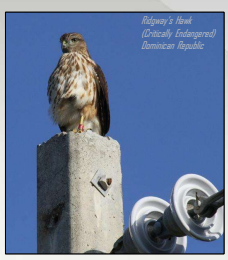
WILDLIFE PROTECTION AND RELIABILITY THROUGH GRID PLANNING AND DESIGN

CONSERVACION Y CONFIABILIDAD MEDIANTE EL DISENO DE LA RED ELECTRICA



IAIA Regional Symposium:
Infrastructure & the Environment
Antigua, Guatemala | 7 Nov. 2024

Duncan Eccleston & Rick Harness
EDM International, Inc.
Fort Collins, Colorado, USA
deccleston@edmlink.com
+01 970-481-1836

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1 INTRODUCTION AND OUTLINE

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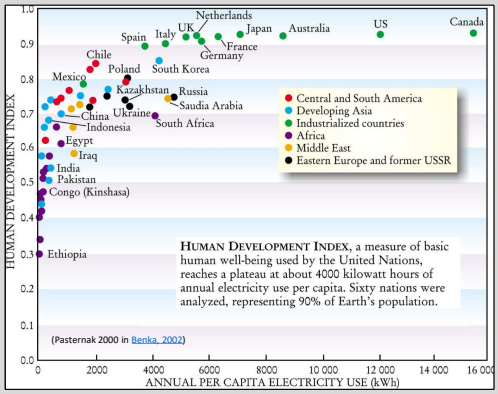
Power-Prosperity Correlation



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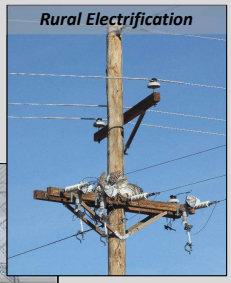
Accelerating Development Trends



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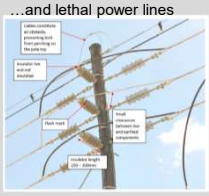
Funding…With Safeguards

INTERNATIONAL BEST PRACTICES

- IFC PS1, PS6
- World Bank ESS1, ESS6
- Equator Principles
- All energy projects have potential for avian/wildlife impacts.
- Assess potential avian-power line interactions during scoping
- Manage risks through targeted prevention/ mitigation/ offsets to meet funding obligations and optimize operational performance

South African wind farm w/ AF siting…

…and lethal power lines



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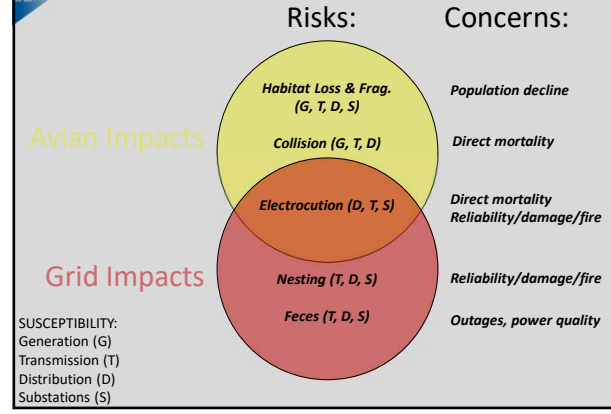
Avian-Grid Context



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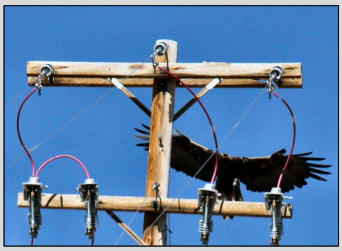
Learning Goals

AN INTRODUCTION TO WILDLIFE-FRIENDLY, HIGH PERFORMING SYSTEMS

- Basic awareness of wildlife electrocution risk in Latin America
- Basic understanding of impacts for birds and electrical systems
- Conceptual grasp of prevention through planning and design
- Access to resources for better projects



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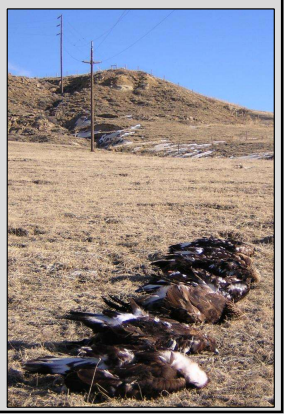
Presentation Outline

