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

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.

Background

- 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

Bird Conservation Region

Great Basin (9)
Northern Rockies (10)
Southern Rockies / Colo Plateau (16)
Badlands and Prairies (17)
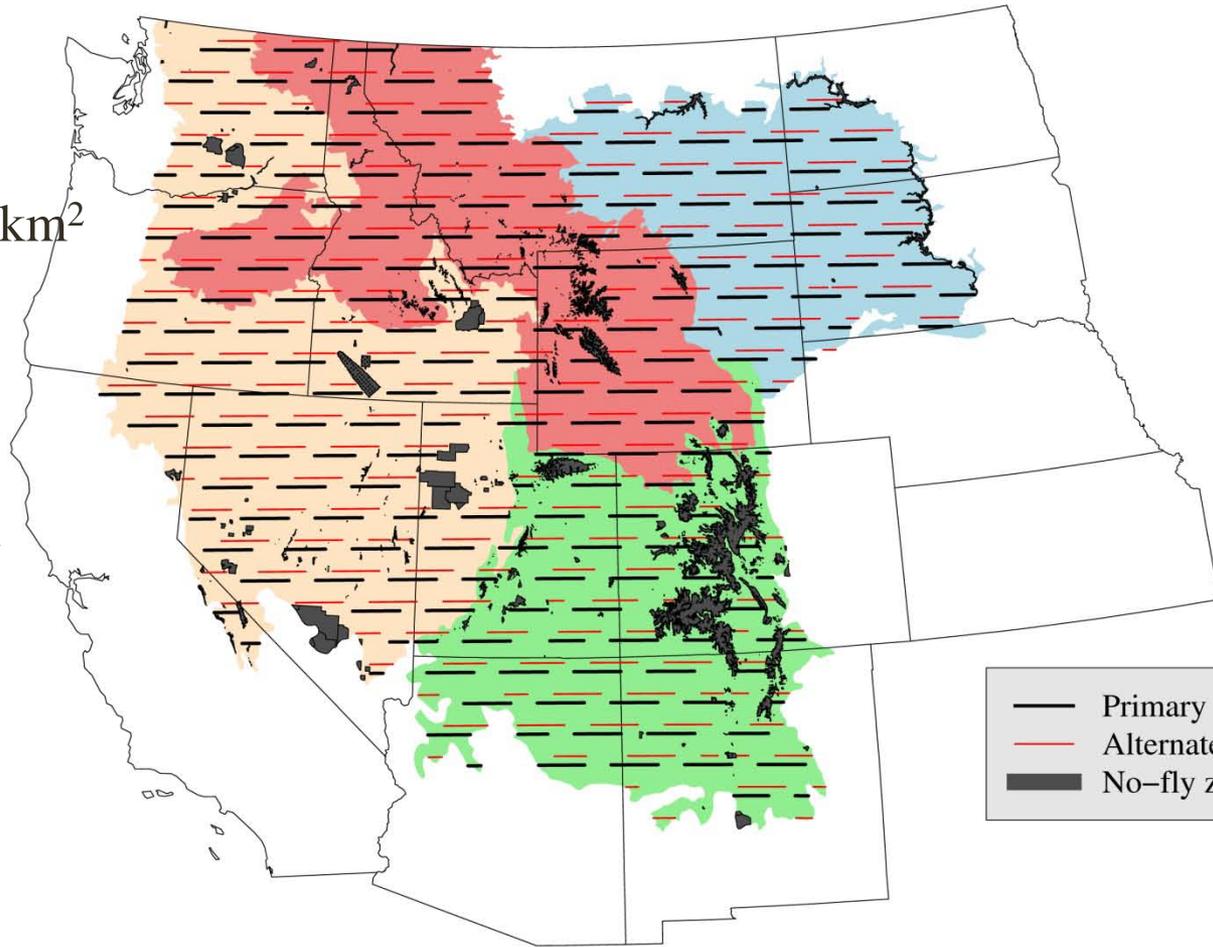
- Study area
  >1,962,000 km^2

