- Streamlined Testing at Appropriate Number of Sites
- Tech Vendors

Peer Review

Verified Detection/ Deterrent Technologies

Outcomes:

- ✓ Operational Tools
- ✓ Avenues for Compliance
- ✓ Published Studies

Pooling knowledge/resources to find best solutions

AWWI's Technology Verification Program

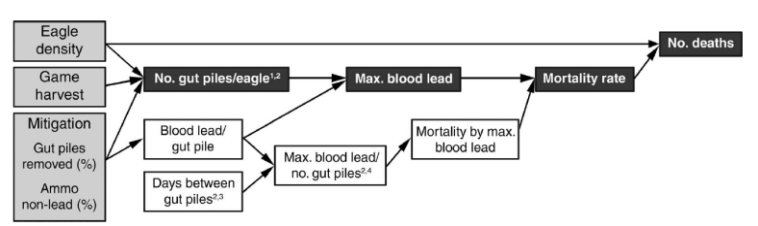
Ongoing Projects at Operational Facilities

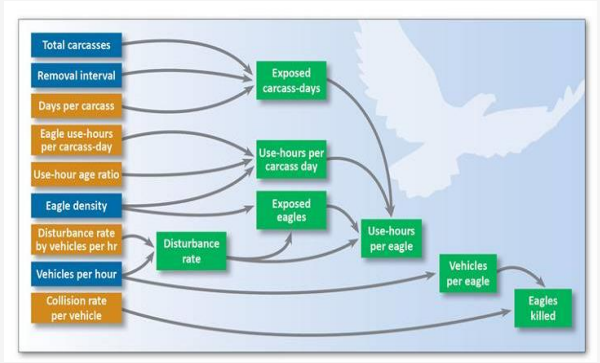
1. Eagle detection & deterrent technology (CA, 2016 – 2017)
2. IdentiFlight – detection & informed curtailment (WY, Fall 2016)
3. DOE-funded evaluations (Summer 2017 – 2020)
   - IdentiFlight – detection & informed curtailment
   - DTBird – detection & deterrent

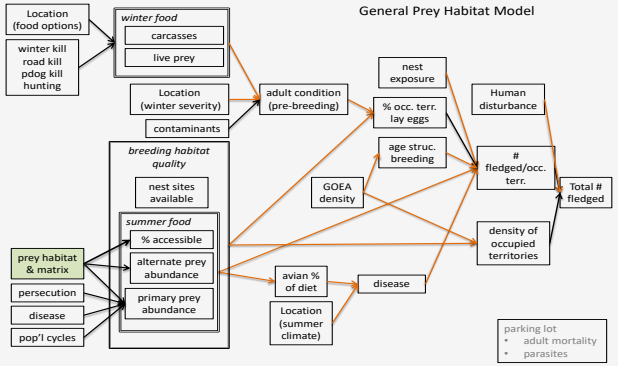
Future Projects (2018 and Beyond)

- Bat deterrent technologies (Summer/Fall 2018)
- Technologies for other target species (e.g., condors)

