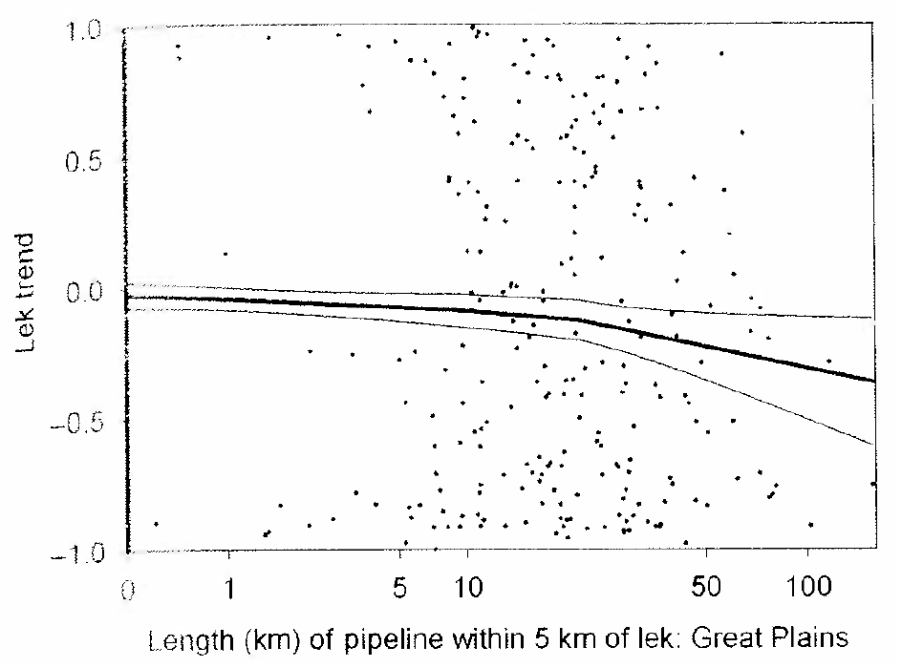
Infrastructure and Sage-grouse

A Research Synthesis

Pipelines

- Lek trends related to distance to pipeline in Great Plains and Wyoming Basin (Johnson et al. 2011)