- 2 crews

- >17,500 km
  of transects

- Aug 15 to
  Sept 15

Primary transect
Alternate transect
No−fly zone

12/2012

Bird Conservation Region

Great Basin (9)
Northern Rockies (10)
Southern Rockies / Colo Plateau (16)
Badlands and Prairies (17)

2011

Doubled effort

Primary transect
Alternate transect
No−fly zone

12/2012
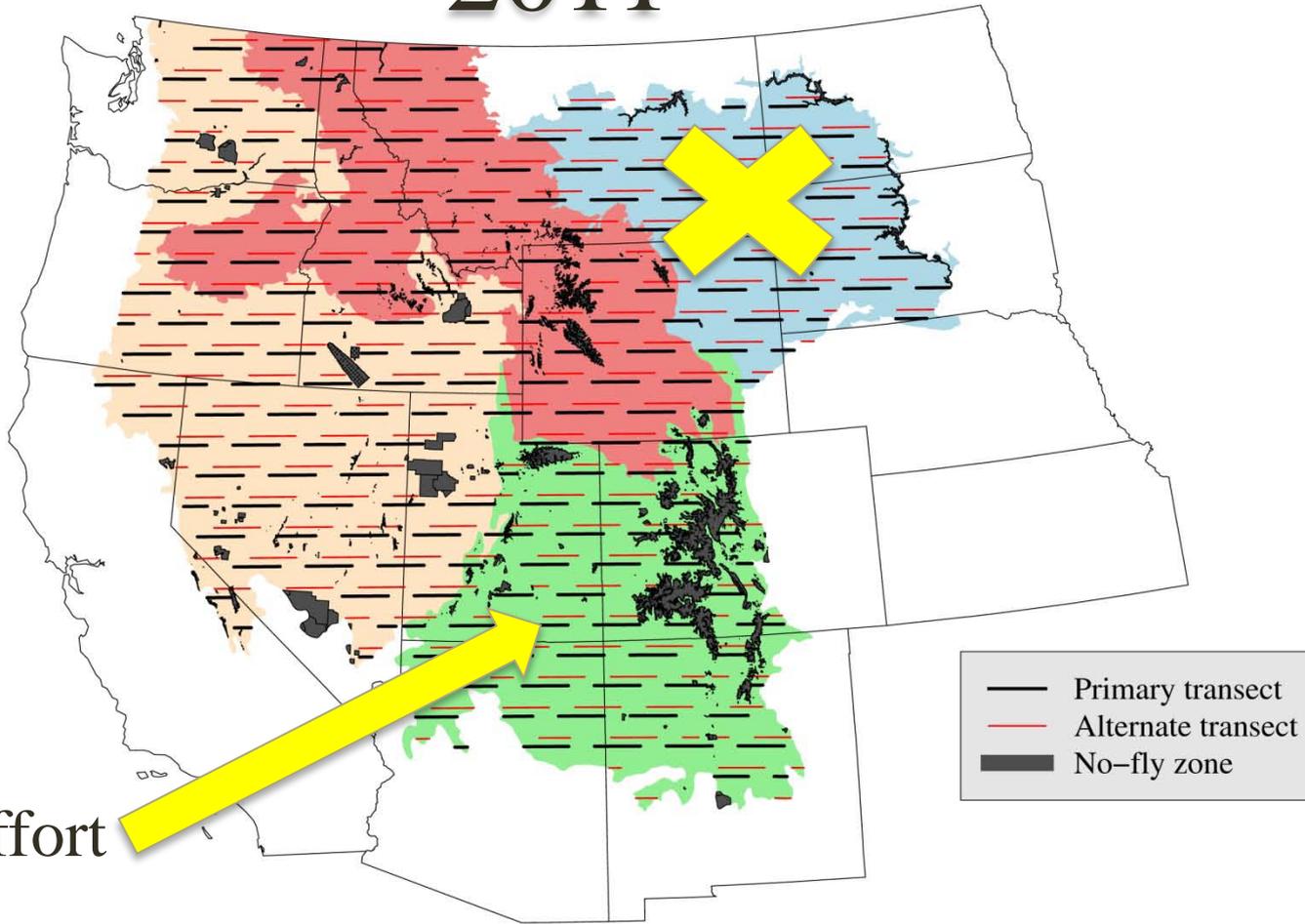
Survey Protocol

- 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

Dale Stahlecker

BCR 9: Great Basin

Trend= 0.075 (90% CI: -0.009 to 0.168)