Compensating for Take – Golden Eagle







Ecological Applications

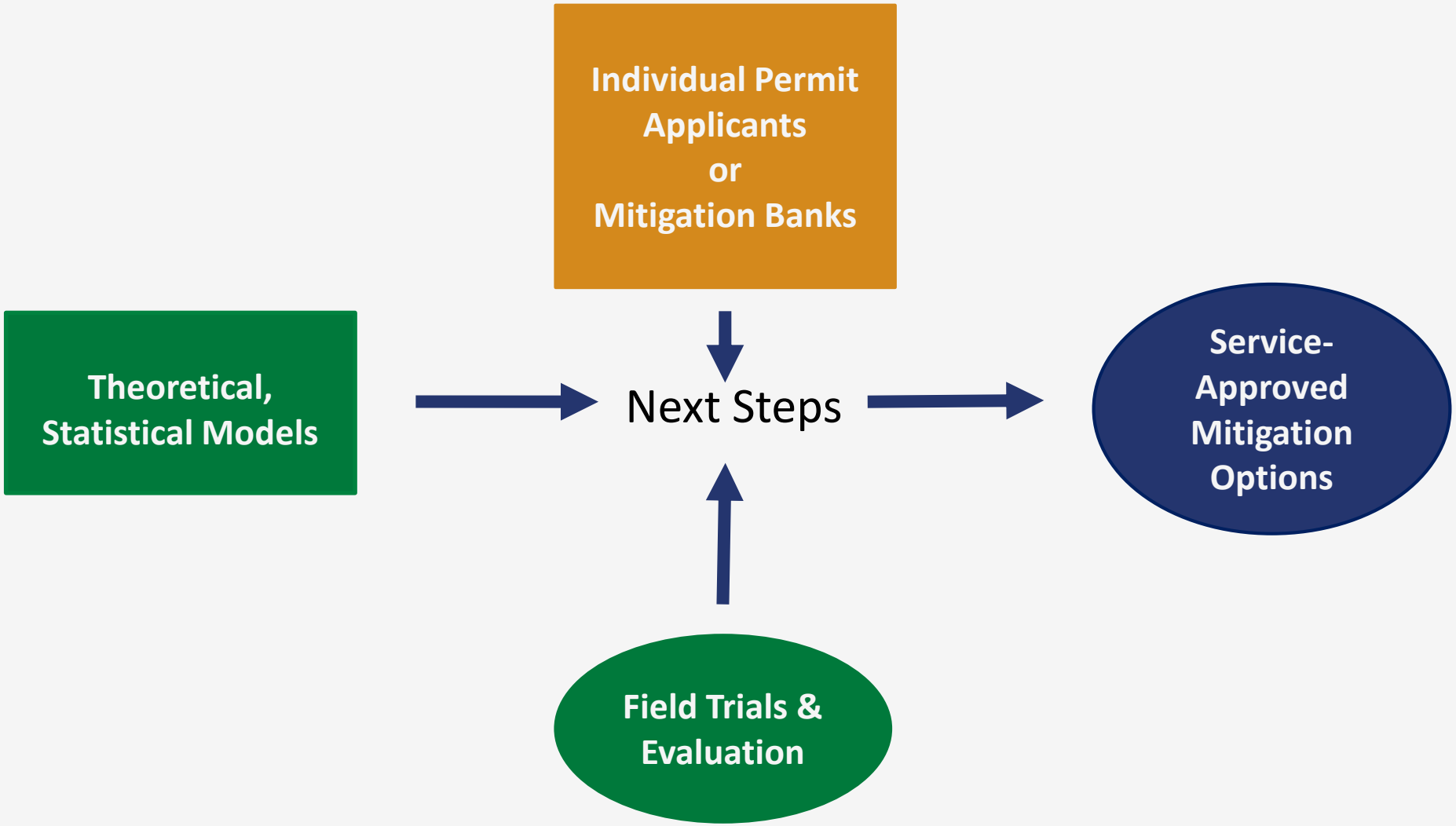
Modeling with uncertain science: estimating mitigation credits from abating lead poisoning in Golden Eagles

