Mitigation Effectiveness for Improving Productivity by Greater Sage-Grouse Nesting in Natural Gas Development Areas

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When avoidance of sage-grouse habitat is not possible, meaningful reductions of the impacts should be implemented and the efficacy of mitigation be assessed”

(U.S. Fish and Wildlife Service greater sage-grouse conservation objectives)
Research Objective

Explore relationships among mitigation practices and sage-grouse nest productivity.

- Can enhanced development practices mitigate effects of energy development on sage-grouse nest productivity?

- Is mitigation targeting the infrastructure and development practices of greatest consequence to nest productivity?
GIS Variables

GIS variables quantified at four spatial scales (335m [0.35km²], 564m [1.0 km²], 800m [2.0 km²], and 1260m radii [5km²])

Infrastructure

1. Wells
2. Roads
3. Power lines
4. Man-made reservoirs
5. Surface disturbance (“energy footprint”)
Environmental Spatial Analysis
Development Spatial Analysis
Nest Success and Big Sagebrush Within ~ 1/2 km.

% sagebrush cover
Water Edge (Man-made Reservoirs)

- Greater sage-grouse nest
- Persistent water
- 5.0 km sq (1.260-km radii)
Nest Success Estimates

![Nest Success Estimates](image)

**Nest Survival (%)**

- **Outside development**: High survival rate
- **Mitigated**: Moderate survival rate
- **Non-mitigated**: Lower survival rate
- **Other**: Lowest survival rate

**Nest category**
Mitigated vs. Non-mitigated Nest Exposure

1. Mitigated sage-grouse nests were exposed to almost half the amount of reservoir water edge
   - $1.208 \pm 0.140 \text{ km vs. } 2.313 \pm 0.289 \text{ km}$

2. Mitigated sage-grouse nests were exposed to about $1/3$ less surface disturbance ("energy footprint")
   - $1.85 \pm 0.13\% \text{ vs. } 2.58 \pm 0.36\%$
Summary

1. Enhanced management (mitigation) is beneficial to sage-grouse productivity by bolstering nest success.

2. We were able to quantify a reduced energy footprint in mitigated development areas.

3. This research demonstrates that science supported mitigation can result in measurable reductions in impacts to sage-grouse.