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

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Need

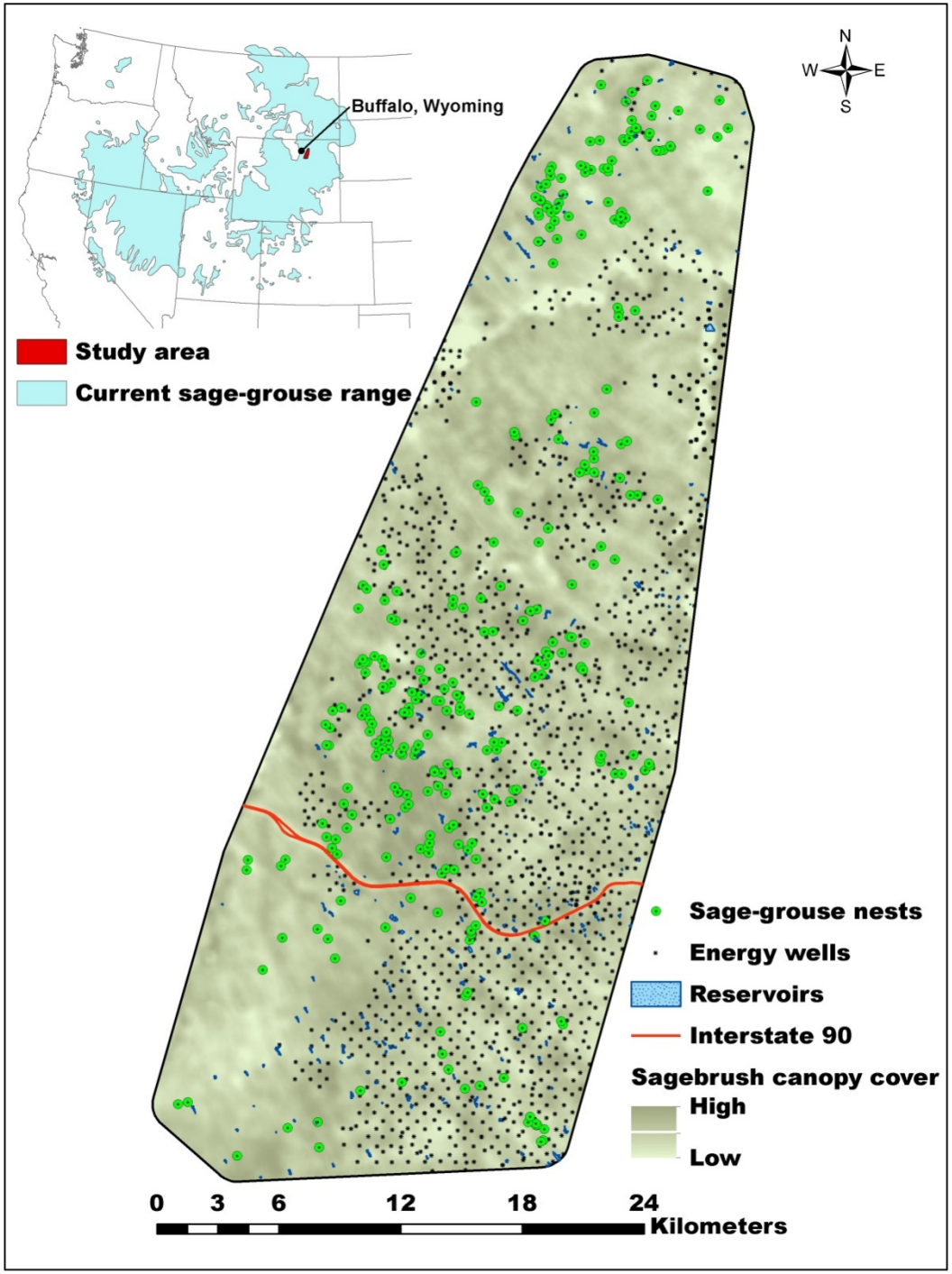
"When avoidance of sage-grouse habitat is not possible, meaningful reductions of the impacts should be implemented and the efficacy of mitigation be assessed"

