Expanding Mitigation Options for Offsetting Eagle Take

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REWI Compensatory Mitigation for Eagle Take

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

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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 e implementation of unproven mitigation methods provided they are analyz framework that deals transparently and rigorously with uncertainty. We d approach to quantify and analyze compensatory mitigation that (1) relies on ex elicited in a thoughtful and structured process to design the analysis (models) and available data, (2) builds computational models as hypotheses about cause–eff ships, (3) represents scientific uncertainty in stochastic model simulations, (probabilistic predictions of "relative" mortality with and without mitigation, results in clear formats useful to applying risk management preferences (regulator and selecting strategies and levels of mitigation for immediate action, and (6) defin parameters in units that could be monitored effectively, to support experimen management and reduction in uncertainty. We illustrate the approach with a characterized by high uncertainty about underlying biological processes and high interest: estimating the quantitative effects of voluntary strategies to abate lead Golden Eagles in Wyoming due to ingestion of spent game hunting ammunition

Key words: Aquila chrysaetos; *Bald and Golden Eagle Protection Act; compensato decisions in response to uncertainty; expert opinion; incidental take; lead abatement; l*

In: Structured Decision Making: Case Studies in Natural Resource Management. Runge, Converse, Lyons & Smith (eds). 2020. Johns Hopkins University Press

Chapter 15

Hedging against uncertainty when granting permits for mitigation

Jean Fitts Cochrane, Taber D. Allison, and Eric V. Lonsdorf

Abstract

The U.S. Fish and Wildlife Service must decide how much credit to grant for mitigation actions, such as methods designed to compensate for incidental taking of eagles by wind energy facilities or other activities requiring federal permits. When established mitigation approaches are insufficient or unavailable for avoiding or offsetting losses, conservation goals may still be achievable through experimental implementation of novel mitigation methods. The uncertainty in outcomes, or risks of not meeting conservation targets, must be analyzed thoroughly and addressed explicitly in the decision analysis. We used simulation modeling and a decision model with utility, a quantitative expression of the agency's risk tolerance, to demonstrate how the Service can evaluate a plan to voluntarily abate lead poisoning of golden eagles in central Wyoming. This example illustrates how to characterize and respond to uncertainty in a regulatory decision.

Key Words: Risk analysis, risk management, uncertainty, utility, elicitation, golden eagles

Problem Background

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RESEARCH ARTICLE

Assessing carcass relocation for offsetting golden eagle mortality at wind energy facilities

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Abstract

As wind energy expands to achieve the United States' net zero emission goals, compensatory mitigation will be required to offset negative effects on birds and bats. The golden eagle (*Aquila chrysaetos*) is particularly susceptible to collision with wind turbines, but only 1 option for offsetting mortalities has been approved by the United States Fish and Wildlife Service despite many sources of anthropogenic-caused mortality. We update a previously developed vehicle-collision model with data collected during 3 winters from 2016 to 2019 and integrate a resource equivalency analysis so that relocation of

USFWS Eagle Rule – in Revision

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Parts 13 and 22

[Docket No. FWS–R9–MB–2011–0094; FF09M20300–167–FXMB123109EAGLE]

RIN 1018–AY30

Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests

AGEN[illegible]: [illegible] Wildlife [illegible]vice, Inter[illegible].

ACTION: [illegible]nal rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service or USFWS), are revising the regulations for eagle nonpurposeful take permits and eagle nest take permits. Revisions include changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees. We intend the revisions to add clarity to the eagle permit regulations, improve their implementation, and increase [...] impacts from otherwise lawful activities.

The Service is modifying the definition of the Bald and Golden Eagle Protection Act's "preservation standard," which requires that permitted take be compatible with the preservation of eagles. We are also removing the distinction between standard and programmatic permits, codifying standardized mitigation requirements, and extending the maximum permit duration for eagle incidental take permits (50 CFR 22.26). Th[illegible] regulations als[illegible] [illegible] of [illegible] nest take regulations at 50 CFR 22.27, as wel[illegible] as revisions to the permit fee schedule at 50 CFR 13.11; new and revised definitions in 50 CFR 22.3; revisions to 50 CFR 22.25 (permits for golden eagle nest take for resource development and recovery operations) for consistency with the § 22.27 nest take permits; and two provisions that apply to all eagle permit types (50 CFR 22.4 and 22.11).