1. Introduction and Outline
2. Wildlife Electrocution
3. Latin American Context
4. Opportunities and Recommendations
5. Resources



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2 WILDLIFE ELECTROCUTION

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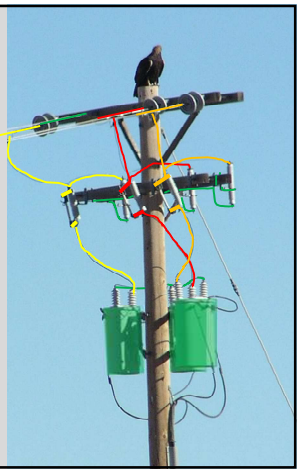
Mechanism

ANIMAL AS ENERGY PATHWAY



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Global Biodiversity Impacts

EXAMPLES, NOT A COMPREHENSIVE LIST

Common Name	Scientific Name	Electrocution	IUCN Status	Continent
Martial Eagle	*Polemaetus bellicosus*	Yes	Near Threatened	Africa
Cape Vulture	*Gyps coprotheres*	Yes	Vulnerable	Africa
White-backed Vulture	*Gyps africanus*	Yes	Endangered	Africa
Egyptian Vulture	*Neophron percnopterus*	Yes	Endangered	Africa
Lappet-faced Vulture	*Torgos tracheliotos*	Yes	Vulnerable	Africa
Blakiston's Fish-Owl	*Ketupa blakistoni*	Yes	Endangered	Asia
Eastern Imperial Eagle	*Aquila heliaca*	Yes	Vulnerable	Asia (primarily)
Saker Falcon	*Falco cherrug*	Yes	Endangered	Asia (primarily)
Spanish Imperial Eagle	*Aquila adalberti*	Yes	Vulnerable	Europe
Red Kite	*Milvus*	Yes	Near Threatened	Europe (primarily)
Orange-breasted Falcon	*Falco deiroleucus*	Yes	Near Threatened	South America

BirdLife International 2012. Species reports. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. <www.iucnredlist.org>. Downloaded on 19 September 2013. Search strategy: keywords = buzzard, condor, eagle, falcon, harrier, hawk, kite, lammergeier, osprey, owl, and vulture. Excluded species of least concern and data deficient species. Searched each remaining species page for the word "power" as in power line collision or power line electrocution.

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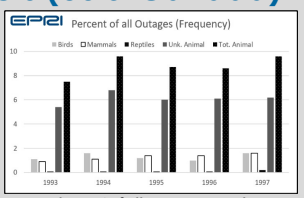
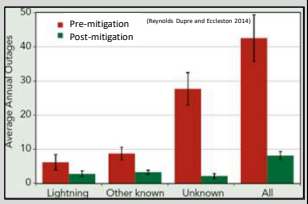
Reliability Impacts (US & Canada)

- Electrocutions are a leading outage cause (~9%) behind (typically):
  - Weather
  - Vegetation
  - Equipment failure
- US utility reduced outages by 70% through electrocution mitigation (Rogers et al. in press)
- Biodiversity impact MUCH greater than outages because only 6 (Kemper 2013) to <10% (Dwyer 2010) of electrocutions cause power outages



...plus ~9% of all outages are unknown



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Equipment Damage

https://www.youtube.com/watch?v=u_bylq6hlKI

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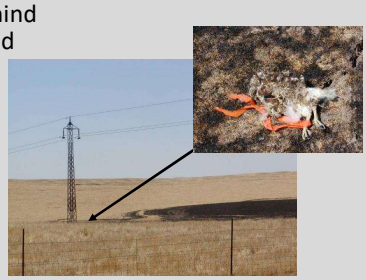
Wildfire

CALIFORNIA PUBLIC UTILITIES COMMISSION (2014-2023)

- 73 of 594 utility ignitions/year (12%) from wildlife.
- 3rd leading cause behind equipment failure and vegetation.



