

# 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<sup>D</sup>.
- 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<sup>F</sup>.
- 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-peripheral 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

- Collared Greater sage-grouse in 2010, 2011, & 2012 (N = 66; 49 males & 17 hens) with VHF transmitters.
- Birds located weekly during spring, summer, and fall; monthly during winter. March 2011 to August 2012.

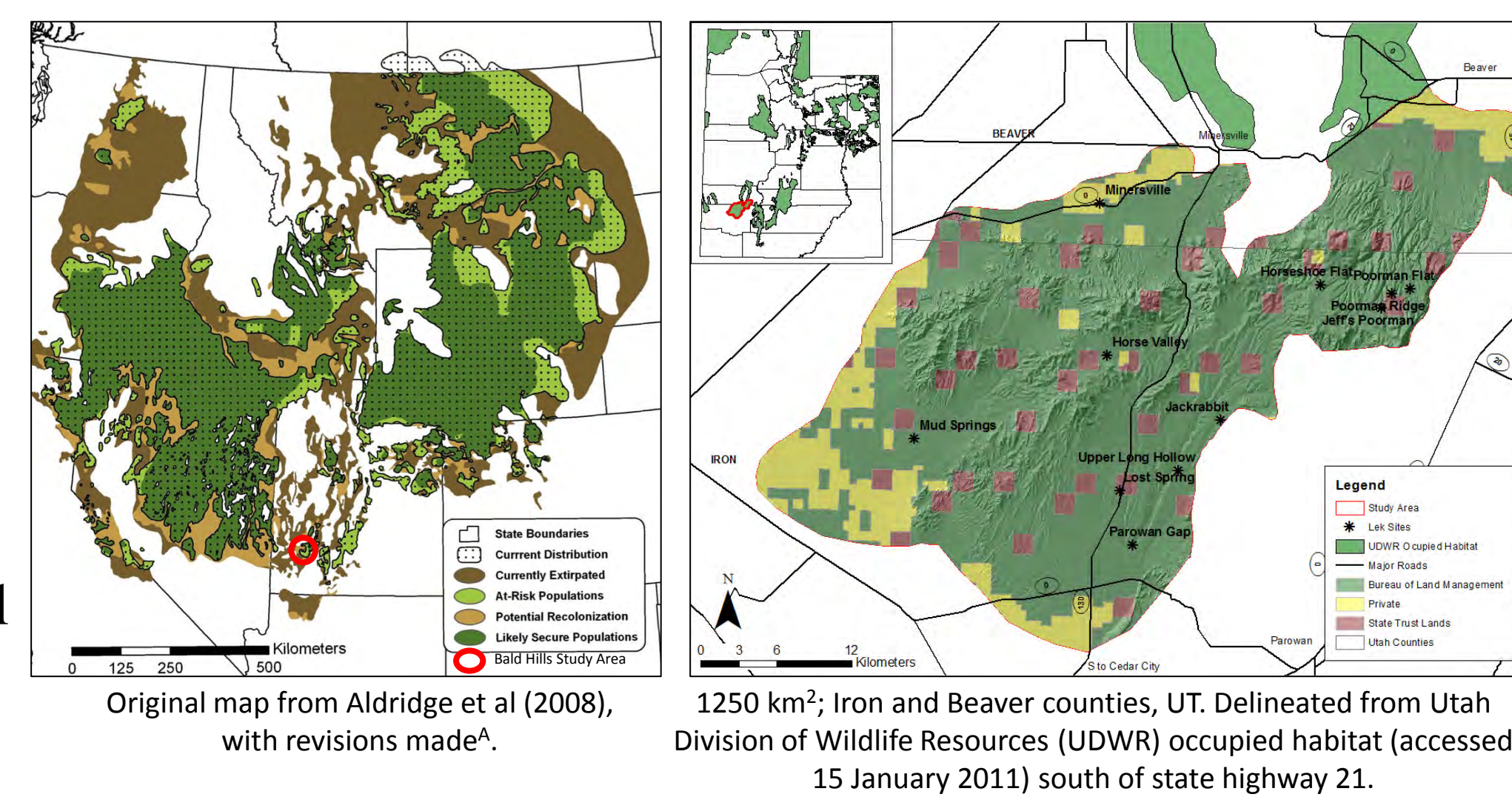
### B. SEASONAL MOVEMENTS

- 2010 & 2011 capture cohort with >1 location per season (N = 20)<sup>B,C</sup>.
- Calculated distance between Mean Center (MC) of all seasonal locations per bird<sup>B,C</sup>.
- Euclidean distance between seasonal MCs >10 km defined as migratory<sup>D</sup>.
- Spring movements = Feb-July; Fall = Oct-Dec.

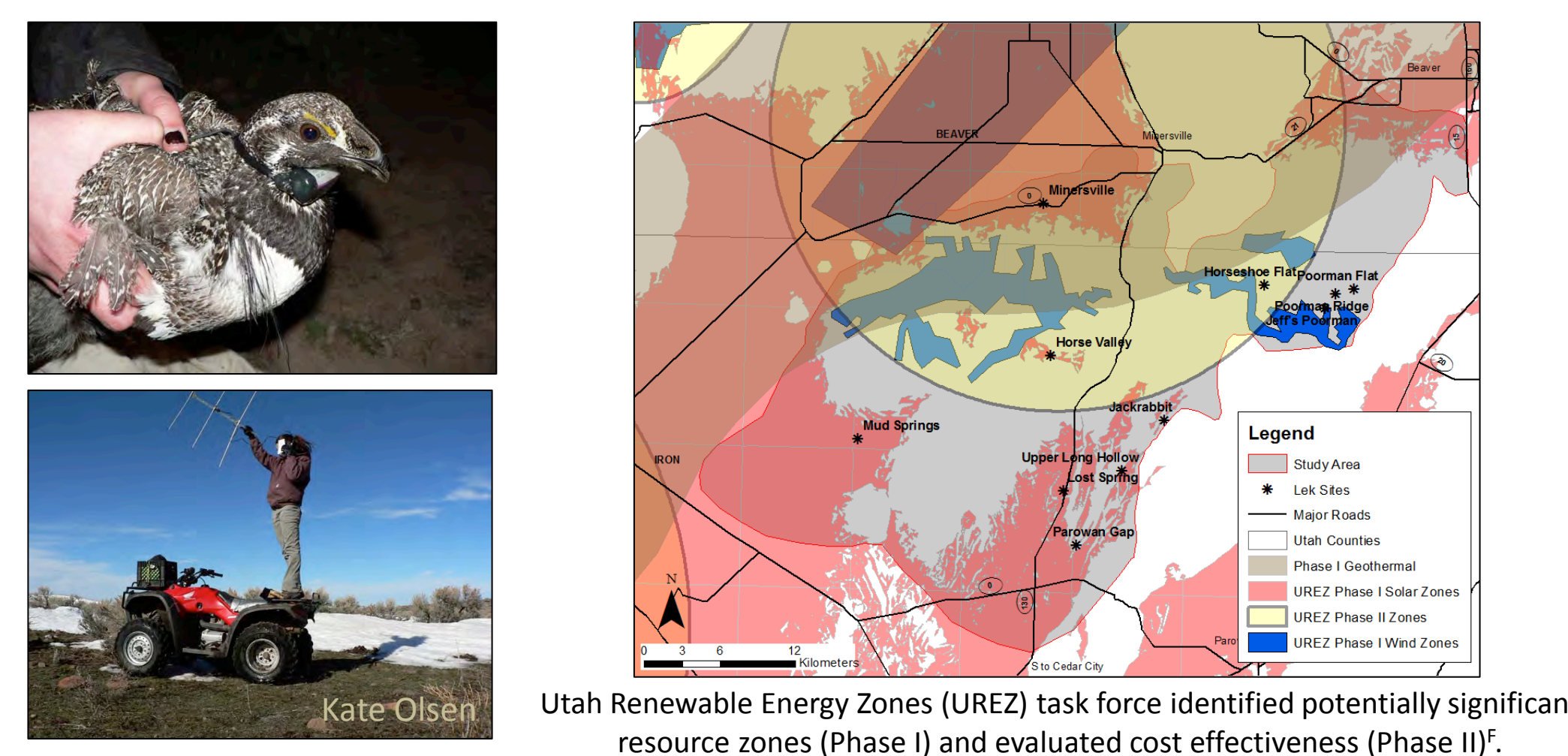
### C. SPECIES DISTRIBUTION MODEL (SDM)