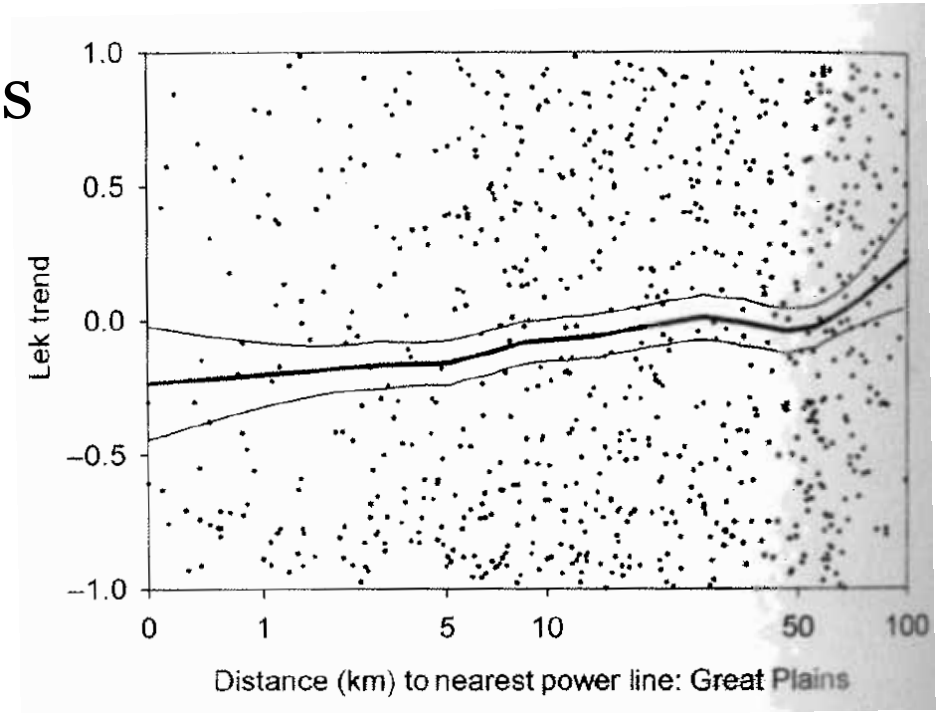


Pipelines

- Pipeline density influences habitat suitability and lek presence
  - Highest habitat suitability had pipeline densities <0.01 km/km2 (Knick et al. 2013)
  - Leks were absent when pipeline densities exceeded 0.47 km/km2 (Knick et al. 2013)

Power lines

- Results equivocal
- No effect of power lines
  - Nonne et al. 2013
  - LeBeau 2012
  - Johnson et al. 2011



Power lines

- Density of power lines affects habitat suitability
  - Habitat suitability highest where power line densities <0.06 km/km2 (Knick et al. 2013)
  - Leks absent where power line densities >0.20 km/km2 (Knick et al. 2013)

Power lines

- Avoidance reduces functional habitat
  - Avoidance to 0.45 miles (lesser prairie chickens; Hagen et al. 2011)
  - Avoidance at 0.06 miles (Pruett et al. 2009)
  - Influenced habitat use at 0.4 miles (Braun 1998)
  - Predation, dispersal patterns to 0.75 miles (Ellis 1985)
- Collisions cause direct mortality
  - Collision with lines (Beck et al. 2006, Hagen et al. 2011)

Power lines

- Habitat use, movements, predators affected by power lines
  - Predation, avoidance to 0.45 miles (lesser prairie chickens; Hagen et al. 2011)
  - Nest site selection 0.25 miles (Pitman et al. 2005)
  - Influenced habitat use at 0.4 miles (Braun 1998)
  - Predation, dispersal patterns to 0.75 miles (Ellis 1985)