Background

The Bald and Golden Eagle Protection Act (Eagle Act or BGEPA) (16 U.S.C. 668–668d) prohibits take of bald eagles [...] for eagle nonpurposeful take permits, and in the final environmental assessment (FEA) of the regulations, the Service defined the preservation standard to mean "consistent with the goal of stable or increasing breeding populations" (74 FR 46836, see p. 46837).

On April 13, 2012, the Service initiated two additional rulemakings: (1) A proposed rule to extend the maximum permit tenure for programmatic eagle nonpurposeful take permit regulations from 5 to 30 years, among other changes ("D[illegible] Ru[illegible]") ([illegible] FR 22267); and (2) a[illegible] [illegible] o[illegible] proposed rulemaking (A[illegible]R) soliciting input on all aspects of those eagle nonpurposeful take regulations (77 FR 22278). The Duration Rule was finalized on December 9, 2013 (78 FR 73704). However, it was the subject of a legal challenge, and on August 11, 2015, the U.S. District Court for the Northern District of California vacated the provisions that extended the maximum programmatic permit tenure to 30 years (*Shearwater* v. *Ashe,* No. CV02830–LHK (N.D. Cal., Aug. 11, 2015)). The court held that the Service should have prepared an environmental assessment

GOEA – No Net Loss

Predict Take (Avoidance) → Implement BMPs (Minimization) → Offset unavoidable take (Compensation)

Offsetting Permitted Take of Eagles

Mitigation to achieve "No-net-loss" needs to be quantifiable and verifiable

Mitigation Option → ?? Model ?? → # Eagles saved

1.2 to 1

Mitigation strategies need to be quantifiable and verifiable

Power Pole Retrofitting → **Model Estimate: #Poles/Eagle** → # Eagles saved

Mitigation strategies need to be quantifiable and verifiable

- What percentage of hunters need to use non-lead ammunition?
- How many carcasses must be removed?