- Maxent software to model presence-only data with continuous and categorical predictor variables<sup>E</sup>.
- Summer = Apr - Oct; Winter = Nov - Mar, Nest & Brood = all nest and brood locations<sup>B</sup>.
- 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.

### D. SPECIES RANGE & STUDY AREA



### E. POTENTIAL ENERGY DEVELOPMENT

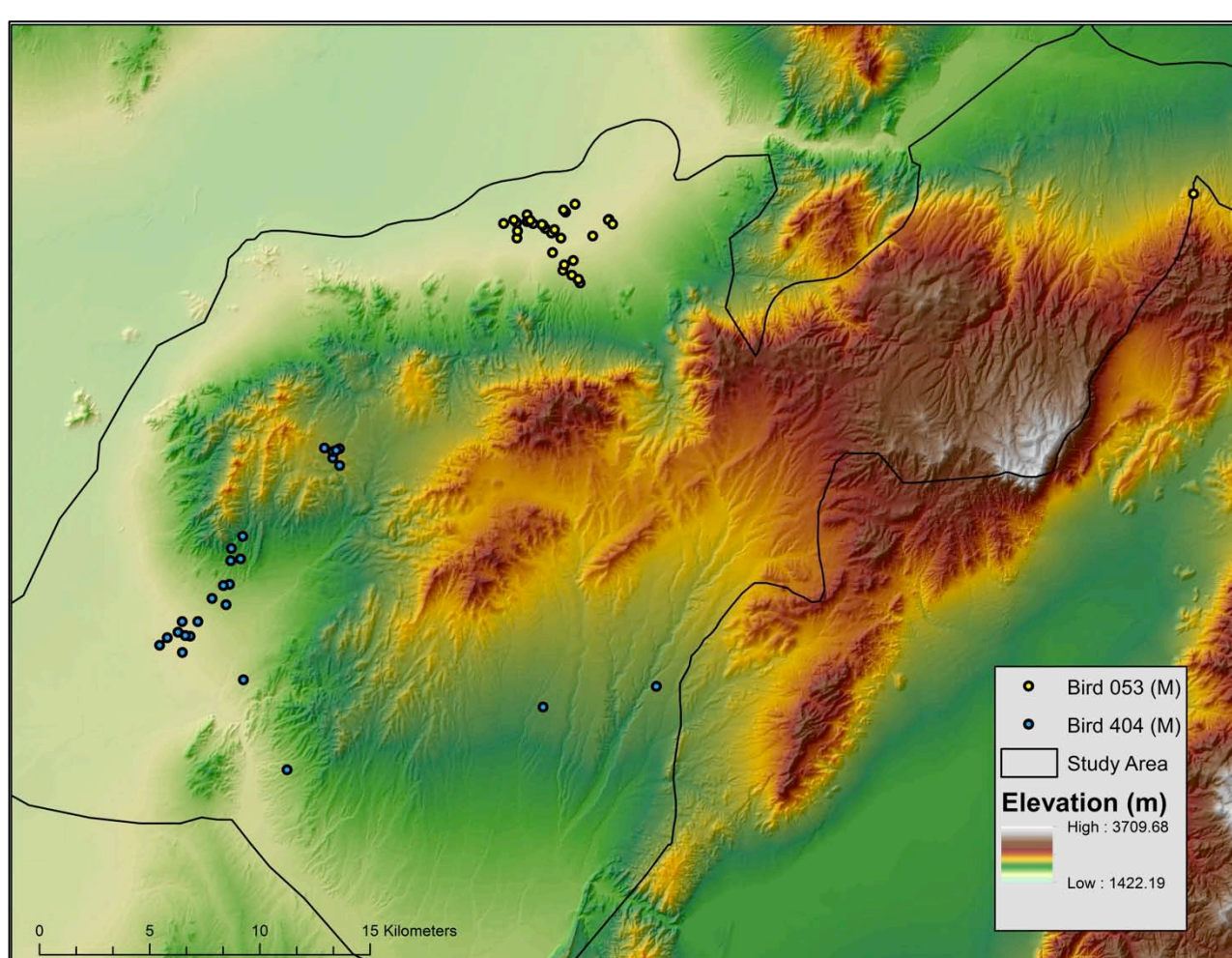