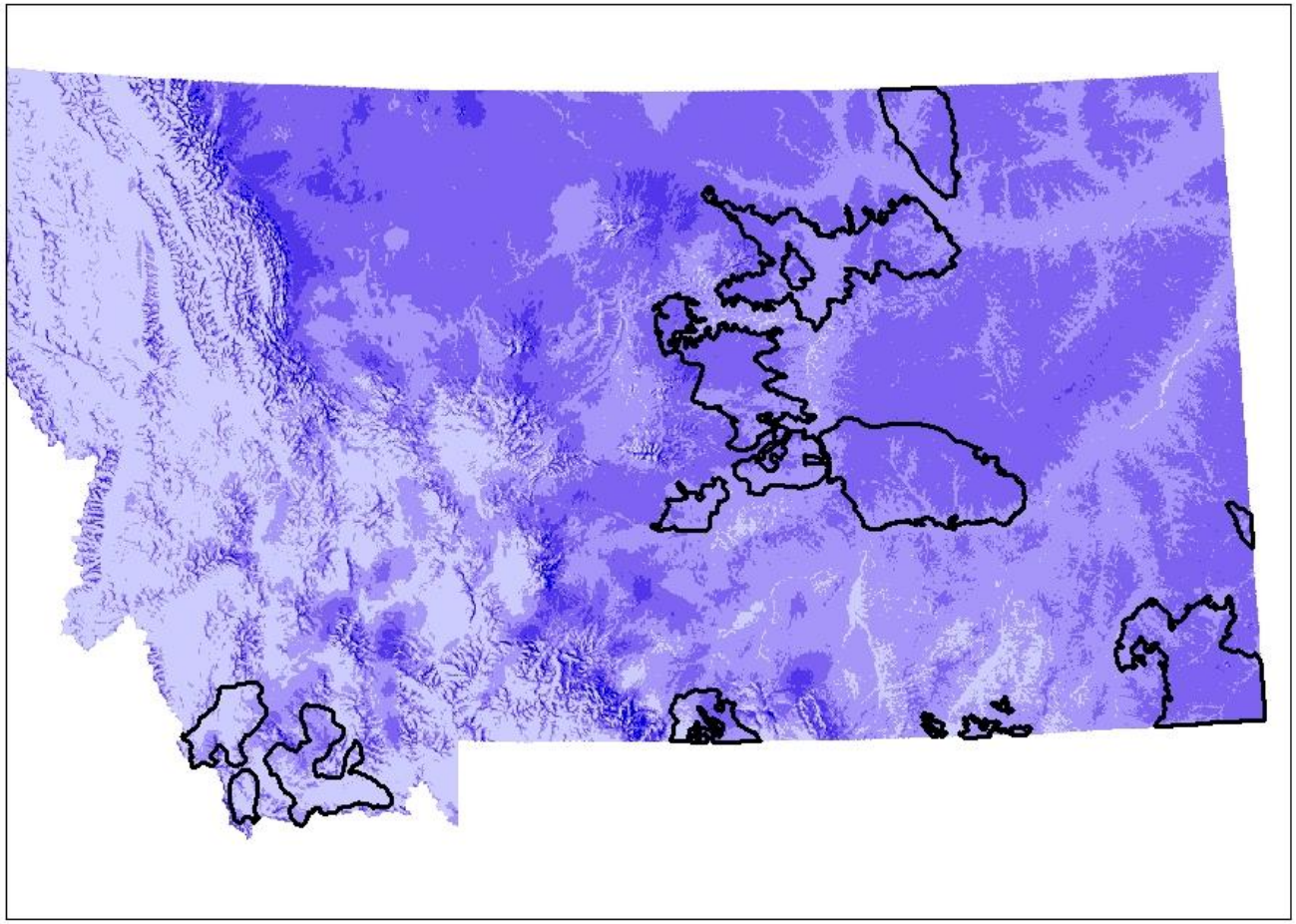
Roads

- Roads can fragment habitat, be barriers to movement and reduce functional habitat
  - 93% of active leks had interstate highway densities of <0.01 km/km2 (Knick et al. 2013)
  - High suitability habitat had highway densities of 0.05 km/km2 and secondary road densities of <1.0 km/km2 (Knick et al. 2013)

Wind Energy

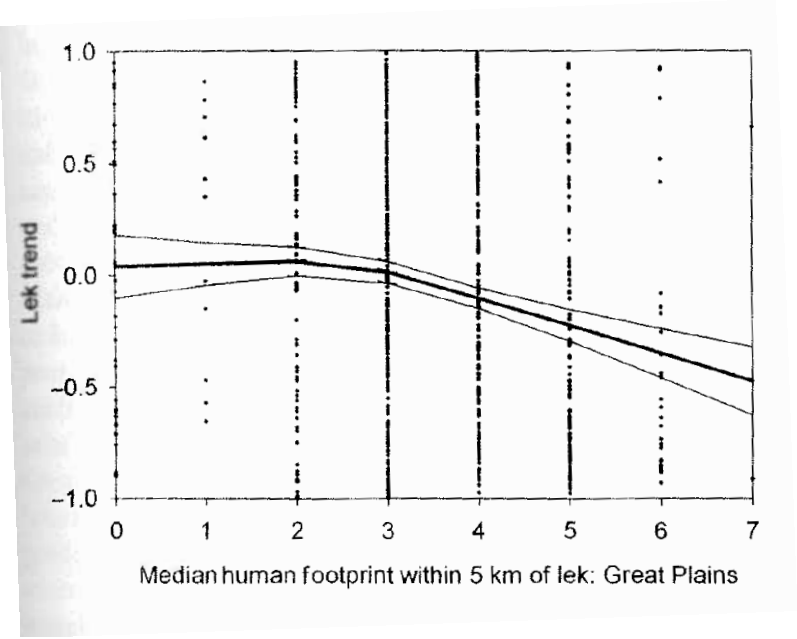
- Sage-grouse (LeBeau 2012)
  - Nest and brood survival negatively affected within 3 miles
  - No effect on female survival
  - Selected brood habitat closer to wind facilities
- Greater Prairie Chickens (Sandercock unpubl.)
  - Negative effect on lek persistence
  - No effect on movements, nest site selection, reproductive effort or nest survival
  - Positive effect on female survival

