Ecoregional Conservation Strategies for Golden Eagles in the Western United States

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Photo: Sky DeLight
Presentation outline

• What is the Western Golden Eagle Team (WGET)?
• Regulatory context
• Golden eagle predictive models: development and use
• Informational resources and risk assessments
• Putting information together: Conservation assessment and strategies
Western Golden Eagle Team

• Established in response to increased regulatory and conservation issues due to renewable energy development

• Included FWS employees from four western regions
Co-authors and Collaborators

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Regulatory context

• Migratory Bird Treaty Act (MBTA) - 1916
• Bald and Golden Eagle Protection Act (BGEPA) - 1940
• Eagle Conservation Plan Guidance (ECPG) - 2013
  – Staged approach to conserving eagles during all phases of wind energy development
  – Currently for wind energy development, but being updated to apply to other activities
• Eagle Rule – revised in 2016
• WGET’s role: To develop a suite of science-based products for use in project siting (ECPG Stage 1) and strategic compensatory mitigation (Stage 4)
WGET Goals

• Provide risk assessment and decision support tools for renewable energy development and mitigation
• Develop landscape-scale strategies for Golden Eagle conservation
• Collaborate with State and Federal agencies, Flyways, research institutions, industry, Tribes, NGOs

Photo: Gary Williams, USFWS
WGET Approach

1. Predictive Models of Golden Eagle distribution and relative abundance during all seasons
2. Spatially explicit evaluation of risk factors
3. Information Resources to support management of Golden Eagles and their prey
4. Incorporate 1–3 into Ecoregional Conservation Strategies
Predictive models

Breeding Habitat

Wintering Areas

Movement & Migration
Breeding Models: Nest Data

- Assembled database from State & Federal agencies, NGOs, researchers, consultants
- 150+ data sets; 131,000+ nest records and counting...
Objective: Reliable prediction of relative habitat suitability (relative density of use) at the scale of breeding territory

Environmental variables:
- terrain, aspect, elevation
- land cover
- primary productivity (NDVI)
- climate
- anthropogenic features
- orographic uplift, thermals

**Models are not a substitute for project-level monitoring**
Breeding Models

Northern Great Basin

NW Plains

WY and Uinta Basins

Central Basin and Range

Southwestern Plains

Columbia Plateau

CA Foothills*

Interior Montane*

SW Plateaus*

SW Deserts*

*Draft models

Partners: Jeffrey Dunk & Dave LaPlante, Humboldt State University
Jason Tack & Barry Noon, Colorado State University
• 28 collaborators
• ~ 800 individual Golden Eagles tracked
• 4,960,946 locations

Always looking for more...
**Winter Model**

**Data Sources:**
- California Avian Data Center area searches
- Rocky Mountain Avian Data Center surveys
- eBird (AKN datasets - filtered appropriately)
- USFWS Mid-winter Bald Eagle survey
- Very course analysis of winter habitat use!
- Aggregated data by 10-km x 10-km cell
Using habitat models for conservation planning

Breeding habitat

Winter habitat

Movement and Settling habitat
Habitat Management and Mitigation

Information resources for landscape-specific management of Golden Eagles

• Prey resources
• Nest sites, nest survival
• GRSG/GOEA overlap
• Limiting factors
Spatially Explicit Evaluation of Risk Factors

Objective: Support prioritization and effectiveness of mitigation efforts

Evaluation and predictive modeling of stressors:

- Electrocution
- Contaminants
- Collisions on roads
- Disturbance
- Disease and parasites
Risk Assessment

Risk = (Hazard) × (Exposure) × (Vulnerability)

High Risk

Low Risk
Predictive Model of Electrocution Hazard

- Model power pole density as surrogate for electrocution hazard
- Increased PPD correlated with increased complexity of equipment (= hazard)

Partners: James Dwyer, Rick Harness; EDM International
Electrocution and Mitigation

- Review and Synthesis of Research Investigating and Mitigating Golden Eagle Electrocutions
  
  Mojica et al. 2017

- Power Pole Density Informs Spatial Prioritization for Mitigating Avian Electrocution
  
  Dwyer et al. 2016

- Avian Electrocution Risk Assessment Predictive Model
  
  EDM International, 2015

- Avian Electrocutions on Incorrectly Retrofitted Power Poles
  
  Dwyer et al. 2017

Partners: EDM, APLIC, Powder River Electric Corp.
Wildfire Risk in the Northern Great Basin

Oranges: Higher-risk areas
Blues: Lower-risk (lack of GOEA)
Greens: Lower-risk (lack of hazard)

(from Tack and Fedy 2015)
Wind Energy Risk in the Northern Great Basin
Risk of Lead Exposure

Deer/Elk Harvest by Game Management Unit (animals/km² 5-year average)

Fall paths of 79 PTT-tagged Golden Eagles originating in Alaska and northern Canada

Represents relative risk of Pb exposure during fall hunting season

Partners: Matthew Lau, James Graham, Jeffrey Dunk; Humboldt State University
Risk of Lead Exposure, cont.

• Issues with recreational shooting:
  - Shooting ground squirrel/marmots species is minimally regulated
  - No bag limits exist
  - Carcasses typically not retrieved
  - Typically occurs from Feb – Aug (GOEA nesting season)

• Opportunity for focused lead remediation through carcass removal and/or non-toxic ammunition.
Golden Eagle
Ecoregional Conservation Strategies

• Combine ecoregion-specific models, risk assessments and information resources
• Developed with collaboration by State and Federal agencies, Flyways, research institutions, industry, Tribes, NGOs
• In progress: Northern Great Basin, Wyoming and Uinta Basins, Central Basin & Range, Northwestern Plains, Southwestern Plains
• When complete: Available online through ECOS-ServCat, USFWS WGET website
Conservation Assessments / Strategies

- Rob Spaul, Boise State University
- Bryan Bedrosian, Teton Raptor Center
- Zach Wallace, WYNDD
- Geoff Bedrosian, USFWS - WGET
- Neil Paprocki, HawkWatch Int’l
- Central Basin and Range
- Wyoming Basin
- Northwestern Great Plains
- Snake River Plain
- Northern Basin and Range
- High Plains
- Southwestern Tablelands
Assessment Outline

1. **Intro to Ecoregion**
   - Boundaries, features, climate, land use, etc

2. **GOEA Population Summaries** (WGET products, literature review, WGET supported studies, etc)
   - Breeding
   - Movements & Migration
   - Winter Ecology & Distribution

3. **Population Ecology**
   - Status & Trends
   - Limiting Factors

4. **Conservation Strategy**
   - Risk Assessments
   - Conservation Measures
Summary

- Predictive models can help identify areas of potential conflict between golden eagles and human activities.
- Predictive models can be excellent planning aids, but are not a substitute for site-specific surveys/monitoring.
- Overlaying predictive models of hazard models can be an effective strategy for prioritizing conservation actions.
- WGET website coming soon!!
Questions?