

Pygmy Rabbit Habitat Suitability in Oregon



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Background

The pygmy rabbit is a “sensitive-vulnerable” species in Oregon and a federal “species of concern”

■ Factors

- Slope ranges 0° – 8° and 8° – 20°
- Presence of sagebrush
- Presence of sandy loam

■ Constraints

- Over 20° slope
- Absence of sagebrush
- High disturbance areas
- Elevation below 1200m and above 2400m



Research Question

- ❑ Where is there suitable habitat for the pygmy rabbit based on its habitat requirements?
- ❑ How fragmented is their habitat within the state of Oregon?
- ❑ How accurate is our model compared to field observations?



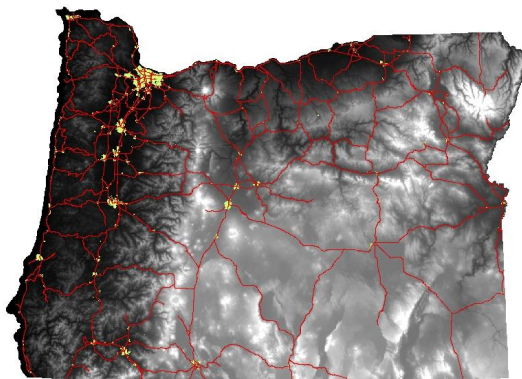
Data

❑ Raster

- DEM 80 meter
 - ❑ Elevation
 - ❑ Slope

❑ Vector

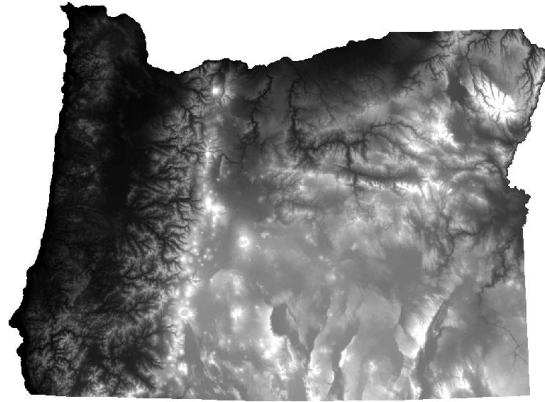
- Highways (lines)
- Cities (polygons)
- Vegetation (polygons)
- Soils (polygons)
- Field Observations (points)



Methods

Data Pre-Processing

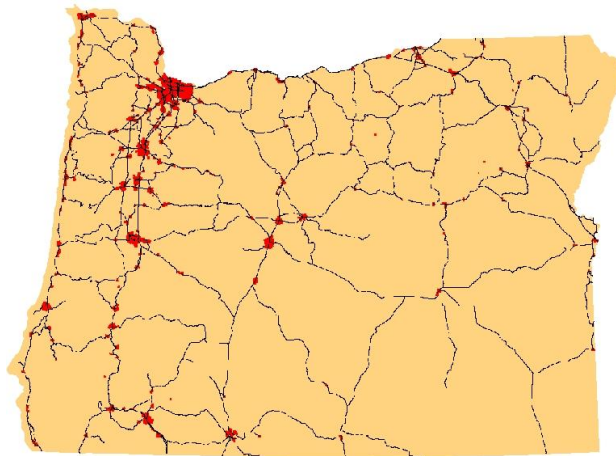
- ▣ Clip the DEM to the Oregon Boundary to define the study area
- ▣ Derive the slope from the DEM



Methods

Data Pre-Processing

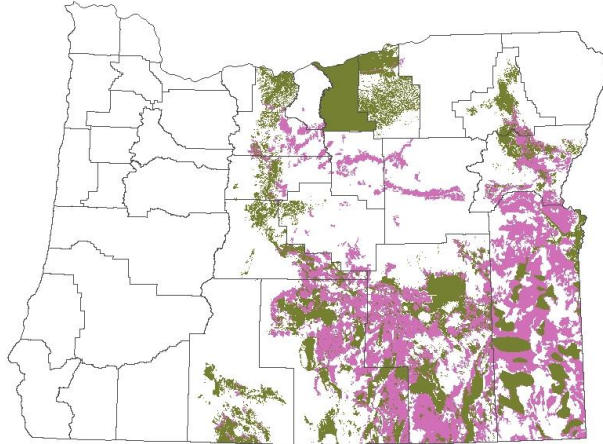
- ▣ Rasterize and Buffer the Highways and Cities



Methods

Data Pre-Processing

- ❑ Select Vegetation and Soil polygons by attributes
- ❑ Rasterize Vegetation and Soil polygons



