Unique Habitat Use in a Greater Sage-Grouse Fringe Population

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1. Introduction

- Greater sage-grouse (Centrocercus urophasianus) population decline since the 1930s throughout most of their range.
- Species designated as warranted but precluded for listing as threatened or endangered under the ESA, USFWS 2010.
- Bald Hills population in Utah is an isolated population at the southern edge of the species’ range.
- Due to lack of research, information about this population’s movements, distributions, and habitat use are unknown.
- High potential for wind, solar, and/or geothermal energy development in the Bald Hills area.
- Study objectives are to 1) quantify seasonal movements, 2) develop a species distribution model to predict and map seasonal habitat use and population distribution, and 3) compare habitat use of this population to studies of other non-isolated and less isolated populations.
- The results of this study will provide local land managers information to improve management techniques and policies in the face of energy development and decreasing Greater sage-grouse populations.

2. Methods & Study Area

A. FIELDWORK
- Birds located weekly during spring, summer, and fall; monthly during winter. March 2011 to August 2012.

B. SEASONAL MOVEMENTS
- 2010 & 2011 capture cohort with >1 location per season (N = 20)\(^6\).
- Calculated distance between Mean Center (MC) of all seasonal locations per bird\(^6\).
- Euclidean distance between seasonal MCs >10 km defined as migratory\(^6\).
- Spring movements = Feb–July; Fall = Oct–Dec.

C. SPECIES DISTRIBUTION MODEL (SDM)
- Maxent software to model presence-only data with continuous and categorical predictor variables\(^8\).
- Summer = Apr–Oct; Winter = Nov–Mar, Nest & Brood = all nests and brood locations\(^9\).
- 30m scale for all variables. 30% points as test data.
- Variables: elevation, slope, fire history, habitat treatment types, landcover, aspect, roads, water, curvature, distance to lek.

3. Results- Seasonal Movements

- Population primarily 1-stage migratory (80%); moving N in spring and S in fall.
- Small portions of population are non-migratory (10%) or 2-stage migratory (10%).
- 1-stage migratory birds stay mainly on eastern or western side of HWY 130.
- Migration dates vary and do not always match SDM seasonal cut-off dates.

4. Results- Species Distribution Models

SUMMER

- Telemetry points problematic because these birds migrated to winter range 1 week prior to the seasonal cut-off for this analysis.
- Did not project outside study area, so do not know predictive ability for telemetry points outside the study area.

WINTER

- Not predicting presence as well as the model should. Cluttered telemetry points here may be indicative of an unidentified lek.
- Commission errors here may be due to importance of distance to lek in the model. These areas represent locations of identified leks that were not active during this study.

NEST & BROOD

- Commission errors; small sample size may lead to omission of points that look like outlers, but may not be outliers.
- Commission errors; these areas may be true omission errors and they may be areas with potential nesting and brood-rearing habitat that was not captured by the small sample size.
- Commission errors; these areas may be true omission errors and they may be indicative that a higher threshold of habitat quality is necessary for nest and brood-rearing habitat.

5. Discussion

Seasonal Movements
- Population primarily 1-stage migratory. Western birds move to agricultural areas in summer. Eastern birds move to higher elevation areas and use juniper trees for cover.
- Small N due to lack of winter data for birds collared in 2012. Potentially problematic because new lek identified in 2012 in central portion of study area and may affect results.

Species Distribution Models
- Models predicting presence with good accuracy. Some omission and commission errors need to be addressed.
- Models have different parameters with varied contribution levels. Some variables included may not be necessary.
- Seasonal cut-off dates may not accurately represent migration dates between seasonal ranges for all birds.
- Because distance to nearest lek is important variable, model indicates that lek buffers may be a good management tool.
- Model may be able to predict areas of unidentified leks as well as nest and brood-rearing habitat.

6. Future Work

- Further examine bird preference for agricultural areas and juniper trees.
- Re-run models to reduce commission and omission errors by 1) adding relevant variables, 2) accounting for window of migration dates, 3) extending the study area with a buffer to account for telemetry points outside study area.
- Examine bird responses to each model variable to identify what level of the variable the birds are selecting for.
- Project models from the study area to the BLM Cedar City Field Office.
- Use final models to make management recommendations for the persistance of this population.

Literature Cited

\(^{10}\)Pontarolo BLM, Jason Nicholes UDWR, Jason Robinson UDWR. Graduate Committee- Dr. Frank Howe, Dr. Chris Calli

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