12/2012

BCR 10: Northern Rockies

Trend= 0.053 (90% CI: -0.032 to 0.142)

12/2012
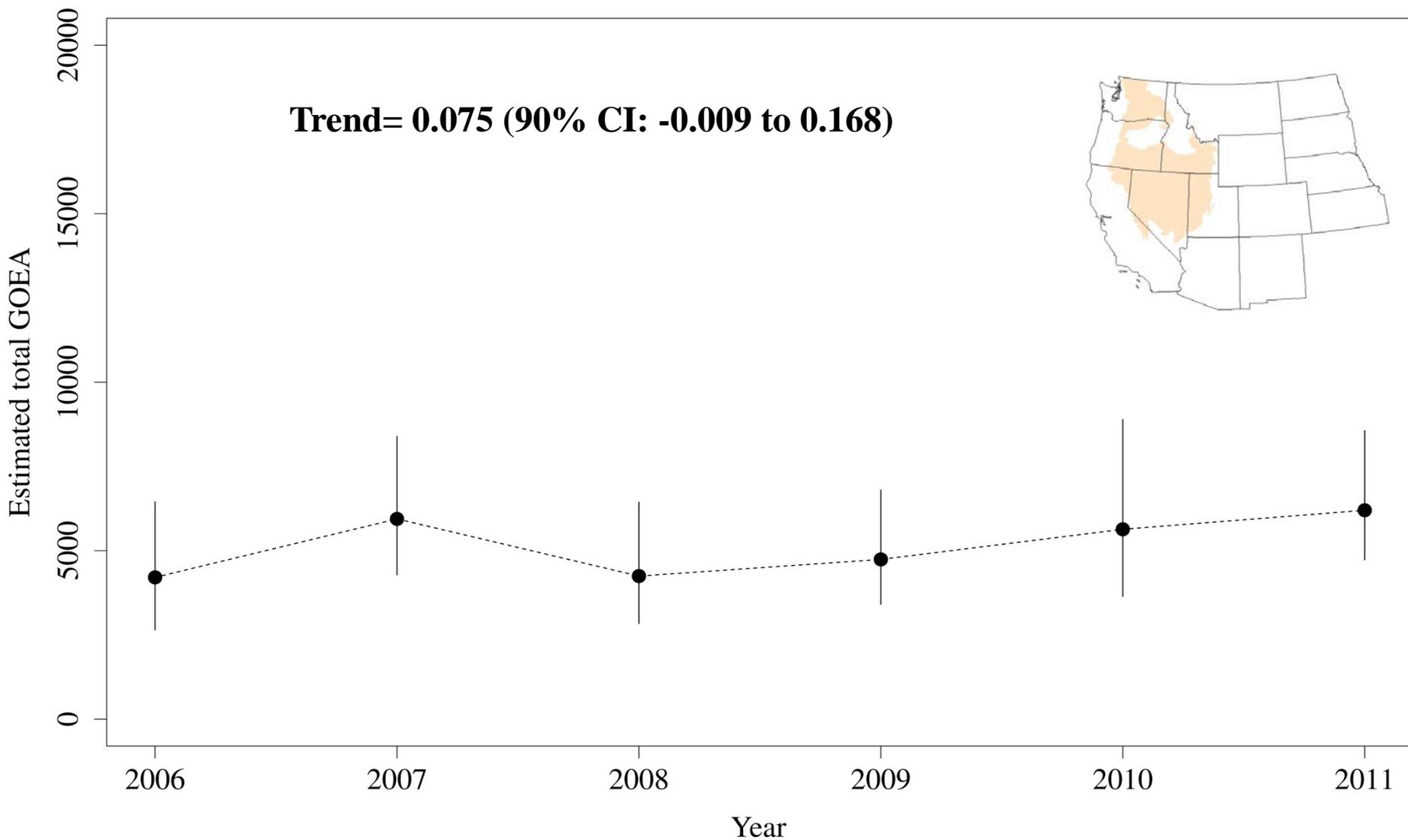