The Approach

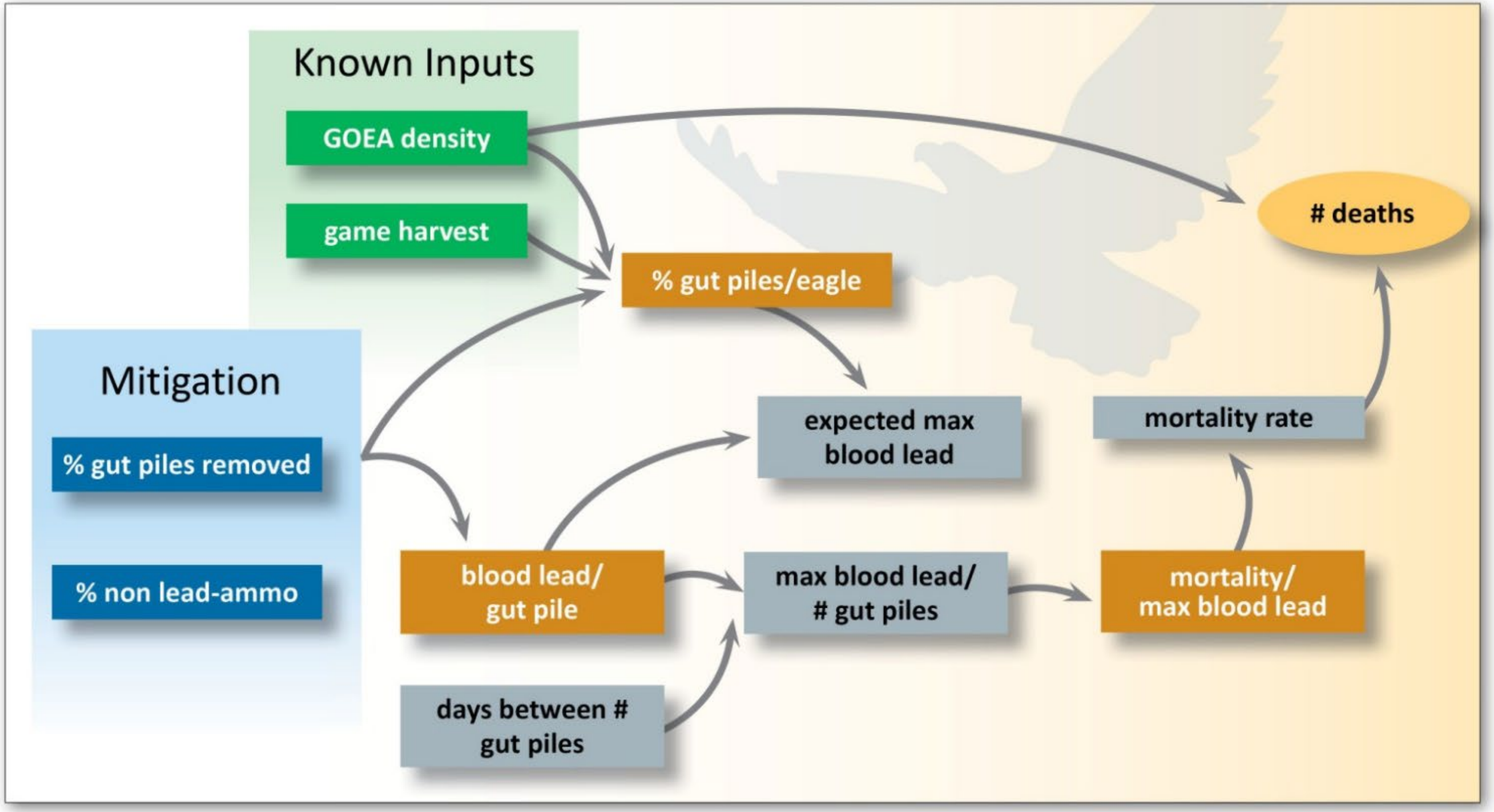
1. Develop a conceptual model (influence/causal diagram)
2. Define functional relationships in the conceptual model
   - **Turn conceptual model into quantitative model**
3. Quantify uncertainty of functional relationships and the overall effect of mitigation
   - **Mirror the USFWS approach to eagle take prediction**
4. Conduct sensitivity analysis to inform future research

REWI Experts: Design and Parameterize Mitigation Models

- Pete Bloom – Bloom Consulting, Inc.
- Michael Collopy – University of Nevada - Reno
- **Chris Franson – U.S. Geological Survey**
- Grainger Hunt – The Peregrine Fund
- Todd Katzner – U.S. Geological Survey
- **Terra Kelly – UC Davis**
- Mike Kochert – U.S. Geological Survey (ret.)
- Brian Millsap – U.S. Fish and Wildlife Service (ret.)
- Robert Murphy – Eagle Environmental, Inc.
- Leslie New – Ursinus College
- **Patrick Redig – University of Minnesota**
- **Bruce Rideout – San Diego Zoo**

*** Lead Experts**

Lead Abatement Conceptual Model



REWI | The Approach – Structured Expert Elicitation

Expert elicitation is the synthesis of opinions of authorities on a subject where there is uncertainty due to insufficient data to support decision-making.

Four-step elicitation (quantities and frequencies)

1. Realistically, what do you think the lowest plausible value for [event X] will be?
2. Realistically, what do you think the highest plausible value for [event X] will be?
3. Realistically, what is your best guess for [event X]
4. How confident are you that your interval, from lowest to highest, could capture the true value of [event X]?

