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Habitat Features Predict the Distribution of Recreational Shooters in the Morley Nelson Snake River Birds of Prey National Conservation Area

Emily R. Sun

Benjamin P. Pauli
Boise State University

Zoe Tinkle

Romaric Mukuna

Daniel Wolfe

See next page for additional authors

Authors
Emily R. Sun, Benjamin P. Pauli, Zoe Tinkle, Romaric Mukuna, Daniel Wolfe, Jennifer S. Forbey, and Julie Heath

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Department of Biological Sciences, Boise State University, Boise, ID, 83725

Piute ground squirrel (photo by Shawn Smith)

Introduction

- Many Treasure Valley residents enjoy the Morley Nelson Snake River Birds of Prey National Conservation Area (NCA; Figures 1 and 2) for various pastimes such as:
  - Target shooting
  - Recreational shooting/hunting
  - Wildlife viewing
- These activities, however, have the potential to interfere with one another.
- Recreational shooting of Piute ground squirrels (*Urocitellus mollis*) could affect local golden eagle (*Aquila chrysaetos*) populations through:
  - Decreased prey availability
  - Increased scavenging opportunities
  - Possible entry of lead into the ecosystem (Pauli and Buskirk 2007)
- To assess possible interactions among shooters, prey, and raptors, the density and habitat preference of human shooters must be determined.
- Understanding where shooters are present in the NCA can inform management strategies by the Bureau of Land Management (BLM) and the Idaho National Guard.

Objectives

- Determine locations of recreational shooters
- Describe typical shooter demographics
- Identify environmental features that predict shooting locations in the NCA
- Map predicted high-use shooting areas in the NCA

Hypothesis

- Shooter density was predicted to be highest:
  - In habitat with good visibility (e.g. grassland)
  - Close to major roads (Stedman et al. 2004)
  - Close to urban center (Boise)
  - In mid-elevations
- Habitat type and distance from roads were predicted to be the most important variables

Methods

- Three routes of approximately 16 km in length through different habitat types in the northwest section of the NCA were driven.
- Each route was sampled three times in random order.
- Opportunistic data was collected while driving routes on Saturdays from February 28, March 3, and March 14, 2015 from 9:00 AM to 2:30 PM.
- Data collection included: location, number of people, number of active shooters, gender, estimated age, and firearm type
- Predictors were: distance from urban center, distance from major road, land cover type, and elevation
- GIS maps were acquired from the Idaho Transportation Department, National Land Cover Database, and United States Geological Service. (all map manipulations were done in ArcMap version 10.3)
- Data were analyzed and modeled using MaxEnt version 3.3.3k using presence-only modeling (Phillips et al. 2006).
- In MaxEnt, data points (observed shooter spots) were compared to randomly generated points within the area sampled to determine the effect of habitat variables on suitability of locations for shooting.
- Model fit was evaluated using area under the curve and a predictive map of shooting probability was generated.

*** Contact Information**

Please e-mail me at: emilysun@u.boisestate.edu

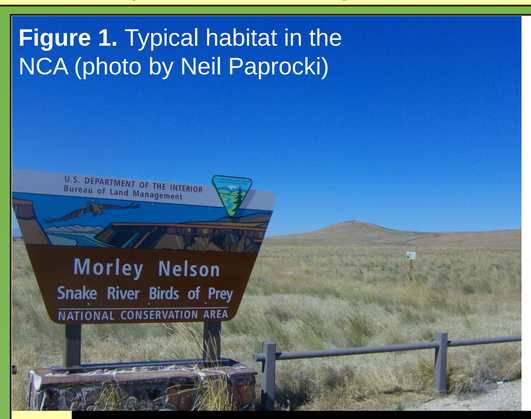

Figure 1. Typical habitat in the NCA (photo by Neil Paprocki)

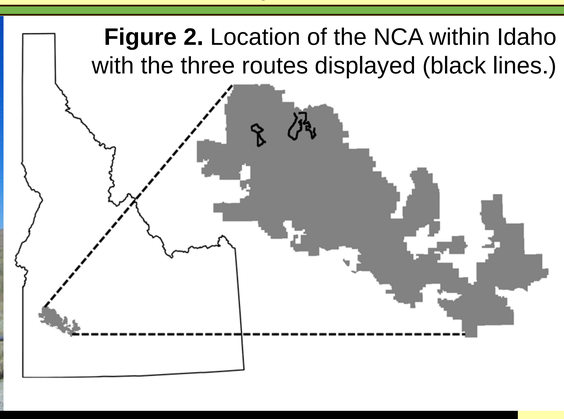

Figure 2. Location of the NCA within Idaho with the three routes displayed (black lines.)