(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?**


Buffalo, Wyoming
Study area
Current sage-grouse range
N
W
E
S
Sage-grouse nests
Energy wells
Reservoirs
Interstate 90
Sagebrush canopy cover
High
Low
0
3
6
12
18
24
Kilometers

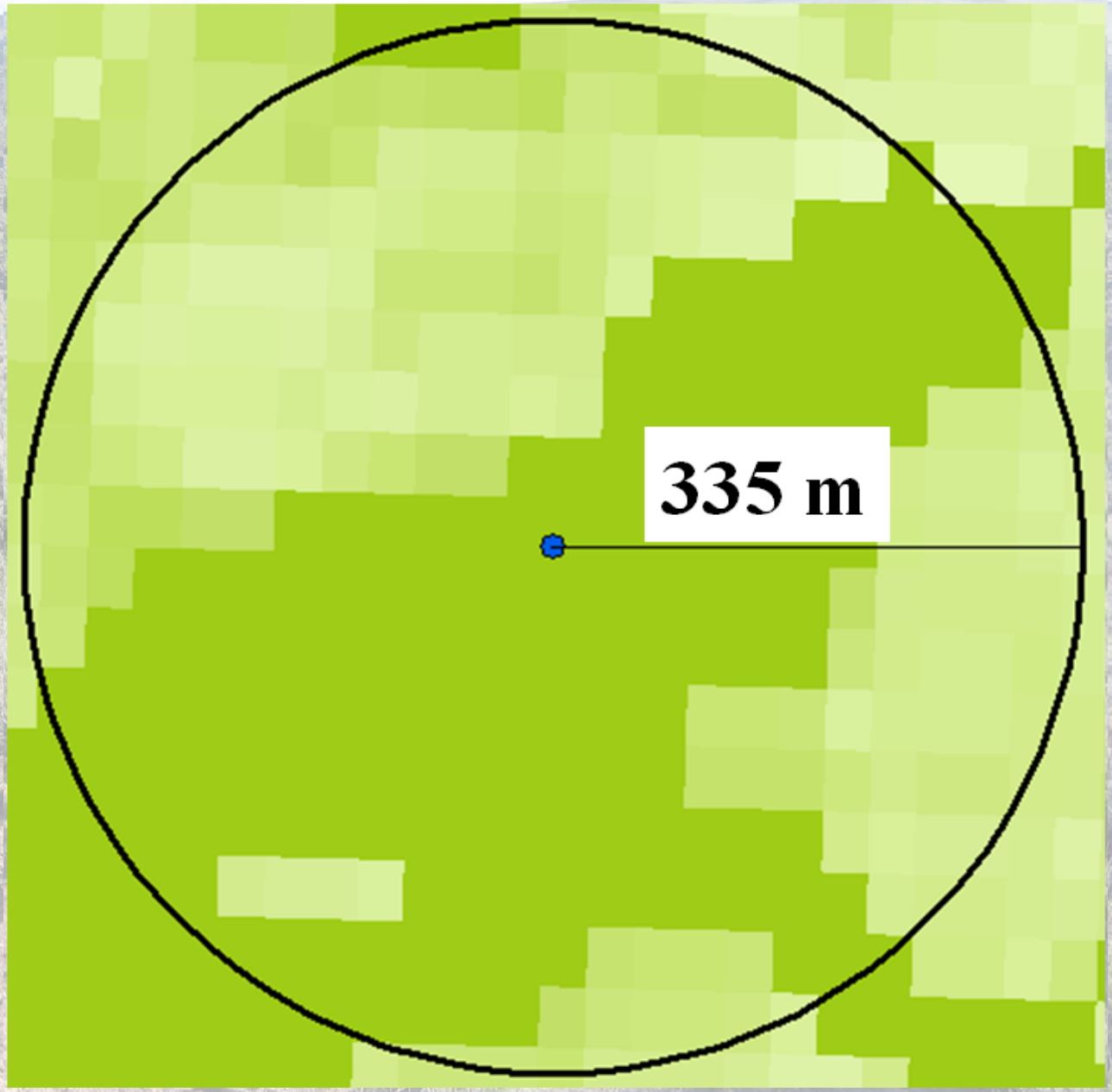
GIS Variables

GIS variables quantified at four spatial scales (335m [0.35km^2], 564m [1.0 km^2], 800m [2.0 km^2], and 1260m radii [5km^2])

