RESULTS SUMMARY

August 22, 2018

Compensatory Mitigation for Golden Eagles: Reducing Vehicle Collisions

The current U.S. Fish and Wildlife Service Eagle Rule requires that any permitted take (killing, wounding, or disturbing) of golden eagles must be offset by reducing eagle mortality from another source, or by increasing eagle productivity, by 1.2 eagles per 1 eagle taken.

Power pole retrofitting to reduce eagle electrocutions is the principle method used by wind energy companies to offset permitted take, but other options can be considered in eagle take permit applications if they are quantifiable and verifiable. Eagles are at risk of being killed by vehicles as they scavenge on roadkill. It is estimated that vehicle collisions are responsible for ~1% of annual golden eagle mortality in the western United States. AWWI and collaborators evaluated removal of roadkill as an additional compensatory mitigation option by developing a model that estimates the number of golden eagles that can be saved through this approach.

The full paper is published in the *Journal of Wildlife Management* and is **available online**.

ABOUT THE MODELING APPROACH

The authors developed an approach to evaluate a method for reducing vehicle collisions with golden eagles using data collection, modeling, and expert judgments. The resulting model represents relationships (and accounts for uncertainty) between the ecological components that scientists believe are most influential to eagle-vehicle collisions. The research team also assessed the plausibility and practical value of the model.

KEY TAKEAWAYS

- Initial analyses suggest that **eagle deaths from vehicle collisions could effectively be reduced through targeted road carcass removal efforts**, depending on certain parameters (number of carcasses, traffic volume, and background removal).
- **Road carcass removal may be a relatively easy and economical way to offset predicted unavoidable take of eagles at wind energy facilities** instead of, or supplementing, power pole retrofitting efforts.

NEXT STEPS

- The authors recommend prioritizing research to update certain parameter values (i.e., the relationship between eagles and carcasses) to increase the reliability of predictive modeling and specific mitigation values.[i] Updating should reduce uncertainty in the model's parameter values and predictions. It may also improve the model's underlying assumptions and prediction accuracy.
- The model is available to use as a proposed compensatory mitigation method in Eagle Conservation Plans at wind energy facilities.

[i]For example, U.S. Department of Interior biologists are pilot-testing video and radar methods to quantify eagle scavenging by eagle age, carcass types and locations, local eagle density, and traffic volume and speed.

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

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STUDY DESIGN

The authors worked with a team of eight golden eagle experts to develop parameters for a model that uses simulations to estimate how many golden eagles are killed by vehicle collisions while scavenging on roadkill carcasses. Overall collision risk to eagles in a defined area is a function of the number and size of carcasses, the number of days each carcass is available for scavenging (adjusted for carcass removals by road crews), the density of eagles, the volume of traffic, and the per-vehicle likelihood of collision for a scavenging eagle. The model quantifies these cause-effect relationships.

To assess if the model was plausible, the authors used it to predict eagle mortality from vehicle collisions in Wyoming. They developed a framework for reducing collisions through road carcass removal that is scientifically defensible, accounts for uncertainty, and is efficient. The model was then used to compare how mitigation credits per removal effort may vary based on traffic volume, eagle density, and background carcass removal scenarios.

STUDY RESULTS

The model simulations predicted that as roadkill carcass numbers increase, so does eagle mortality. All else being equal, increasing carcass density caused eagle mortality to increase most at relatively low amounts of traffic. Increasing from 0 to 5 carcass removals per month resulted in a 30% reduction in eagle mortality caused by collisions regardless of vehicles per hour (vph). The model predicts a limit to the efficacy of removal efforts; if carcasses are removed every day, 15% of the originally predicted mortality would still occur.

The model could be used to plan strategic removal programs, with credits awarded based on actual carcass removals. Potential mitigation credits could be dependent on expected carcasses encountered, traffic volume, and the current removal intervals from maintenance crews or other activities.

The model results indicated that increasing carcass availability in a given area results in increasing variation in expected mortality. Uncertainty in the time eagles spent scavenging per day the carcass was available had a greater influence on mortality probability than the number of days the carcass was available or the age ratio of eagles scavenging. However, the effect of vph and removal intervals on relative mortality were not affected by uncertainty in scavenging behavior.

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