

PREDICTING AVIAN RESPONSES TO FOREST MANAGEMENT PRACTICES

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Management Options

- ▣ Do nothing
- ▣ Traditional fuel reduction prescription
 - Reducing ladder fuels and canopy cover
- ▣ Spatial heterogeneity prescription (GTR-220)
 - Emphasis on maintaining/creating structural variability

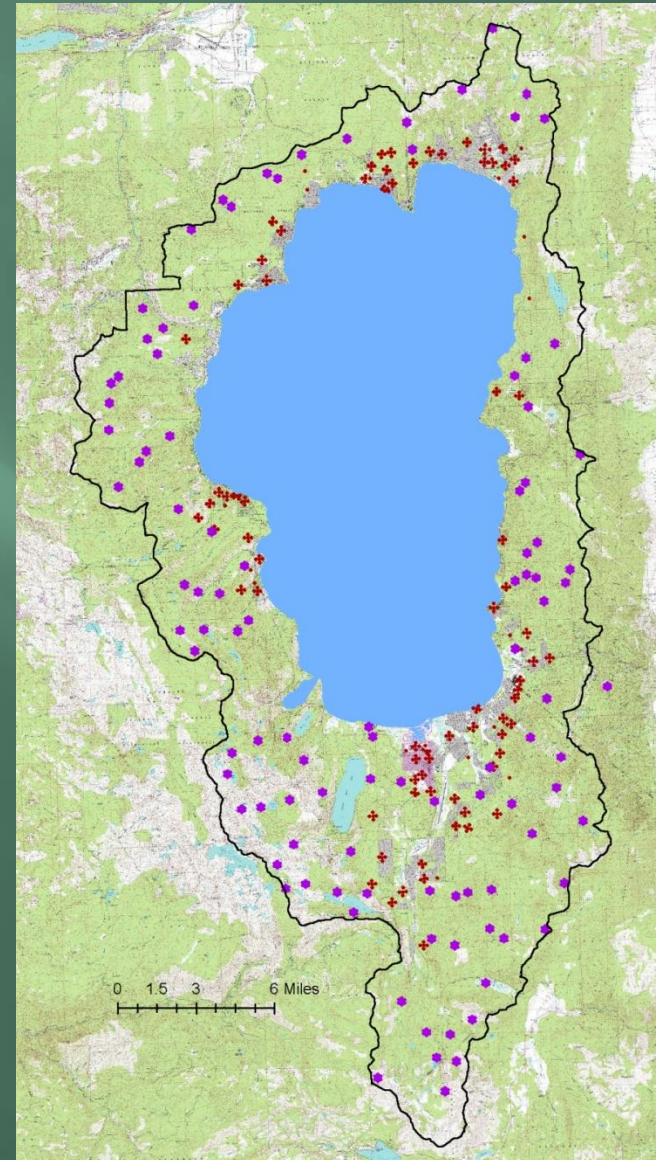


Predicting Species' Responses to Fuel Reduction Treatments

- ▣ Experimental studies are often ambiguous
 - Treatments and starting conditions vary
 - Measuring short-term responses
- ▣ Why use occupancy modeling?
 - Responses not limited to abundant species
 - Accounts for imperfect detection
 - Models habitat covariates directly

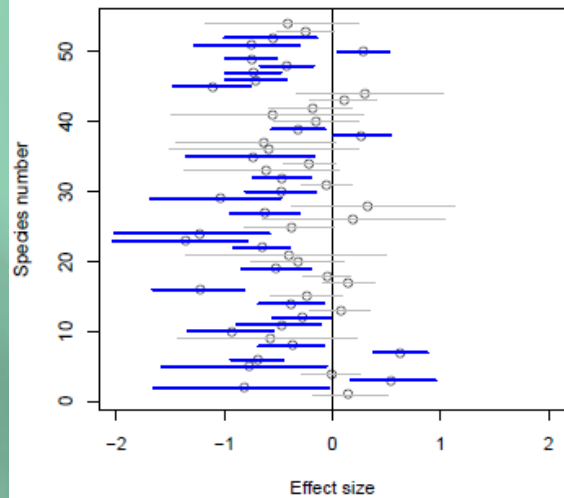
Occupancy Modeling

- ▣ Probability of occupancy
- ▣ Requirements
 - Detection/non-detection data
 - Spatially and temporally replicated data
- ▣ Point count data collected from 742 locations from 2002-2005

