Large Ungulates With Gas: How Elk Respond To Natural Gas Development

Clay B. Buchanan and Jeffrey L. Beck
Department of Ecosystem Science and Management
University of Wyoming
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**Risk** – A state of uncertainty where some of the possibilities involve a loss, catastrophe, or other undesirable outcome
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Pursued
Injury
Death

Balance time and energy

Foraging
Locating a mate
Migrating
Risk concepts are transferable to disturbance events.
Fortification Creek Elk

- Sample elk distribution and resource selection
- Measure influences of coal bed natural gas (CBNG) development
- Assess elk ability to reduce impacts
• Fortification Creek Area (FCA; ~498 km²)
• Non-migratory elk population of ~230 individuals
• CBNG development began in early 2000s
• >700 wells at the end date of GPS data
• Sagebrush/grassland dominated
• GPS collared female elk
• Measured traffic volume and environmental variables

• Resource selection functions (RSF, Manly et al. 2002)
  – Pooled data across individual elk
  – Relative probability of elk use as the response variable
  – Summer and winter RSFs
  – Day and night during early and late summer RSFs
Conclusion:  
Part 1

- Elk avoided CBNG roads
  - Increased avoidance during development
  - Human activities levels vary
  - Avoided roads with lowest activity

- Juniper cover type and ruggedness
  - Predictive during all periods
    - Thermoregulation
  - Increasing importance during development
    - Escape cover
Elk Self Mitigation of Development Impacts
Mitigation – the act of making a condition or consequence less severe
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Mitigation

- Examples of:
  - Resource use shifts
  - Some return to original resource after disturbance lessens or concludes

- Do animals use resources on a smaller temporal or spatial scale to mitigate disturbance effects?
Similar Methods

• Pooled GPS data across individuals
• Relative frequency of use as the dependent variable
• Locations separated by time of day
  – Day (700 – 1900 hrs)
  – Night (1900 – 700 hrs)
• Seasons
  – Early summer (April 1 – July 14)
  – Late summer (July 15 – October 15)
Early Summer 3.5% shift

Late Summer 3.6% shift

High Probability of Use Areas
Conclusion: Part 2

- High use areas
  - Average distance further away from roads at night than during the day
    - Early summer—250 m further
    - Late summer—280 m further
  - Maintaining avoidance of roads
    - Vehicle traffic present but decreased at night
    - Less predictable traffic pattern
• Has this effected demography?
  – Approx. 90% pregnancy rate
  – Cow:calf are consistant
  – Population numbers remain constant
• Body condition (organ fat content) is lower than reference population
Overall Conclusions

• FCA elk appear to perceive varying levels of risk
  – Respond by avoiding risky areas
  – Mixed demographic signals

• Short term mitigation is not occurring
  – FCA elk maintain or extend distance from roads at night
Overall Conclusions

• FCA elk avoided CBNG roads
  – Avoidance behavior was greater during CBNG development
    • Compared with pre development elk resource selection

• Loss of high use habitat of 30–40%

• FCA elk did not opportunistically return at night

• Reducing vehicle volume may reduce pressure
  – Also: telemetred wells, directional drilling, refugia
Committee members:
J. L. Beck
S. N. Miller
M. J. Kauffman
B. M. Alexander
D. F. Doak

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Questions