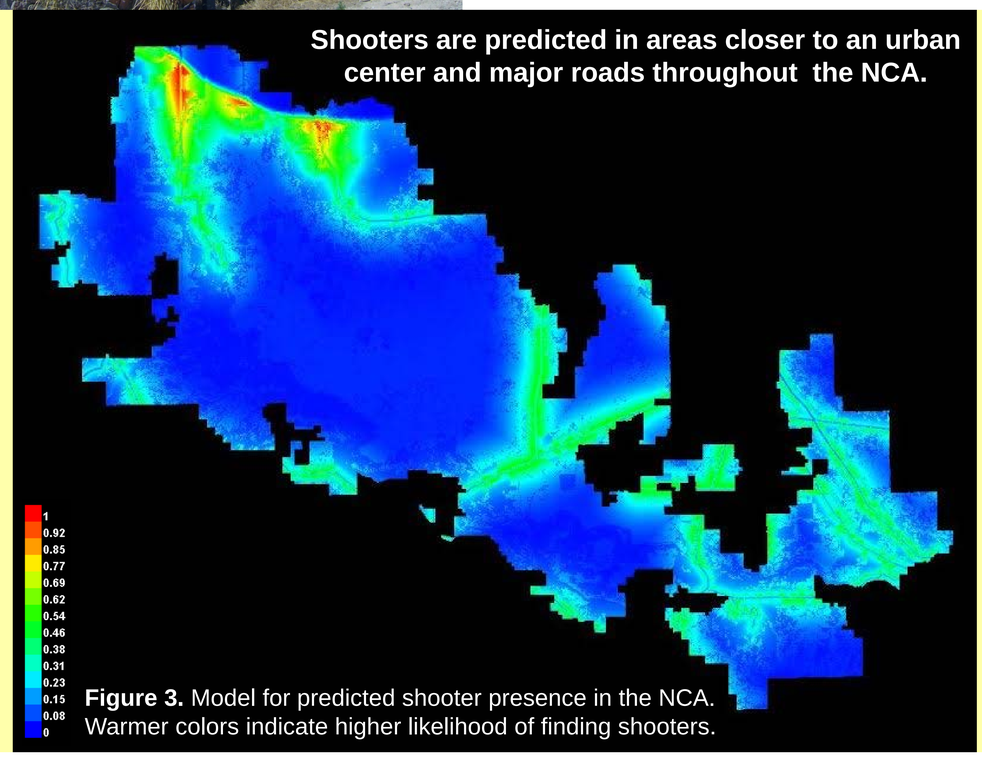

Figure 3. Model for predicted shooter presence in the NCA. Warmer colors indicate higher likelihood of finding shooters.

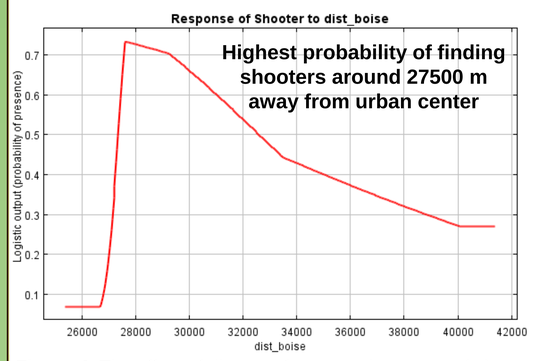

Figure 4. The effect of distance from an urban center (m) on probability of shooter presence (0 – 1.0).

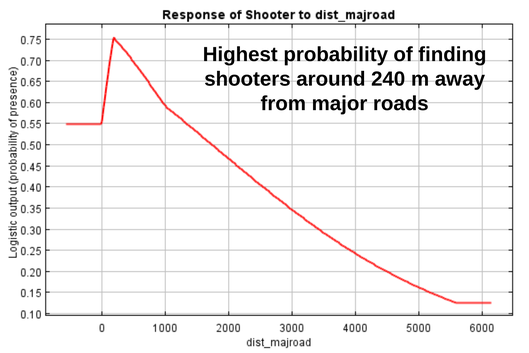

Figure 5. The effect of distance from a major road (m) on probability of shooter presence (0 – 1.0).