Lead Model: Published

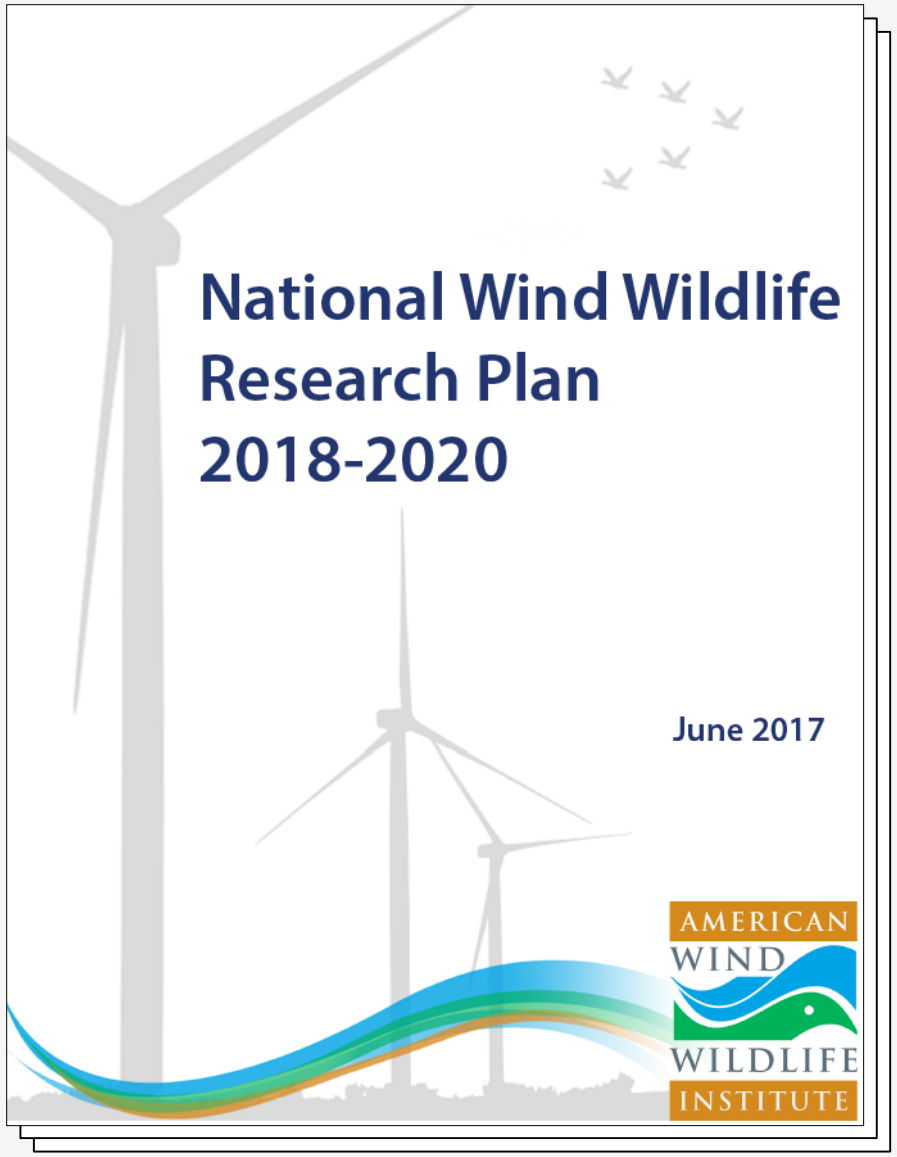
Vehicle Model: In Review

Habitat Model: Under Development

Implementing Compensation Strategies



Further Research Needs



https://awwi.org/june-28-2017-awwis-2018-2020-national-wind-wildlife-research-plan-now-online-2/

Wind Wildlife Research Plan – Priorities & Outcomes

Priority	Outcome
Bald and Golden Eagles	
Develop and evaluate potential best management practices (BMPs) for avoiding and minimizing take, including technologies intended to minimize impacts	Cost-effective, scientifically accepted technologies and strategies that minimize eagle take, consistent with the Eagle Rule's avoidance standard; reduced need for compensatory mitigation
Create and evaluate quantifiable and verifiable **options for offsetting eagle take**	Cost-effective, practical, scientifically accepted compensatory mitigation practices available for use in permit applications
Enhance eagle take prediction models to provide more accurate take predictions	Cost-effective, scientifically accepted technologies and strategies that minimize eagle take, consistent with the Eagle Rule's avoidance standard; reduced need for compensatory mitigation
Migratory Birds	
Use AWWIC to **develop more accurate estimates of avian impacts**	Improved understanding of impacts of wind energy on avian populations and scientifically sound investment in risk reduction
Support development and evaluation of measures to mitigate collision impacts for target avian species	Expanded BMP options to reduce hazards to target species such as condors, cranes, and raptors

Questions?