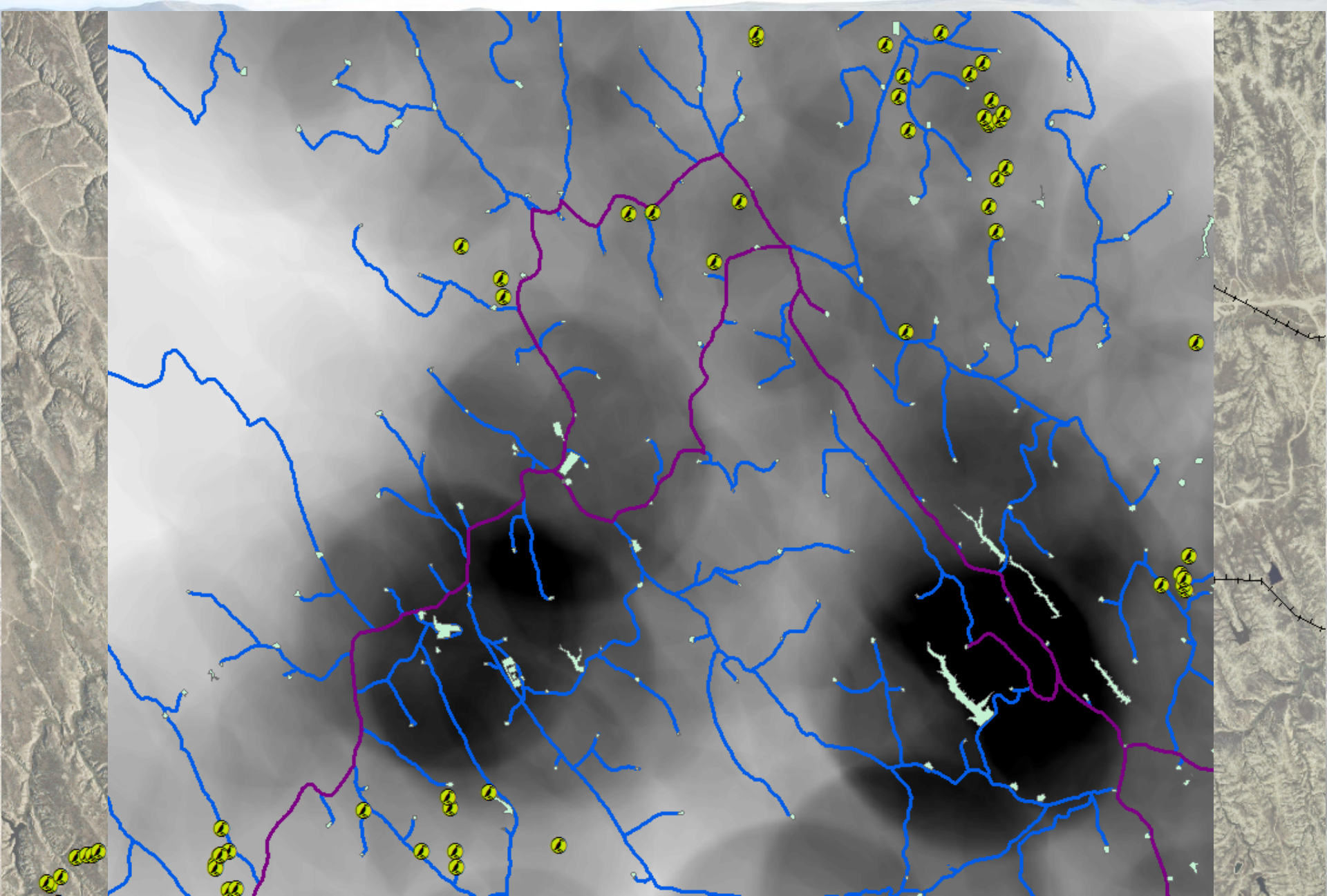
Infrastructure

1. **Wells**
2. **Roads**
3. **Power lines**
4. **Man-made reservoirs**
5. **Surface disturbance ("energy footprint")**

