Monitoring Abundance of Golden Eagles in the Western United States

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Introduction

- Background
- Survey Protocol
- Statistical Methods
- Results
- Relevance to Wind Energy Development

12/2012
Background

- Bald and Golden Eagle Protection Act
  - USFWS can authorize ‘take’ if it is compatible with the preservation of the species.
    - Need for baseline information, yearly status, and trends
- USFWS released RFP in 2003.
Objectives:

Monitor the GOEA population in 4 BCRs

- Estimate yearly status
- Trends in GOEA abundance
  - 80% power to detect an average of a 3% decline per year over a 20-yr period using a 90% CI

- Monitor juvenile abundance
Background

- Survey began in 2003
- Re-started in 2006
- Same sample of transects and methodology 2006 – 2010, and 2012
- Temporary deviation in 2011
- Study area >1,962,000 km²
- 2 crews
- >17,500 km of transects
- Aug 15 to Sept 15
Doubled effort
Survey Protocol

- Cessna 205/206
- Gentle terrain = 107 m AGL
- Rough terrain = 150 m AGL
Survey Protocol

- 2 observers on right side, 1 back-left
- Mark-recapture on the right side to estimate P[detection]
Survey Protocol

- Flights begin at first light
- Last transect no later than 12:30 pm
- Same general route(s) each year
  - Transects are generally flown ~ same date each year
Survey Protocol

- Consistency since 2006
  - Route
  - Protocol
  - Observers
  - 2-3 days of training each year
  - Pilots/Aircraft
Survey Protocol

- All GOEA seen on transect are recorded
Survey Protocol

- All GOEA seen on transect are recorded
  - Flying or perched
  - Group size
  - GPS location
  - Observer
  - Age class
  - AGL
Statistical Methods

- Density is estimated via standard methods.

- Separate detection functions and density estimates for various types of observations:
  - Flying vs. Perched birds
  - AGL
  - Observer position
Statistical Methods

- Trends are estimated via fitting a Bayesian hierarchical model to counts along transects using MCMC.

\[
\log \left[ \lambda_{ijt} \right] = \log(\text{length}_{ijt}) + BCR_i + \gamma_i (t - t^*) + \delta_{it} + \omega_{ij} + \varepsilon_{ijt}
\]

- 2003 NOT Included in Trend Analysis
Results: 2006 - 2011
Trend = 0.075 (90% CI: -0.009 to 0.168)
Trend = 0.053 (90% CI: -0.032 to 0.142)
Trend = -0.011 (90% CI: -0.111 to 0.080)
Trend = 0.027 (90% CI: -0.064 to 0.114)
Total Study Area

Trend = 0.036 (90% CI: -0.080 to 0.151)
The most current survey report is available online at the following web address:

http://west-inc.com/wildlifesurveys.html
Results

- Evaluation of consistency with BBS trends:

Relevance to Energy Development

- Take permitting will likely be based on population sizes and trends within BCRs.

- Monitoring trends in larger population(s) helps identify whether ‘floaters’ (i.e., replacements) are available to maintain viable local/regional/… populations.
Relevance to Energy Development

- Best methods for estimating population size including non-breeders, floaters, and juveniles.
  - Telemetry and nesting surveys do not tell the entire story

- Replicated at the project-level in WY.

- BLM is replicating the survey on a smaller scale in eastern MT and western Dakotas.

- Potential pilot study in the DRECPA in 2013
DRECPA Pilot Study - 2013

Issues to Consider for DRECP Area
• Small area (compared to Western Wide)
• Low density of GOEA
• Timing of survey(s)
• Access restrictions
  • DOD, NPS, et….

Considerations for DRECP Area
• Increase sample size (i.e., greater density of transects)
• Conduct survey at different times of year
  • Early breeding (Jan/Feb?)
  • Post-fledging ~ same as Western Wide survey (August?)
• Potentially fly two surveys back to back during each period
The End