Rehabilitated Raptors serve as Mitigation Tool for incidental Take.

"Dead-Birds Flying" Can Rehabilitated



Raptors Mitigate Anthropogenic Mortality?

Figure 2. Map depicting total admissions of injured or diseased raptors in USA from 2013-2023. Lighter colors indicate relatively fewer birds admitted, darker colors indicate larger volume of admissions, from 492 facilities.



Releases: 75,657

Admissions: 335,328

Figure 1. The numbers of North American raptors injured or diseased admitted to (blue) and released (green) from 492 rehabilitation facilities 2013-23.

Intro

- Human-caused raptor injury & mortality are significant Offsetting human-caused

Methods

- 45 years banding data
- 17 species of raptors 2.
- Mark-recovery models 3.
- Sample = 2.03 mil birds

0.3 - 0.2	2-yr 3-yr 4-yr	1-yr 2-yr 3-yr 4-yr	exemplify patterns where rehab birds survival ≠ wild
Family	Dead bird flying ≠	Dead bird flying ≈ Wild	birds (A), and
	Wild		rehab = wild birds
Accipiter	NOGO*, SSHA*	СОНА	(B), respectively.
Buteo	RTHA	BWHA, RSHA, SWHA*	The table summarizes these patterns for all 17 species evaluated. *Species estimates with large variance
Eagle		BAEA, GOEA	
Falcon	MERL*	AMKE, PEFA	
Owls	BADO	BANO, EASO, GHOW, WESO*	



Figure 4. A 30-yr projection of additions to wild populations (only showing 8 of 17 species) from sustained releases of rehab raptors modeled where survival of rehab approximates wild (solid line) or not (dashed line). From 24 facilities (2%) of the 1,027 permitted facilities across the coterminous USA. Release numbers were based on observed average annual releases. Proportion additivity averaged 0.21% (range = 0.02 to 0.77%), with K-selected (i.e., long-lived, low reproductive output) species typically exhibiting largest effects.

3.6	
•	
3.2 -	



mortality legally required Rehab facility admission steadily increasing releases:

avg = 37% annually

- Lack of research on postrelease rehab birds
- Need for mitigation options

Objectives:

1) Estimate Survival (Ŝ) of "dead-birds flying" 2) Plug Ŝ into population models

Evaluate contribution to wild

3) Quantify mitigation ratios

Results

- Releases add to wild populations
- 12 of 17 species Rehab $\hat{S} \approx \text{Wild } \hat{S}$ First year \hat{S} rehab < \hat{S} wild
- Second year+ \hat{S} rehab = \hat{S} wild
- Population additivity all 17 species
- Mitigation ratio >1:1 for 16 species

Discussion

- Our results based **ONLY** 2% of all facilities
- K-selected species large effect
- Small % increase in population
- = sustained population growth (Eagles)
- Next steps: Quantify causality
- Eagle focused evaluation
- Resource Equivalency Analysis



Figure 5. Mitigation ratios for after-first-year (AFY) wild raptors in the conterminous USA developed from survival of banded birds released between 1974 – 2018. Ratios >1:1 (bold line) suggest >1 rehabilitated raptor is needed to offset the loss of a wild-bird related to anthropogenic mortality. *Example:* Golden Eagle, S_{T1} Rehab (0.466) / S_{T1} Wild (0.789) = 0.590, and 1/0.590 = 1.69 rehab per AFY wild golden eagle

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