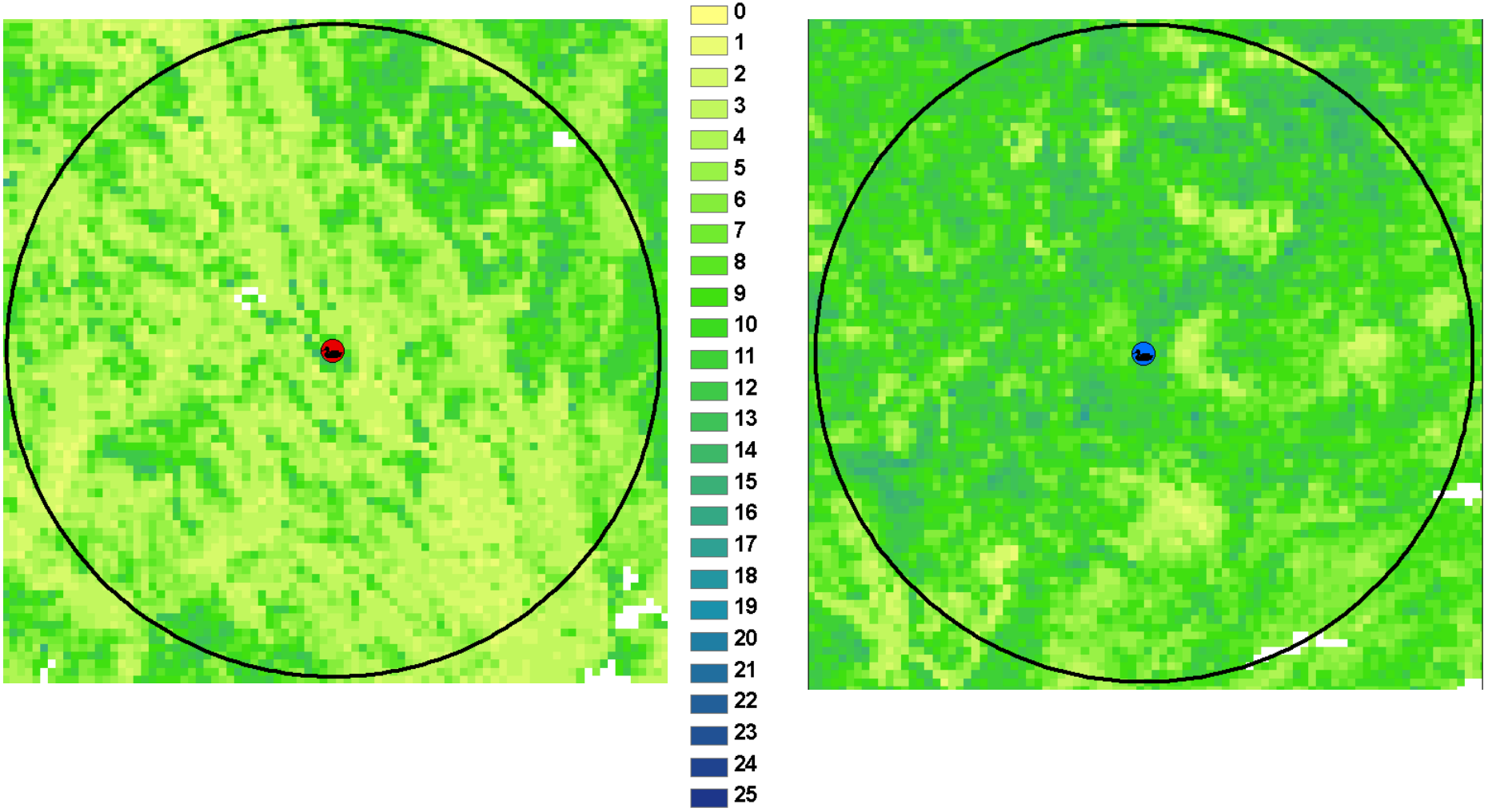
Environmental Spatial Analysis



Development Spatial Analysis