Methods

Data Reclassification

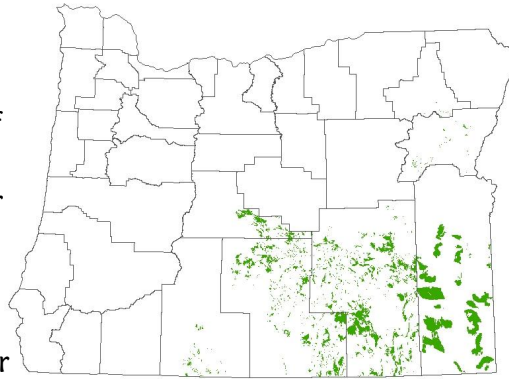
- ❑ Elevation Reclassed into 2 classes
 - 1 for 1200m – 2400m
 - 0 for Below 1200 m and Above 2400 m
- ❑ Slope Reclassed into 3 classes
 - 2 for 0° – 8°
 - 1 for 8° – 20°
 - 0 for Above 20°
- ❑ Vegetation Reclassed into 2 classes
 - 1 for presence of tall sagebrush (0 for all else)
- ❑ Soil Reclassed into 2 classes
 - 1 for suitable soil texture and depth (0 for all else)
- ❑ City and Highway Buffers Reclassed into 2 classes
 - 1 for absence of cities or highways, 0 for presence

Methods

Data Processing

▣ Habitat Patch Creation

- Linear Combination of Weighted Variables using Raster Calculator
- Combines factors and constraints to yield patches that are preferred, tolerated, or unsuitable



Patches = City * HWY * Elevation * Slope * Soils * Vegetation

Results in 0 for unsuitable, 1 for tolerated, 2 for preferred

Methods

Data Processing

▣ Processed Habitat Patches using FragStats

Fragstats	Class 1	Class 2
Total Area	19,564 sq. m	8,846,789 sq. m
% of Total Landscape	0.01%	4.8%
# of Patches	135	2291
Euclidean Nearest Neighbor Mean	10,562 m	3,355 m

Model Testing

First Run

- ▣ Compared Patches to Observations: 32 burrows
- ▣ Select by Location
“PR_Burrows” ARE WITHIN “patchshape”
- ▣ $18/32 = 56.25\%$
- ▣ What variable(s) is excluding the burrows?

Model Testing

Second Run

- ▣ Removed soils layer based on a visual inspection
 - Soils were selected for exclusion based on possible poor translation from literature to soil data sets
- ▣ Reran Raster Calculator without soils
 - Patches = City * HWY * Elevation * Slope * Vegetation
- ▣ Compare patches to Observations: 32 burrows
- ▣ Select by Location
“PR_Burrows” ARE WITHIN “patch_run2”
- ▣ $28/32 = 88\%$

Results

□ Patch Clustering

- Converted patch polygons to points

- Average Nearest Neighbor

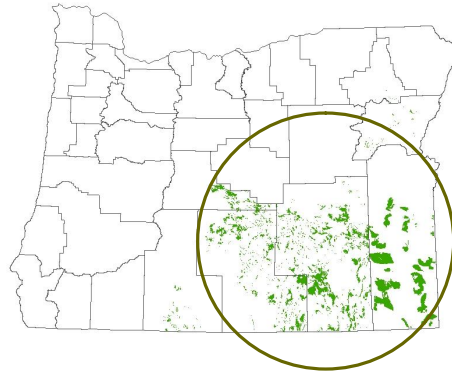
Observed Mean Distance/Expected Mean Distance = 0.3

Z-score: -82.69 s.d.

Less than 1% results are random

□ The clustering of patches is statistically significant

- Index values less than 1 correspond to clustering



Conclusion

- Suitable habitat is clustered primarily in the southeastern quadrant of the state

- Based on the Euclidean Nearest Neighbor mean, the habitat patches are fragmented

- Mean distance is greater than their maximum home range

- 168 meters – 449 meters

- Vegetation appears to be the most important factor for suitable habitat

- Slope and elevation relatively uniform

- Highway and urban area disturbances are sparse



Limitations

- ❑ DEM resolution may be too coarse to determine slope at the scale for a pygmy rabbit
- ❑ Soil requirements need refinement to provide a more accurate model
- ❑ More field observations would have allowed better model evaluation



References

- ❑ Hagar, J., Lienkaemper, G. 2007, Pygmy rabbit surveys on state lands in Oregon, U.S. Geological Survey Open-File Report 2007-1015, 23p.
- ❑ U.S Fish and Wildlife Service. 2008. Species Fact Sheet: Pygmy Rabbit. Accessed: E:\GIS_2\Project\Pygmy rabbit Fact Sheet.mht
- ❑ U.S. Fish and Wildlife Service. 2007. Draft Recovery Plan for the Columbia Basin Distinct Population Segment of the Pygmy Rabbit (*Brachylagus idahoensis*). Portland, Oregon. 118 pp.
- ❑ Boundary, Cities, Highways, DEM, and Vegetation from the Oregon Geospatial Clearinghouse
- ❑ Soils from NRCS
- ❑ Burrow Locations from USGS

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Questions?