## 3. Results- Seasonal Movements

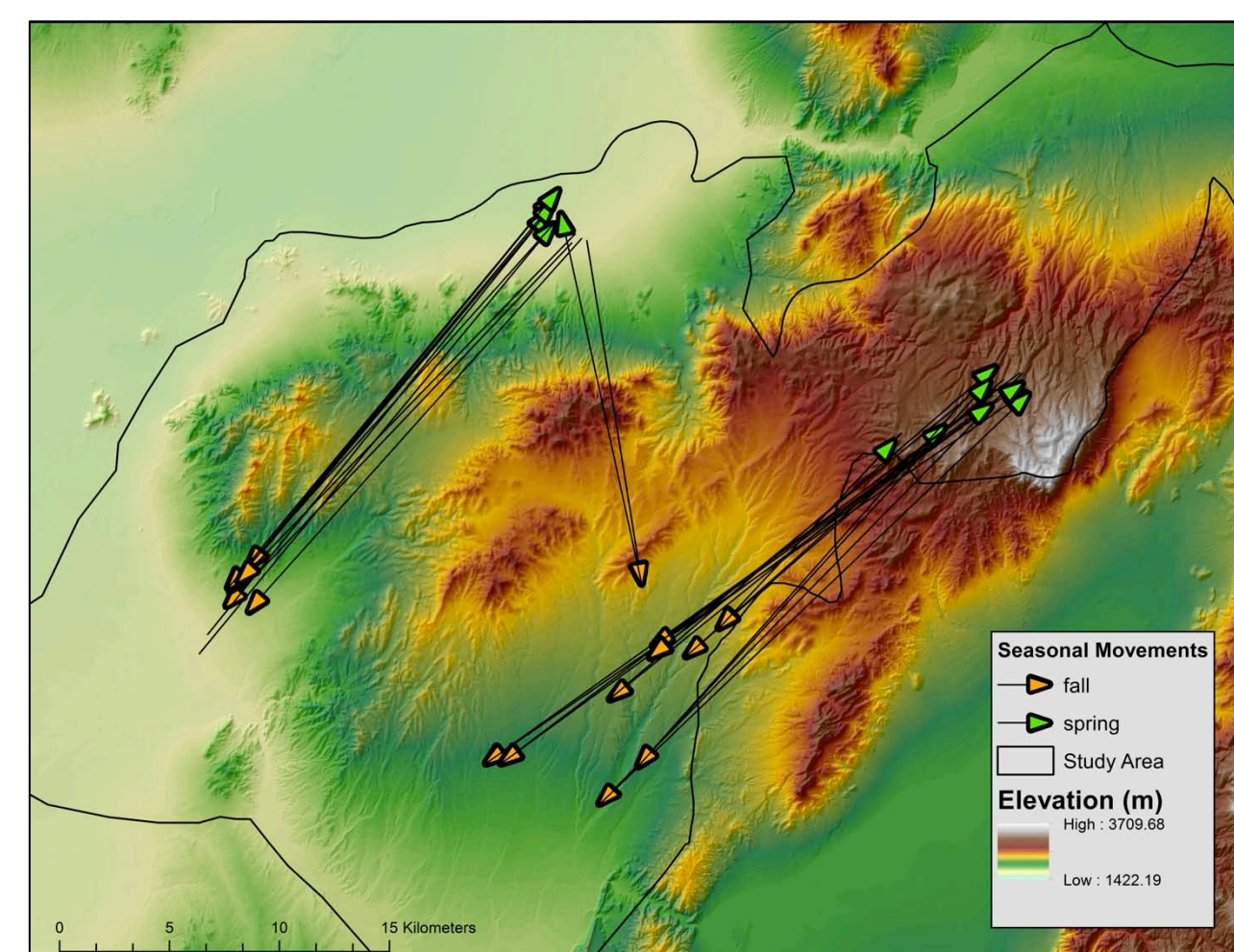
- Population primarily 1-stage migratory (80%); moving N in spring and S in fall.
- Small portions of population are non-migratory (10%) or 2-stage migratory (10%).
- 1-stage migratory birds stay mainly on eastern or western side of HWY 130.
- Migration dates vary and do not always match SDM seasonal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