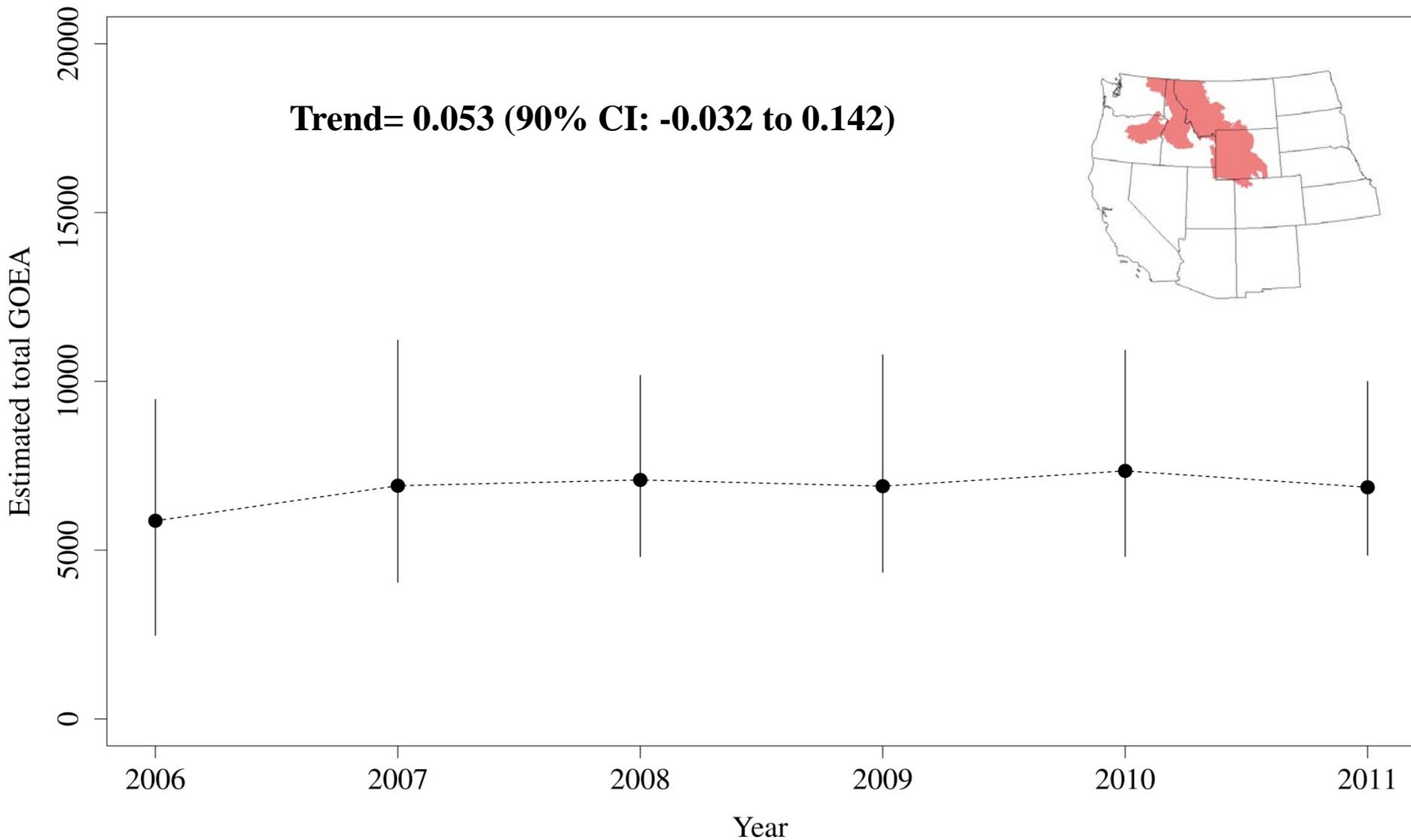
BCR 16: Southern Rockies / Colorado Plateau

Trend= -0.011 (90% CI: -0.111 to 0.080)