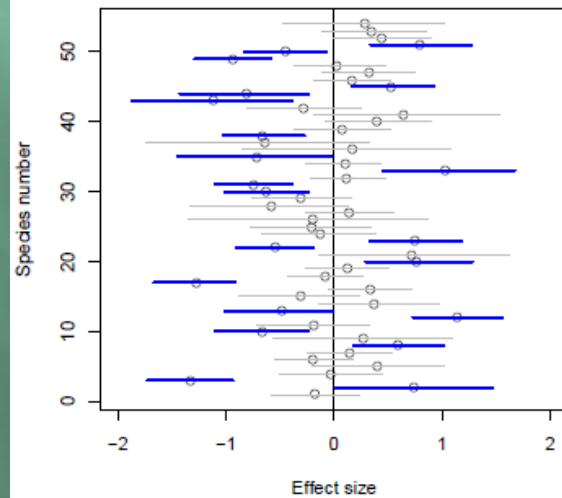


What Factors Drive Diversity?

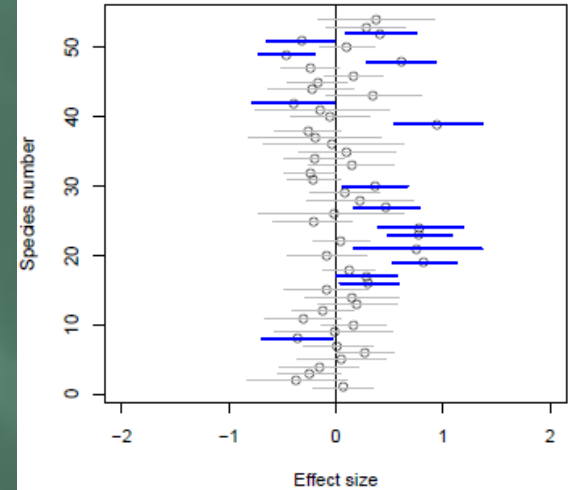
Effect of development (linear) on occupancy



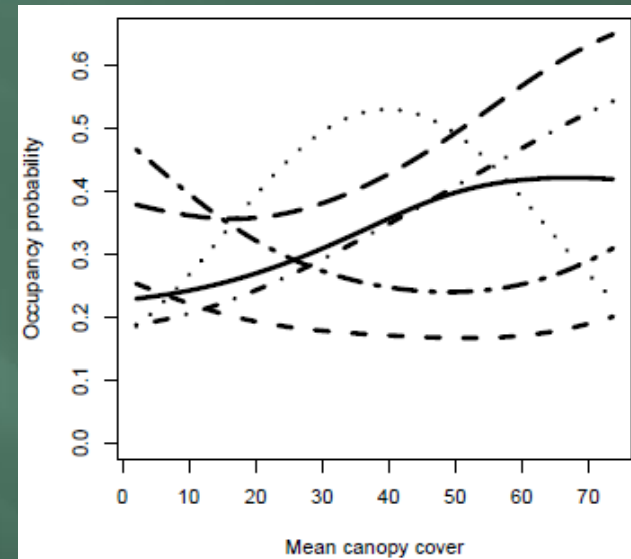
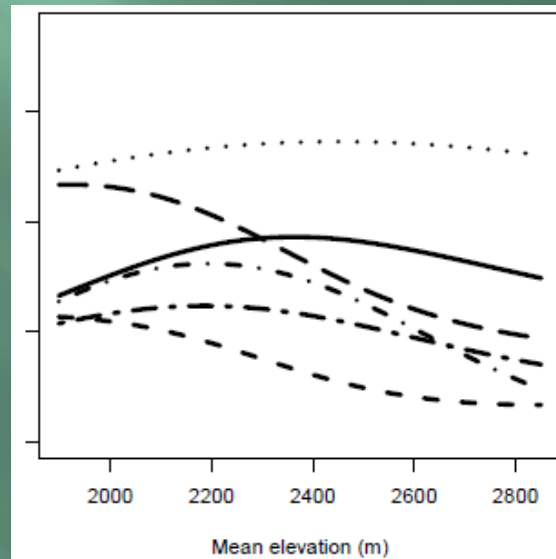
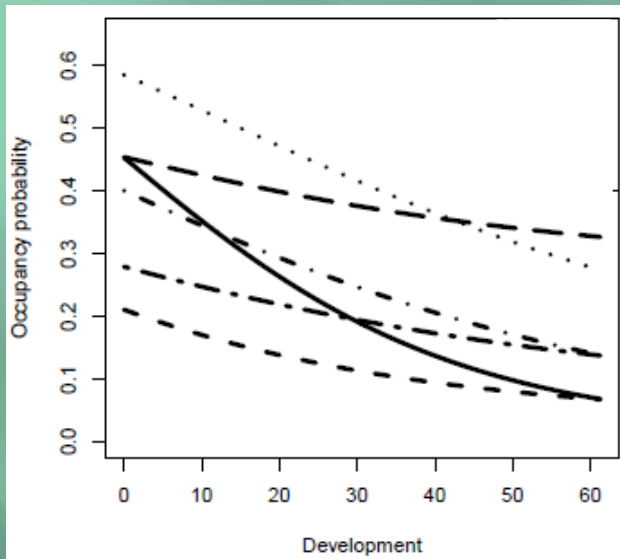
Effect of elevation (linear) on occupancy