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3 LATIN AMERICAN CONTEXT

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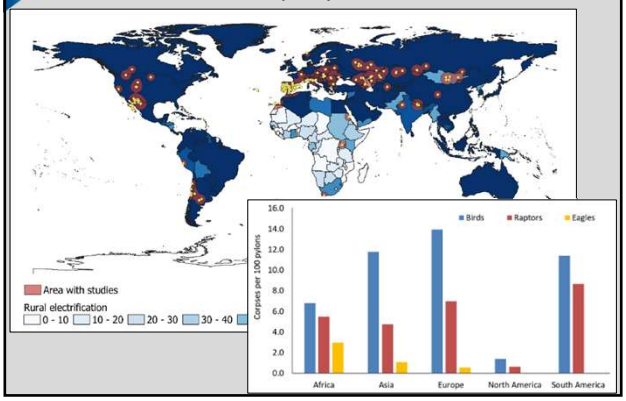
Avian Electrocution Worldwide

GUIL AND PEREZ-GARCIA (2022)



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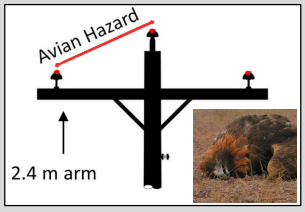
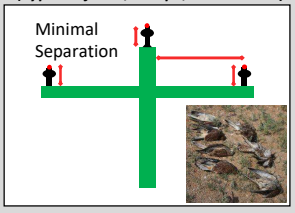
Design & Materials Influence Risk

WOOD POLES VS. CONCRETE PYLONS

Wood Pole & Arm
(Typical of US/Canada)



Grounded (Metal/Concrete) Pylon & Arm
(Typical of Asia, Europe, & Elsewhere)



(Eccleston and Harness 2018)

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Prevention: Safe Clearances

EXAMPLE: GOLDEN EAGLE

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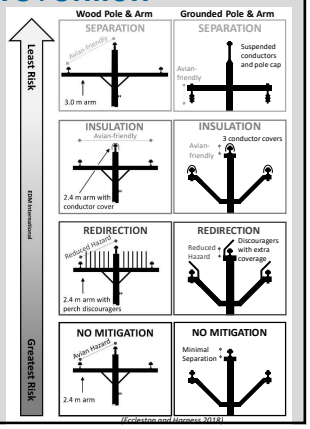
Mitigation and Prevention

CREATE SAFE PERCHES

- Redirection: shift perching to safer location (not reliable)
- Insulation: strategic cover-up (requires maintenance)
- Separation: preferred approach is durable and reliable (project design)



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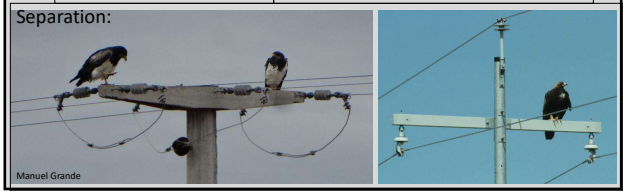
Practical Examples

Redirection:

Insulation:

Separation:



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Known LatAm Biodiversity Impacts

…JUST SCRATCHES THE SURFACE

Common Name	Scientific Name	Electrocution	IUCN Status
Reddish Egret	*Egretta rufescens*	Yes	Vulnerable
Ridgeway's Hawk	*Buteo Ridgwayi*	Yes	Critically Endangered
Harpy Eagle	*Harpia harpyja*	Yes	Vulnerable
Andean Condor	*Vultur gryphus*	Yes	Vulnerable
Crowned Solitary Eagle	*Buteogallus coronatus*	Yes	Endangered
Orange-breasted Falcon	*Falco deiroleucus*	Yes	Near Threatened

(Rebolo-Ifran et al. 2022, Dwyer et al. 2019)

- Examples of sensitive species w/ documented electrocution
- ***Which*** sensitive species are electrocuted in LatAm is unknown.
- We only know that sensitive species ***are*** being electrocuted!