Movement Pattern	N	% Population
Non-Migratory	2	10%
1-Stage Migratory	16	80%
2-Stage Migratory	2	10%

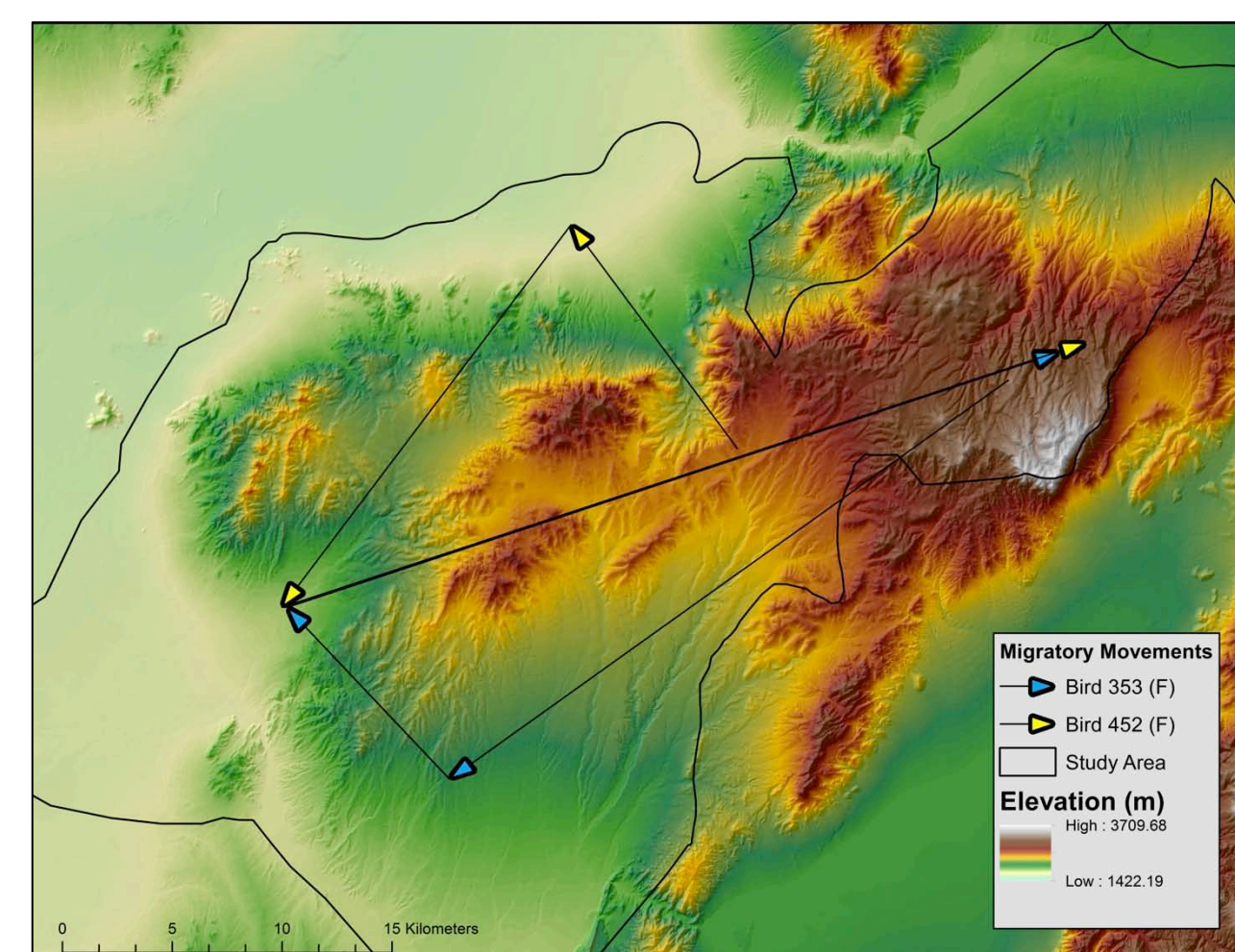
### NON-MIGRATORY



### 1-STAGE MIGRATORY



### 2-STAGE MIGRATORY



## Literature Cited

<sup>A</sup>Aldridge, C.L., S.E. Nielsen, H.L. Beyer, M.S. Boyce, J.W. Connelly, S.T. Knick, and M.A. Schroeder. 2008. Range-wide patterns of greater sage-grouse persistence. *Diversity and Distributions*. 14:983-994.

<sup>B</sup>Baxter, R.J., J.T. Flinders, and D.L. Mitchel. 2008. Survival, movements, and reproduction of translocated greater sage-grouse in Strawberry Valley, Utah. *Journal of Wildlife Management*. 72:179-186.