Effect of canopy cover (linear) on occupancy



What Are the Consequences to Ecosystem Function?



— Air
forager

-- Bark
forager

... Bark
gleaner

... Foliage
invertivore

-- Ground
invertivore

-- Seed
eater

Predict Avian Response to Management Practices

- ▣ How does treatment impact species, communities and ecosystem services
- ▣ Does incorporating spatial heterogeneity in treatments benefit biodiversity?
- ▣ How does urbanization mediate wildlife response?



Management Impacts on Species Richness

Table 3. Mean, standard deviation and 95 % posterior intervals in species richness for avian groups predicted under different forest management practices.

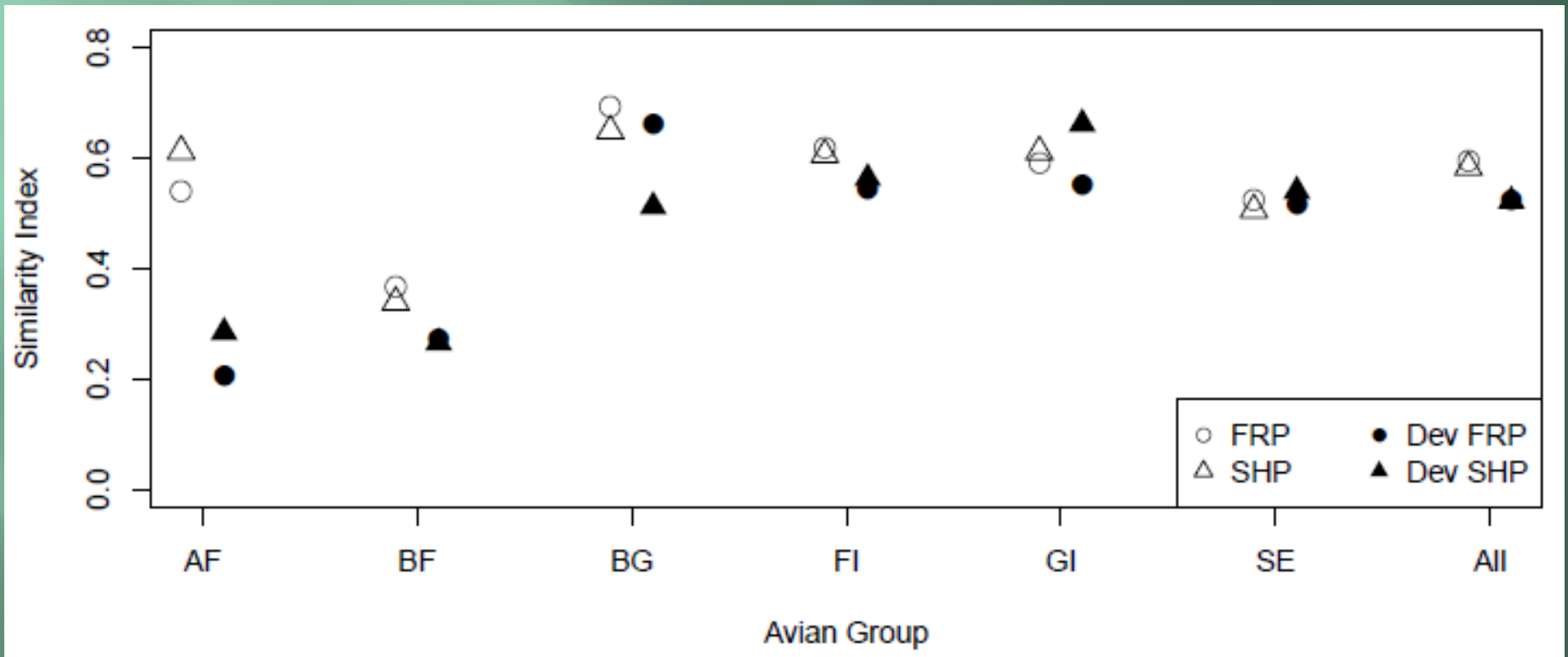
Avian group	Undeveloped			Developed		
	FSF	FRP	SHP	FSF	FRP	SHP
All species (46)	21.11 ± 2.41 (16 - 26)	17.73 ± 2.62 (13 - 23)	19.18 ± 2.73 (14 - 25)	16.88 ± 2.47 (12 - 22)	13.47 ± 2.34 (9 - 18)	14.06 ± 2.60 (9 - 19)
Air foragers (5)	2.31 ± 0.98 (0 - 4)	2.31 ± 0.95 (1 - 4)	2.56 ± 0.91 (1 - 4)	1.04 ± 0.87 (0 - 3)	0.97 ± 0.84 (0 - 3)	1.26 ± 0.85 (0 - 3)