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Ridgeway's Hawk

DOMINICAN REPUBLIC (DWYER ET AL. 2019)

- Endemic and Critically Endangered (pop 300-40)
- 2011-2014: ≥10/40 (25%) captive-raised birds electrocuted
- 2015: 101 poles mitigated with insulated
- 2015-16: 2/55 (4%) electrocuted, both due to installation errors
- Mitigation far more costly than better system design

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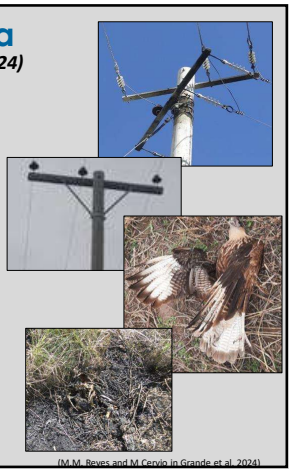
Crested Caracara

ARGENTINA (GRANDE ET AL. 2024)

- Common species, but no records of electrocution prior to 2019.
- Argentina transitioning from wood to concrete/metal structures
- 3 records of electrocution (incl. ignition), 2019-23, all on grounded structures
- Smaller species newly susceptible to electrocution on grounded structures
- Presumed impacts to uncommon species



(M.M. Reyes and M Cervio in Grande et al. 2024)

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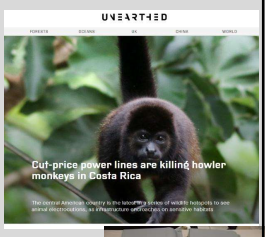
Howler Monkeys

GUANACASTE, COSTA RICA

- 1995-2007: population decline >50% (Sanchez 2007)
- Electrocution major cause: 789 in 5 years in Tempisque conservation area.
- 2019 Ministry report: 4K in 5 years, directive to prevent.
- Mitigation specific to species size and habits
- Cost a barrier to mitigate—PREVENTION PREFERRED



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4 OPPORTUNITIES & RECOMMENDATIONS

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The Vision

DEVELOPMENT PROJECTS AS CONSERVATION VEHICLE

- Finders flag potential risks to biodiversity
- Risk assessment focuses prevention and mitigation
- Capacity building grows local skills and investment
- Monitoring drives adaptive management, demos high line performance
- Performance and conservation is a strong case for wider adoption

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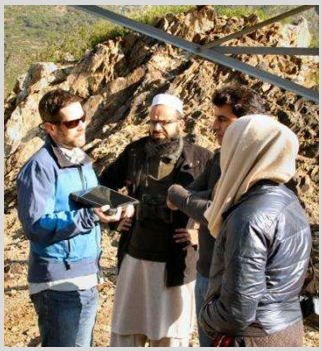
Implementation

BASIC PROCESS

- Identify species at risk (size, behavior, utility records)
- Identify sensitive species and habitats; if biodiversity-driven, focus prevention there
- Assess risks posed by typical construction standards
- Cooperatively develop alternative, wildlife-friendly standards, for example:
  - Suspension insulators
  - Extra insulation
  - Equipment protection
- Conduct hands-on testing to select preferred products
- Train field personnel for successful installation



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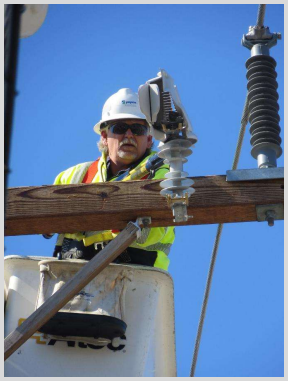
Lessons Learned

SUCCESS DEPENDS ON HIGH STAKEHOLDER INVOLVEMENT

- Leadership by individuals with broad and deep experience in:
  - Wildlife behavior & habitats
  - Power line engineering & operations
  - Electrocution mitigation
- Support from national wildlife experts
- Active participation by utility engineers and project personnel
- Open-minded power line field personnel (linemen)
- Patience and goodwill from all stakeholders



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Electrocution Risk Avoidance

A GENERATIONAL OPPORTUNITY

- Avoidance is very effective
- Avoidance is inexpensive
- Avoidance can improve system performance
- Avoidance requires awareness and planning
- Project funders have the information and levers to implement solutions

