Estimating Abundance of Golden Eagles in the DRECP Area 2013
Introduction

- Summer of 2013 the CEC funded a proposal to conduct aerial surveys for golden eagles in the DRECP area (~9,172,281 ha)
Objectives

• Estimate GOEA abundance (including non-breeders, floaters, and juveniles) in the DRECP area using methods developed for the western-wide survey.

  — Post-fledging survey: 31 July – 6 August.


• Full analysis of the results will be completed in June 2014.
Methods

• Sampling Effort:
  – Desired precision was not identified.
  – Budget allowed for a target of 2,700 km of transects
  – Systematic sample of 50-km long transects covering the area.
  – Transects were 50 km apart east-west and 25 km apart north-south.
Methods

Proportion of area surveyed was ~3 times greater than the western-wide golden eagle survey.
Methods

• Limitations on access
  – Many of the transects overlapped DOD or NPS lands.
  – Unable to fly 135 km of transects during summer survey (5%)
  – Unable to fly 241 km during the winter survey (9%)
Methods

We followed the protocol developed for the western wide golden eagle survey conducted 2003, and 2006 – 2013.


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

Gentle terrain = 107 m AGL
Methods

Rough terrain = 150 m AGL
Methods

- 1 back-left observer
- 2 observers on right side
- Mark-recapture on the right side to estimate $P[\text{detection}]$
Methods

• Flights began at first light
• Flights finished by 11:30 in summer and 13:00 in winter
• Record flight path (every few seconds)
  – Major habitat changes (AGL) for post-stratification of analysis
• Golden eagles seen
  – Observer
  – Activity
  – Group size
  – GPS location
  – Age class
Methods

• Initial intent – Bayesian approach
  – Utilize detection functions from the western-wide surveys coupled with the mark-recapture trials from DRECP surveys to estimate final probability of detection.

• Separate detection functions and density estimates for various types of observations:
  – Flying vs. Perched birds
  – Height above ground (AGL)
  – Observer position

• Final approach – due to low sample sizes, will use detection functions from western-wide surveys
Results: Post-fledging 2013

- **4 August**
  - 1 eagle
  - ~400 m from transect
  - Flying
- **6 August**
  - 1 eagle
  - ~100 m from transect
  - Perched
Results: Winter 2013

- **12 December**
  - 1 Eagle
  - ~600 m from transect
  - Perched

- **14 December**
  - 2 adult eagles
  - ~300 m from transect
  - Flying
Results: 2013

- DRECP is nearly (~95%) within BCR 33
- DRECP area is ~40% of US portion of BCR 33
- Millsap et al. 2013 estimated ~500-600 eagles in BCR 33
  - IF evenly distributed, we would expect to see 4-5 birds during each survey
  - We saw 2 during the summer and 3 during the winter
  - Likely to be within confidence intervals of Millsap et al.
Discussion

• Although we saw lots of topography and crossed many smaller mountain ranges, we barely entered the larger/higher ranges – almost no pine-juniper habitat.
• Summer survey was about a month later than desired.
• WEST is conducting several monitoring studies in a larger region containing the DRECP area, and we have observed relatively few golden eagles June – August, with greater numbers observed in the fall and winter.
• Conversations with eagle biologists suggested that the number of golden eagles in the region could be twice as high in winter versus summer.
• 2013 was the driest in over 100 years in CA. Did this lead to a reduction in the number of eagles using the area?
Future Considerations

• If it is decided aerial surveys should continue
  – Should the study area be expanded?
    • Include some buffer area that may detect birds that move in/out of the DRECP area.
  – Stratify the sample?
    • Devote more effort to potentially better habitat (e.g., mountainous areas and transition zones)?
    • 4 of 5 observations were in the far west and north areas in or adjacent mountainous (i.e., better?) habitats
  – Change timing?
    • Post-fledge earlier in season (June?)
    • Winter (December or ??)
  – More effort?
    • Increase transect density?
    • Fly more than once each season?