Bark foragers (5)	1.27 ± 0.90 (0 - 3)	1.29 ± 0.91 (0 - 3)	1.15 ± 0.88 (0 - 3)	0.93 ± 0.82 (0 - 3)	0.86 ± 0.80 (0 - 3)	0.82 ± 0.76 (0 - 2)
Bark gleaners (6)	2.35 ± 0.65 (1 - 4)	3.53 ± 0.94 (2 - 5)	2.92 ± 1.11 (1 - 5)	2.05 ± 0.63 (1 - 3)	2.80 ± 1.00 (1 - 5)	2.10 ± 1.07 (0 - 4)
Foliage invertivores (15)	10.40 ± 1.33 (8 - 13)	5.84 ± 1.44 (3 - 9)	7.80 ± 1.60 (5 - 11)	8.90 ± 1.57 (6 - 12)	4.48 ± 1.23 (2 - 7)	5.85 ± 1.59 (3 - 9)
Ground invertivores (5)	2.36 ± 0.76 (1 - 4)	2.25 ± 0.93 (0 - 4)	2.02 ± 0.84 (1 - 4)	2.03 ± 0.84 (1 - 4)	1.93 ± 0.82 (0 - 3)	1.82 ± 0.75 (1 - 3)
Seed eaters (10)	2.34 ± 1.09 (0 - 5)	2.54 ± 1.05 (1 - 5)	2.71 ± 1.16 (1 - 5)	1.99 ± 1.05 (0 - 4)	2.36 ± 0.98 (1 - 4)	2.24 ± 1.02 (1 - 4)

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Management Impacts on Community Composition



Science Synthesis & Gaps

- ▣ Assess “biodiversity” needs
- ▣ Embrace heterogeneity
- ▣ Further need to understand management impacts on rarer species
- ▣ Link between species composition and ecosystem services



- ▣ Collaborative project between USDA Forest Service PSW & Spatial Informatics Group (SIG)