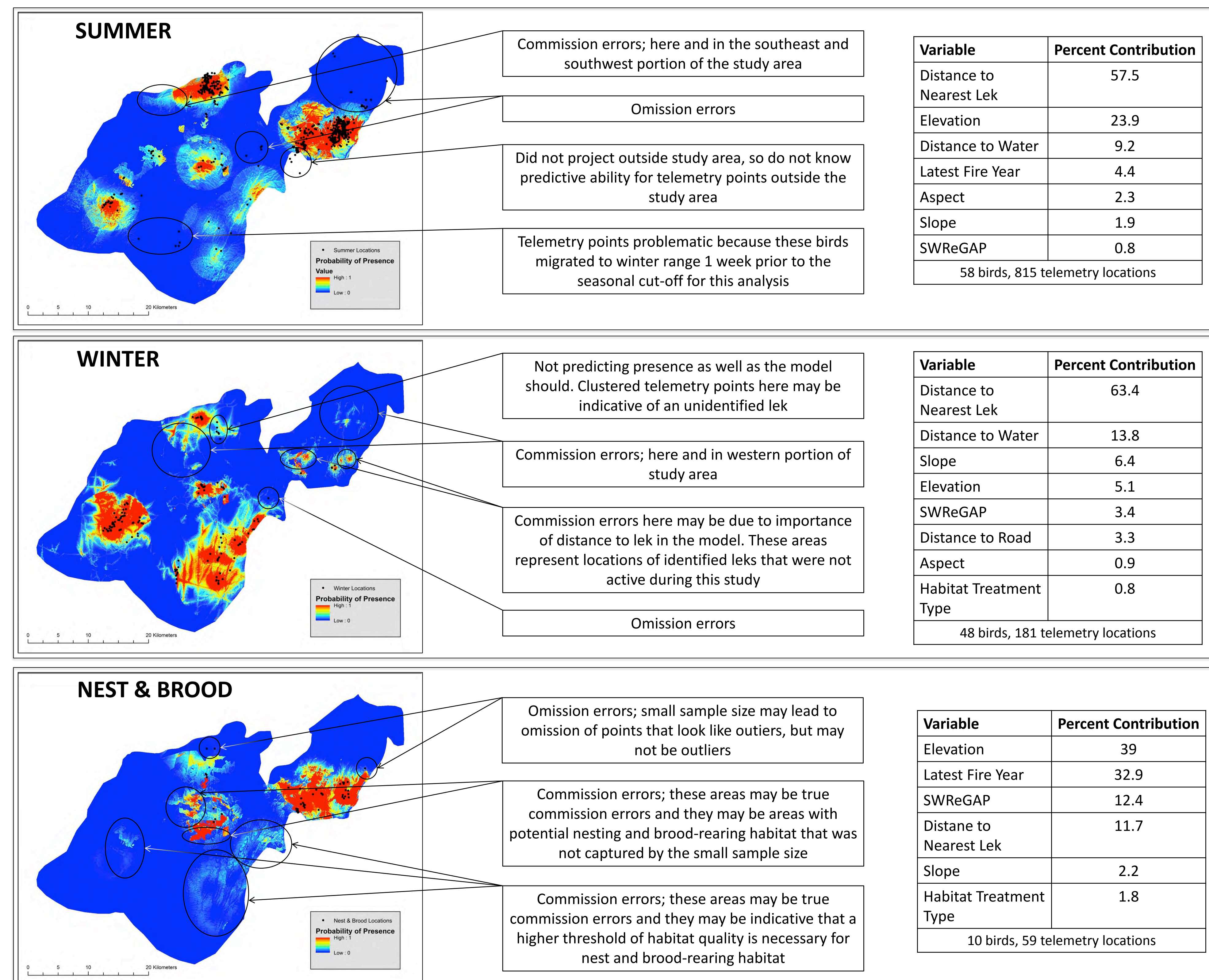
<sup>C</sup>Beck, J.L., K.P. Reese, J.W. Connelly, and M.B. Lucia. 2006. Movements and survival of juvenile Greater sage-grouse in southeastern Idaho. *Wildlife Society Bulletin*. 34:1070-1078.

<sup>D</sup>Connelly J.W., M.A.Schroeder, A.R.Sands, and C.E.Braun. 2000. Guidelines to manage sage grouse populations and their habitats. *Wildlife Society Bulletin*. 28:967-985.

<sup>E</sup>Phillips, S.J., Anderson, R.P., Schapire, R.E., 2006. Maximum entropy modeling of species geographic distributions. *Ecological Modelling* 190, 231-259.

<sup>F</sup>Utah Office of Energy Development. 2012. Renewable Energy: Utah Renewable Energy Zones Task Force. <[http://www.energy.utah.gov/renewable\\_energy/urez/task\\_force.htm](http://www.energy.utah.gov/renewable_energy/urez/task_force.htm)>. Accessed 11 June 2012.

## 4. Results- Species Distribution Models



Variable	Percent Contribution
Distance to Nearest Lek	57.5
Elevation	23.9
Distance to Water	9.2
Latest Fire Year	4.4
Aspect	2.3
Slope	1.9
SWReGAP	0.8
58 birds, 815 telemetry locations	

Variable	Percent Contribution
Distance to Nearest Lek	63.4
Distance to Water	13.8
Slope	6.4
Elevation	5.1
SWReGAP	3.4
Distance to Road	3.3
Aspect	0.9
Habitat Treatment Type	0.8
48 birds, 181 telemetry locations	

Variable	Percent Contribution
Elevation	39
Latest Fire Year	32.9
SWReGAP	12.4
Distance to Nearest Lek	11.7
Slope	2.2
Habitat Treatment Type	1.8
10 birds, 59 telemetry locations	

## 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 persistence of this population.

## Acknowledgements

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