Appendix 11

Habitat model for the northern spotted owl (*Strix occidentalis*)

The model was built in two steps: First, an understanding of habitat relationships was developed based on empirical data from the study area. Second a habitat suitability model was developed based on the understanding of habitat relationships from the statistical model.

We obtained owl site and use data from 35 northern spotted owl sites on the Deschutes National Forest from Ray Davis (USDA Forest Service, Region 6 Old Forests and Spotted Owls Monitoring Lead). We used a combination of logistic regression and selection ratio analyses (Manly et al. 2002) to compare circular areas around the nest sites to the surrounding landscape at three scales: the nest stand (100 ha), the core home range area (500 ha), and the annual home range (2000 ha). Habitat analysis was conducted using year 2000 GNN vegetation data (pre B&B fire). The owl sites were also all pre-2003 sites for consistency with the vegetation data. We evaluated a suite of biologically plausible mixed-effects logistic regression models for each scale using an information theoretic approach (Burnham and Anderson 2010, Singleton 2013). We then investigated the predicted resource selection values from those models and identified thresholds representing areas used less than, equal to, or greater than available across the analysis landscape. Finally, we quantified the range of covariate values found within each resource selection class and identified classification thresholds for each covariate that best distinguished between the classes. The "Good" habitat class represents habitat conditions found to be used more than available across the three scales of analysis, and is generally consistent with spotted owl "nesting / roosting" habitat (Courtney et al. 2004). The "Moderate" habitat class represents habitat conditions generally found to be used in proportion to available, and is more consistent with "foraging" habitat. The "Poor" habitat class represents habitat conditions used less than available and was considered to be "non-habitat".

We then used the habitat relationships from the empirical analysis to build a habitat suitability model that could be used with our state and transition model structure classes:

Habitat Classes:

0 = Non-Habitat
1 = Moderate Habitat (foraging)
2 = Good Habitat (nesting)

Table A8.1. Habitat quality scores for mixed conifer types: Douglas-fir, Douglas-fir-White fir, white fir, grand fir, and red fir/white fir.

		Canopy Cover		
Stem Size		Low (Open)	Medium	High (Closed)
	Sapling	0	0	0
	Pole	0	0	0
	Small	0	1	1
	Medium	0	1	2
	Large	0	1	2

Very Large (Giant)	0	1	2

For Cover Type Group 2 (Mixed Ponderosa pine)

	Canopy Cover		
Stem Size	Low (Open)	Medium	High (Closed)
Sapling	0	0	0
Pole	0	0	0
Small	0	0	0
Medium	0	0	1
Large	0	0	1
Very Large (Giant)	0	0	1

For Cover Type Group 3 (Mountain Hemlock)*

	Canopy Cover		
Stem Size	Low (Open)	Medium	High (Closed)
Sapling	0	0	0
Pole	0	0	0
Small	0	1	1
Medium	0	1	1
Large	0	1	1
Very Large (Giant)	0	1	1

*Only for CT_MH areas < 1800 m elevation and < 1km from Good (2) habitat

Literature Cited:

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Manly, B.F., L.L. McDonald, D.L. Thomas, T.L. McDonald, W.P. Erickson. 2002. Resource Selection by Animals: Statistical design and analysis for field studies. Second Edition. Kluwer Academic Publishers. Dordrecht, The Netherlands.