12/2012
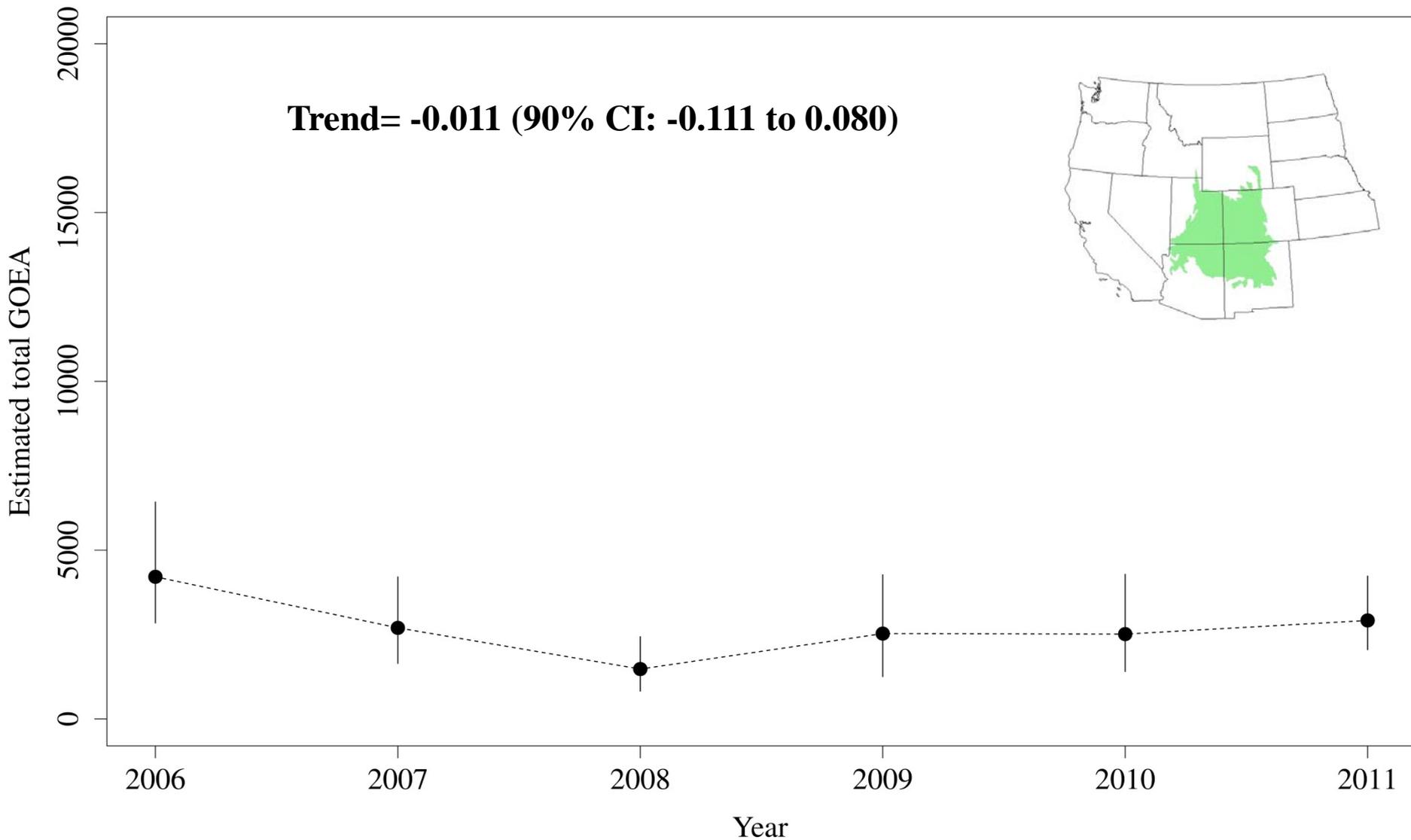
BCR 17: Badlands and Prairies

Trend= 0.027 (90% CI: -0.064 to 0.114)

12/2012

Total Study Area

Trend= 0.036 (90% CI: -0.080 to 0.151)