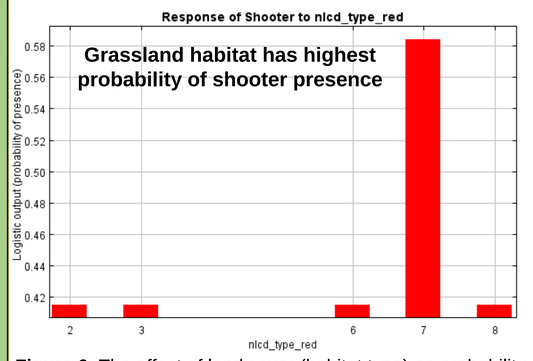

Figure 6. The effect of land cover (habitat type) on probability of shooter presence (0 – 1.0). Figure key: 2 = developed open spaces (lawn grasses,) 3 = developed low intensity (housing,) 6 = shrub, 7 = grassland, and 8 = pasture/hay.

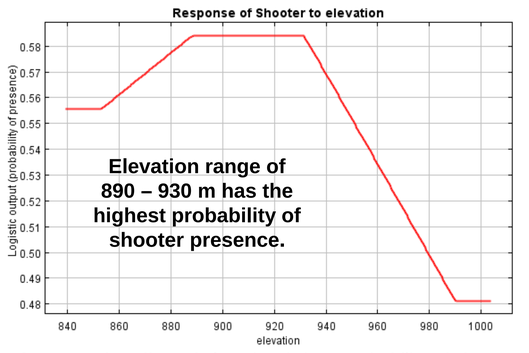

Figure 7. The effect of elevation (m) on probability of shooter presence (0 – 1.0).

Results

- 47 total shooter parties observed for all three routes
  - Fewer shooters observed on rainy or cloudy days (n = 19) versus when sunny (n = 28)
- Shooter demographics:
  - Average party size was 2.4 (range = 1-5), however average number of active shooters was 2.0 (range = 1-4); 85.7% of people present were actively shooting
  - Adults comprised 92.6% (n = 100) of observed people, while children only comprised 7.4% (n = 8)
  - Genders of observed people: 81.1% male (n = 90), 13.5% (n = 15) female, and 5.4% (n = 6) unknown
  - Firearm types observed: 59.8% rifles, 11.3% handguns, 4.1% shotguns, and 24.7% unknown
- Highest predicted likelihood of shooters present was when:
  - 27500 m away from an urban center (Boise; Figure 4)
  - 240 m away from a major road in the NCA (Swan Falls Road or Pleasant Valley Road; Figure 5)
  - In grassland (Figure 6)
  - At elevations ranging from 890 – 930 m (Figure 7)
- Environmental features had different levels of contribution to the model:
  - Distance from urban center: 54.6%
  - Distance from major road: 37.4%
  - Habitat type: 7.1%
  - Elevation: 0.9%
- Area under the curve for the receiver operating characteristic was 0.781 suggesting that the model performed reasonably well in distinguishing shooter locations from background points.

Discussion

- Shooters were likely to be close to urban areas and major roads
- Habitat type and elevation were not important predictors
- Many areas within the NCA were suitable for shooting
- Most high quality shooting areas were predicted to occur in the northwest section of the NCA (Figure 3)
- However, this area is where shooting restrictions have been implemented by the BLM.
- This indicates that there may be some interaction between the restricted area and ideal shooter habitat.

Future Projections/Management Implications

- The BLM could take various actions to modify shooter presence in the NCA
  - Access to quality shooting areas could be increased by creating more well-maintained roads
  - Shooter activity could be decreased by implementing no shooting zones
  - Predictive maps of shooters can be used to target management actions within the NCA
- These results can inform current ecological research on:
  - Piute ground squirrel populations, especially as potential lead entry into the ecosystem
  - Studies of cliff-nesting raptor species and whether their home ranges overlap with popular shooting areas

Acknowledgements

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