Estimating mortality based on blood lead levels

Assumptions:
1) mortality is a direct result of lead consumption that produced this blood lead level (peak level post-scavenge) at any time during the month
2) DO NOT include mortality due to any sources other than lead exposure (e.g., the "background" rate)
3) blood lead levels here are MAXIMUM following a scavenge event with lead exposure (e.g., when eagles are sampled in the field or in rehab, many or most will have blood lead below their maximum exposure due to time lapsed since the scavenge event)

Given this maximum blood lead level at **ANY TIME** during a month:	How likely do you believe it is that a wild-living eagle will die **as a direct result** of having blood lead reach this level at some point during a month? *(answer between 0 and 100 probability in each box)*			**How confident are you that the probability of death will be within the range of your lowest-to-highest estimates?** *(answer between 50-100%)*
	<u>Lowest</u> reasonable estimate for the probability of death	**<u>Highest</u> reasonable estimate for the probability of death**	**Your <u>best estimate</u> for the probability of death**	
50 ug/dL				
75 ug/dL				
100 ug/dL				
125 ug/dL				
150 ug/dL				
200 ug/dL				
300 ug/dL				
400 ug/dL				
500 ug/dL				
600 ug/dL				
700 ug/dL				

These columns do NOT need to sum to 100; any probability may be appropriate for any box

Any comments or sources for what are you thinking about as you answer?

Defined quantitative, functional relationships of model terms

Model Output – Lead Abatement

			Golden eagle mortality rate prediction by % of gut pile removal								
% Sims	0	10	20	30	40	50	60	70	80	90	100
20	1.18%	1.08%	0.96%	0.83%	0.69%	0.54%	0.38%	0.19%	0.05%	0.00%	0
30	1.54%	1.39%	1.23%	1.07%	0.89%	0.70%	0.50%	0.27%	0.08%	0.00%	0
40	1.96%	1.77%	1.57%	1.36%	1.13%	0.90%	0.65%	0.36%	0.11%	0.01%	0
50	2.51%	2.27%	2.01%	1.74%	1.45%	1.15%	0.83%	0.48%	0.17%	0.01%	0
60	3.23%	2.91%	2.56%	2.21%	1.86%	1.49%	1.09%	0.64%	0.23%	0.02%	0
70	4.22%	3.82%	3.38%	2.94%	2.45%	1.95%	1.42%	0.87%	0.33%	0.03%	0
80	5.93%	5.42%	4.83%	4.15%	3.46%	2.76%	2.04%	1.25%	0.52%	0.07%	0

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Graphic User Interface with REA

AutoSave Off GOEA_Lead mitigation tool_Final.xlsx -... Search Taber Allison

File Home Insert Page Layout Formulas Data Review View Automate Help XLSTAT

A3 Unit 1

MODEL INPUTS

1. What is the size of the hunting unit (in square miles)?				
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
1428	143	1428	0	0

2. How many golden eagles do you expect there to be feeding within the hunting unit?				
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
61	25	61	0	0

3. How many large ungulates have been harvested within the hunting unit?				
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
2000	90	573	0	0

4. Which management units will be used for mitigation?				
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
Yes	Yes	Yes	No	No

5. What is the expected take per year for the permit?	1

6. Hit F9

MODEL OUTPUTS

The response in the tables represent the percentage of copper bullets needed to offset the expected take.

50th Percentile		Years of Permitted Take		
		1	5	30
Years mitigation effort	5	6%	30%	NA
	10	3%	16%	70%
	30	1%	7%	30%

20th Percentile		Years of Permitted Take		
		1	5	30
Years mitigation effort	5	13%	61%	NA
	10	7%	33%	NA
	30	3%	14%	61%

80th Percentile		Years of Permitted Take		
		1	5	30
Years mitigation effort	5	3%	14%	59%
	10	2%	7%	31%
	30	1%	3%	14%

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Summary

- Expert Elicitation is a useful tool for developing models to evaluate risk and mitigation benefits when available data are insufficient to support decision-making
- Expert-constructed models are hypotheses that drive more efficient research to reduce uncertainties (Carcass Removal: Slater et al. 2022. JWM; Lonsdorf et a. 2023. JWM)
- Vehicle strike and lead abatement models have been provided to USFWS for consideration in new Eagle Rule
  - **REWI has worked with industry partners and USFWS to estimate mitigation credits for both lead abatement and carcass removal mitigation in Eagle Permit Applications**
  - **Lead abatement program approved for two projects in Region 1**
  - **Mitigation must be repeated, unlike power pole retrofitting**

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- Deepak Ray, University of Minnesota

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- **Bruce Rideout – San Diego Zoo**
- Matt Stuber – U.S. Fish and Wildlife Service

Thank You & Questions Welcome