12/2012
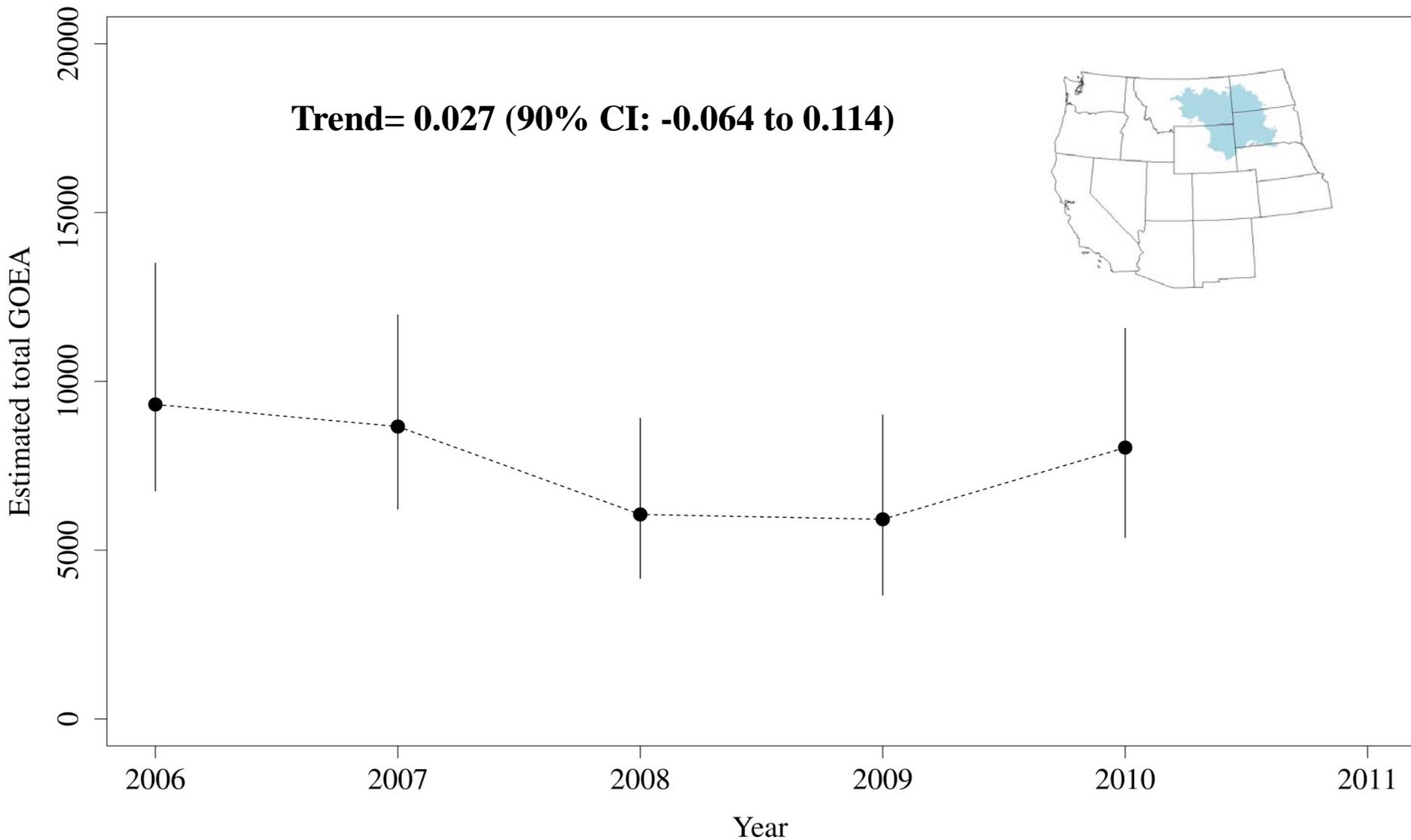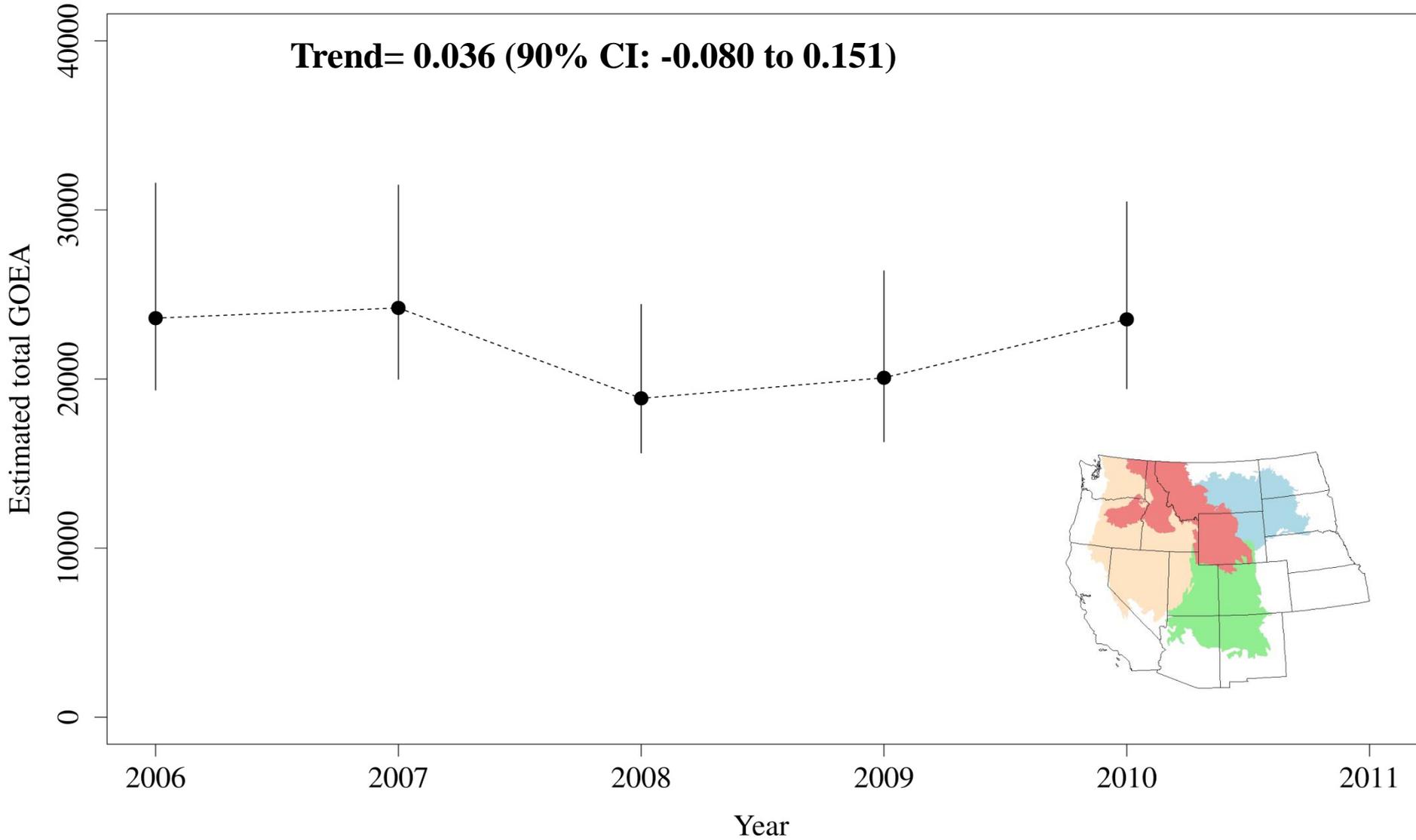
Results

The most current survey report is available online at the following web address:

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

Results

Nielson, R. M., McManus, L., Rintz, T., McDonald, L. L., Murphy, R. K., Howe, B., and R. E. Good. *In Review*. Monitoring abundance of golden eagles in the western United States. *Journal of Wildlife Management*.

Results

- Evaluation of consistency with BBS trends:

   Millsap, B. A., Zimmerman, G. Sauer, J. R., Nielson, R. M., Otto, M., Bjerre, E., and R. K. Murphy. *In Review*. Golden eagle population trends in the western United States: 1968 – 2011. *Journal of Wildlife Management*.

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 time s 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

10/2012