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5 ADDITIONAL RESOURCES

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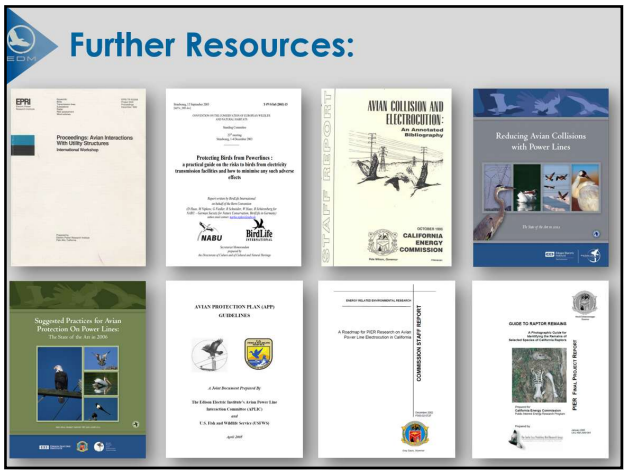
Further Resources:
Proceedings: Avian Interactions With Utility Structures
International Workshop
Protecting Birds from Powerlines :
a practical guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects
NABU
BirdLife INTERNATIONAL
STAFF REPORT
AVIAN COLLISION AND ELECTROCUTION:
An Annotated Bibliography
CALIFORNIA ENERGY COMMISSION
Reducing Avian Collisions with Power Lines
Suggested Practices for Avian Protection On Power Lines:
The State of the Art in 2006
AVIAN PROTECTION PLAN (APP) GUIDELINES
COMMISSION STAFF REPORT
GUIDE TO RAPTOR REBAND
PIER Public Interest Energy

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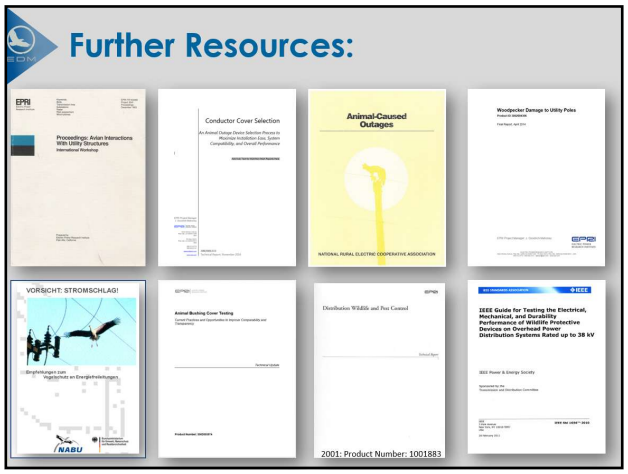
Further Resources:
Proceedings: Avian Interactions With Utility Structures
International Workshop
Conductor Cover Selection
Animal-Caused Outages
NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION
Woodpecker Damage to Utility Poles
VORSICHT: STROMSCHLAG!
Einrichtungen zum Vogelschutz an Energieleitungen
NABU
Animal Bushing Cover Testing
Distribution Wildlife and Pest Control
IEEE Guide for Testing the Electrical, Mechanical, and Durability Performance of Wildlife Protective Devices on Overhead Power Distribution Systems Rated up to 38 kV
IEEE Power & Energy Society
2001: Product Number: 1001883

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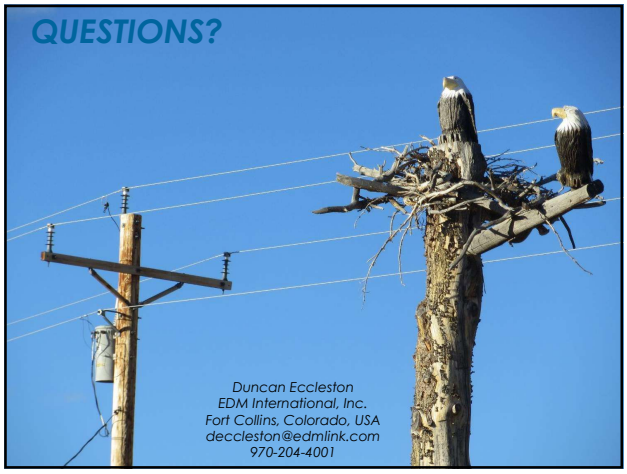
QUESTIONS?
Duncan Eccleston
EDM International, Inc.
Fort Collins, Colorado, USA
deccleston@edmlink.com
970-204-4001

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