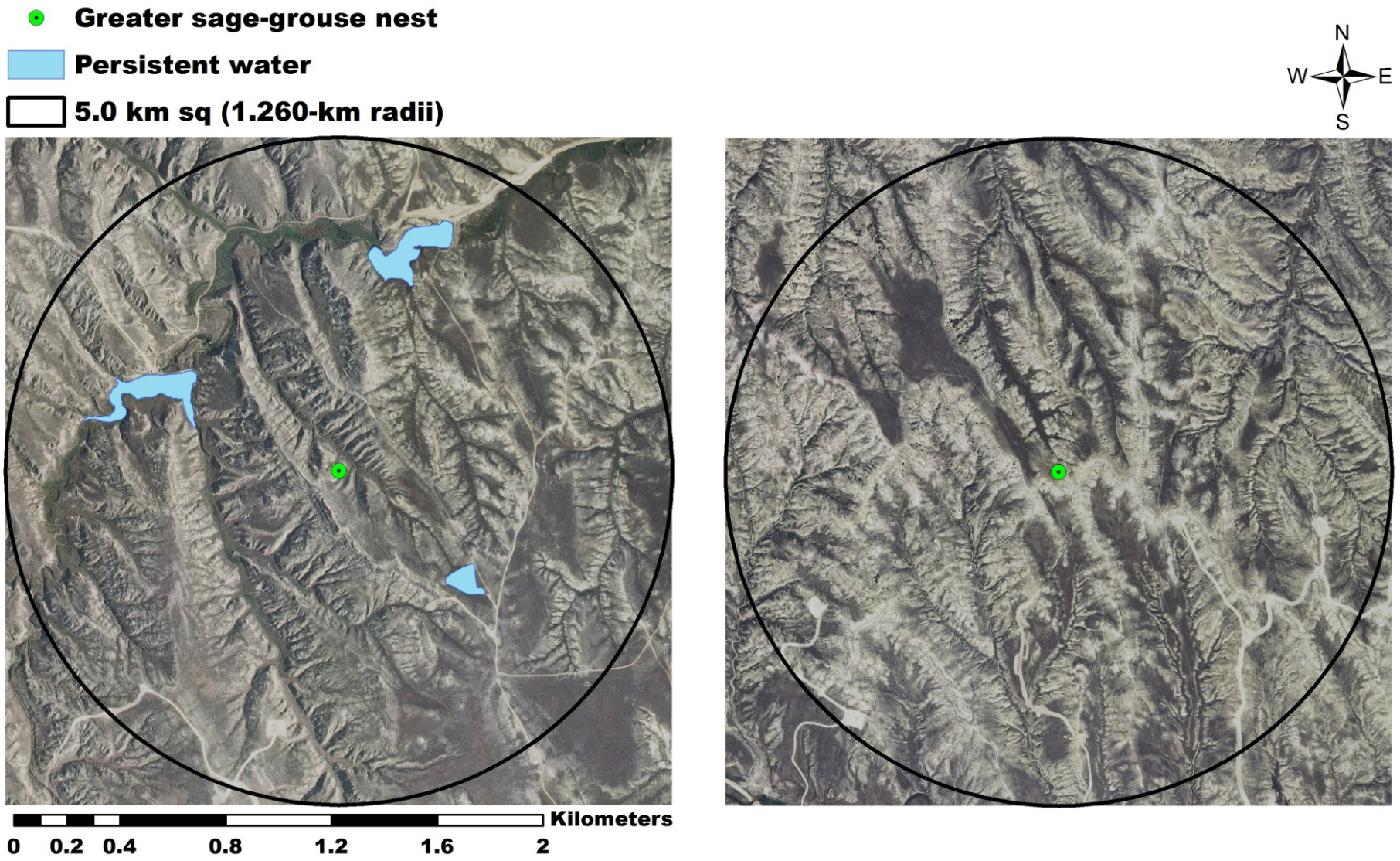


Nest Success and Big Sagebrush Within ~ 1/2 km.

