



Game Bird Carcasses Are Less Persistent Than Raptor Carcasses, But Can Predict Raptor Persistence Dynamics

A study supported by the Renewable Energy Wildlife Research Fund evaluated the relationship between game bird and raptor carcass persistence to estimate carcass persistence probability when using game birds more accurately as surrogates for raptors in carcass persistence trials.

Post-construction fatality monitoring (PCFM) is an important tool to understand wind energy impacts to eagles, and accurately estimating the rate of fatalities at an operating wind facility requires that researchers account for sources of imperfect carcass detection: observer efficiency and carcass persistence. Because eagles and other large raptors are difficult to obtain for carcass persistence trials (CPTs), estimates of carcass persistence often rely on trials that use game birds as surrogates. However, game birds consistently have shorter persistence times than large raptor carcasses, which can ultimately lead to an overestimation of eagle fatalities. Accounting for this bias in fatality rates benefits wind companies, wildlife agencies, and other stakeholders by increasing the likelihood that mitigation measures match the true level of take.



STUDY OBJECTIVES

To better evaluate and account for differences in persistence rates between raptor and game bird carcasses, this study pursued three specific objectives:

- 1) Estimate and compare carcass persistence rates between raptors and game birds using experimental field trials.
- 2) Evaluate persistence patterns across regions, habitats, and seasons, using a meta-analysis; and
- 3) Develop a model that can be used to better estimate raptor carcass persistence from game bird persistence trial data.

EVALUATING PERSISTENCE PATTERNS

To meet the first objective, researchers conducted one year of carcass persistence field trials using both game bird and raptor carcasses at six wind facilities across four U.S. Fish and Wildlife Service Regions. Study sites represented several habitat types (e.g., grassland, forest). Field trials were conducted in-person and using game cameras in locations that were too remote, but data collection was otherwise standard between sites with checks scheduled every seven days at in-person sites and a 56-day trial period implemented across all sites. To evaluate patterns in carcass persistence across regions, habitats, and seasons, the team compiled available data from post-construction monitoring projects from 2010 to early 2021. Unlike the field trial, CPT collection methods (e.g., trial duration, collection intervals, number of carcasses) varied widely for the data included in the meta-analysis. Raptor persistence was modeled separately from game bird persistence for the first two analyses. Across analyses, raptor carcass persistence rates were consistently higher than game bird persistence across all regions and landscapes.



PREDICTING RAPTOR PERSISTENCE

To meet the third objective, investigators selected data from wind energy sites that used both game birds and raptors in CPTs. Using these data, the team created linear mixed-effects models predicting raptor average probability of persistence from gamebird persistence probability, based on several factors. The top model suggested a strong positive relationship between raptor and game bird average probability of persistence, while accounting for season, USFWS Region, and habitat. The team validated the top model using random, stratified cross-validation which revealed that model-predicted raptor average probability of persistence was consistently higher than the actual raptor probability of persistence. However, this difference was minimal and suggested that the model could predict raptor persistence from game bird persistence data with a reasonable degree of accuracy.

KEY TAKEAWAYS

- Large raptor carcasses persist significantly longer on the landscape than game bird carcasses.
- In the absence of species-specific persistence data, researchers should use reasonable surrogates (i.e., large raptors) for CPT whenever possible to measure persistence bias and improve the accuracy of the resulting fatality estimates.
- Logistical challenges necessitate the use of game birds as surrogates for large raptors in carcass persistence trials, but doing so can lead to inflated eagle fatality estimates, if not adjusted.
- The scaling model used provides a statistical tool to address gaps in raptor persistence data at sites broadly and should be used to inform fatality estimation when for sites relying on game birds for CPTs.



NEXT STEPS

- A model to predict raptor carcass persistence rates from game bird CPT could be further strengthened and more broadly applicable by using additional carcass persistence trial data from combinations of other limited datasets.
- Developing a simple analysis tool incorporating the model used here would enable researchers to scale existing game bird persistence probabilities to raptor persistence probabilities, allowing more accurate fatality estimates for raptors and eagles across a wide range projects.

CITATION

Hallingstad E, Riser-Espinoza D, Brown S, Rabie P, Haddock J, Kosciuch K (2023) Game bird carcasses are less persistent than raptor carcasses, but can predict raptor persistence dynamics. PLoS ONE 18(1): e0279997. <https://doi.org/10.1371/journal.pone.0279997>