Wind Energy



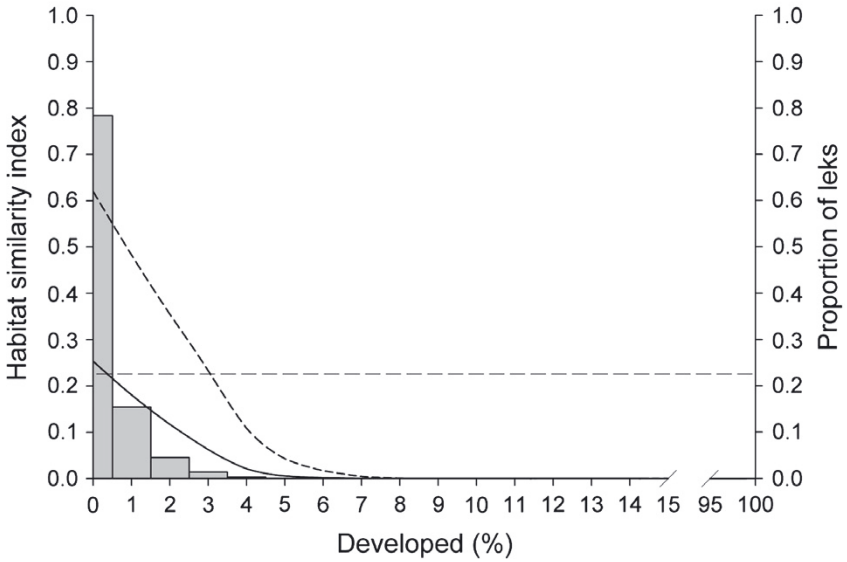
Cumulative Impacts

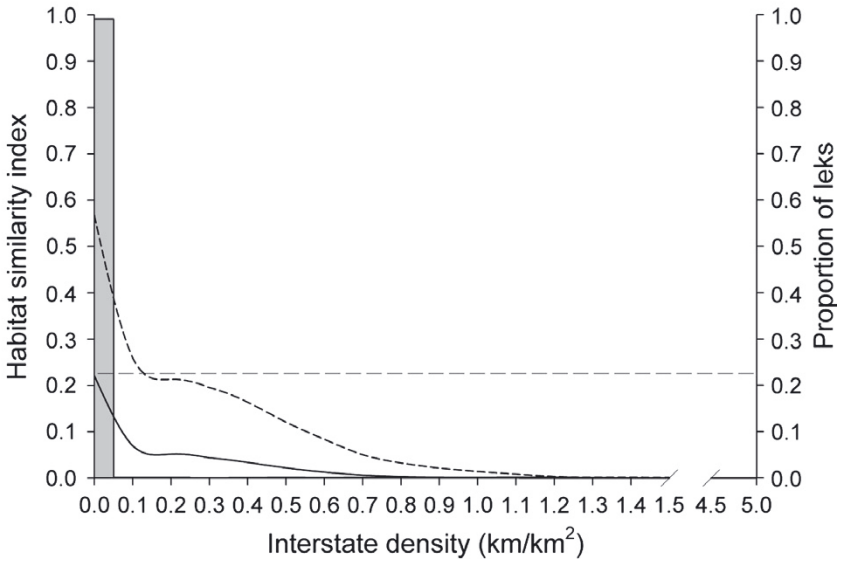
- Human footprint influences lek trends across the range, regardless of the type of anthropogenic threat (Johnson et al. 2011)



Cumulative Impacts

- "Leks were absent from areas with relatively low levels of anthropogenic development and infrastructure" (Knick et al. 2013)





Cumulative Impacts

- Yearling females avoided nesting within 950m (0.6mi) of infrastructure (Holloran et al. 2010)
- Lek buffers insufficient for preventing infrastructure from displacing sage-grouse in winter (Doherty et al. 2008).

Additional Considerations

- Communication towers
- Roads
- Time Lags
  - Nest fidelity by adult grouse
  - “Sink” habitat?