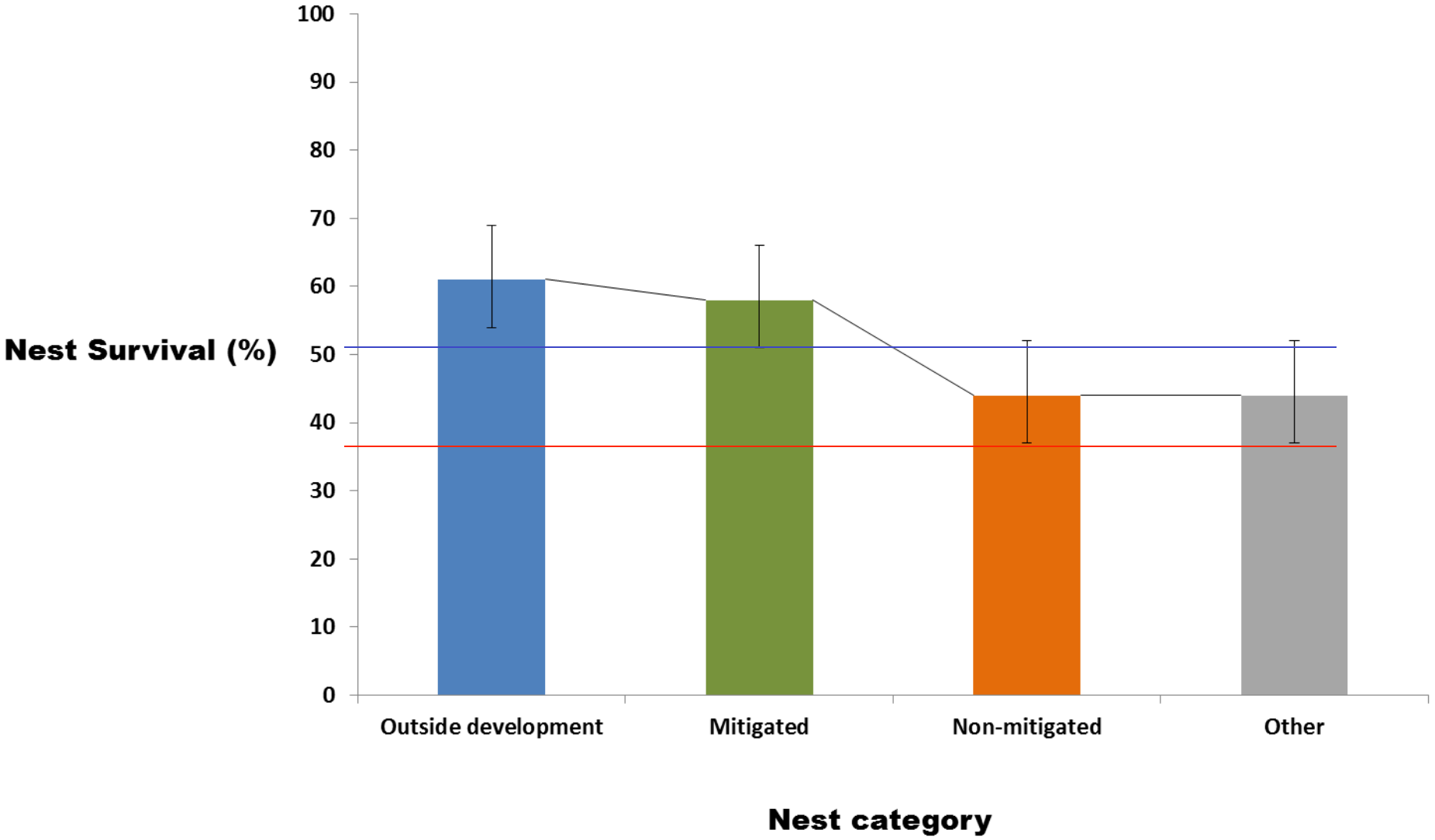


% sagebrush cover

Water Edge (Man-made Reservoirs)



Nest Success Estimates



Mitigated vs. Non-mitigated Nest Exposure

1. **Mitigated sage-grouse nests were exposed to almost half the amount of reservoir water edge**
   - ❑ 1.208 ± 0.140 km vs. 2.313 ± 0.289 km

2. **Mitigated sage-grouse nests were exposed to about 1/3 less surface disturbance ("energy footprint")**
   - ❑ 1.85 ± 0.13% vs. 2.58 ± 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.