

Gunnison sage-grouse appears headed for Endangered Species List

'Warranted but precluded'

DECISION OFFERS ENCOURAGEMENT, CONCERNS FOR INDUSTRY, CONSERVATIONISTS

UT officials disappointed with sage grouse plan

Idaho Task Force Tackles Sage¹³
Grouse Issues

Big fire season further threat to Nevada's sage grouse habitat

Energy Developments Threaten Sage-Grouse Habitat in Wyoming

New Grouse Study Focuses on
Spring Grazing

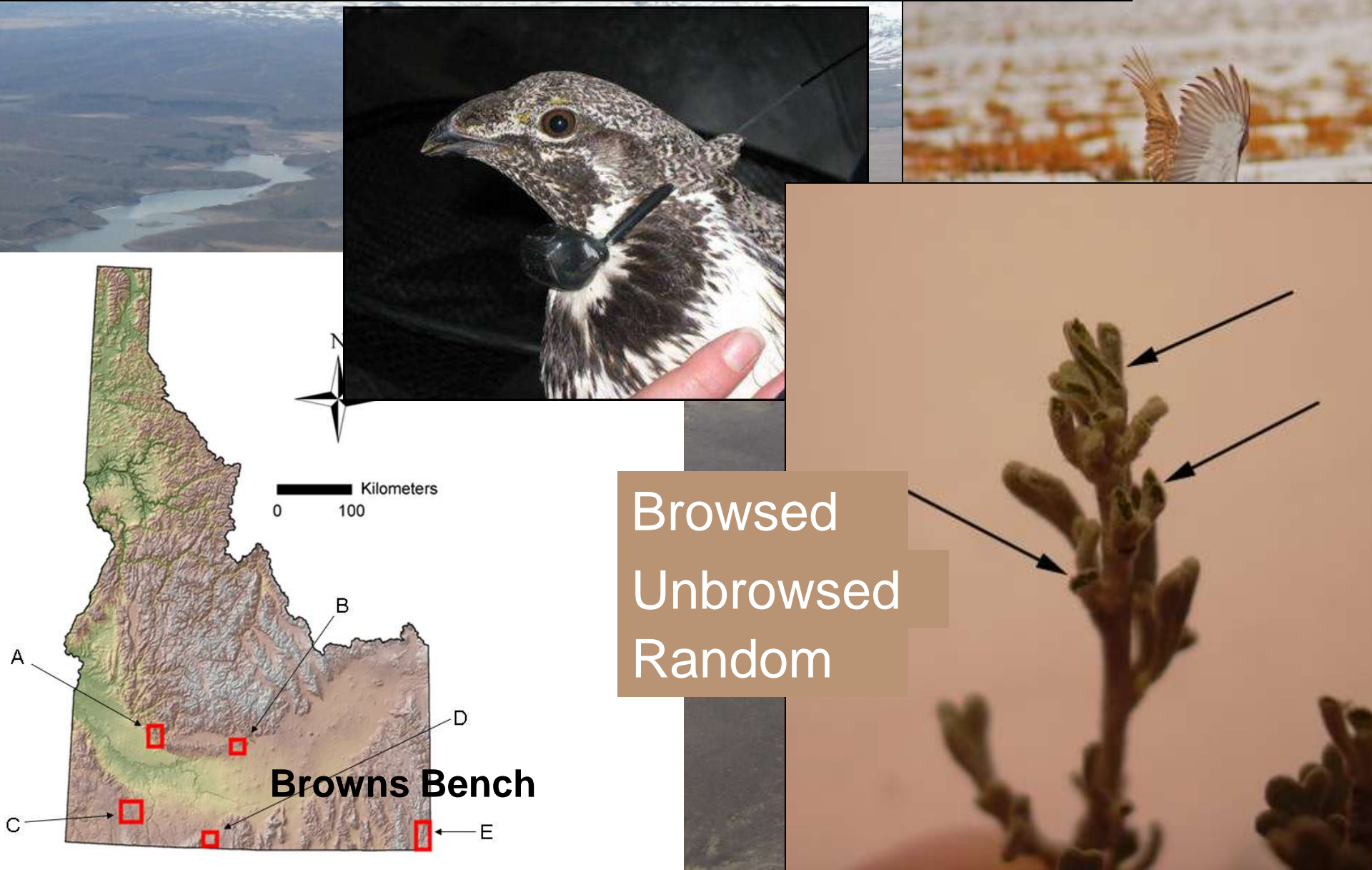
Sage-grouse's eye view of habitat quality: Not all sagebrush are created equal!!



**Jennifer S. Forbey¹, Graham G. Frye¹ and
John W. Connelly²**

¹Boise State University, ²Idaho Department of Fish and Game

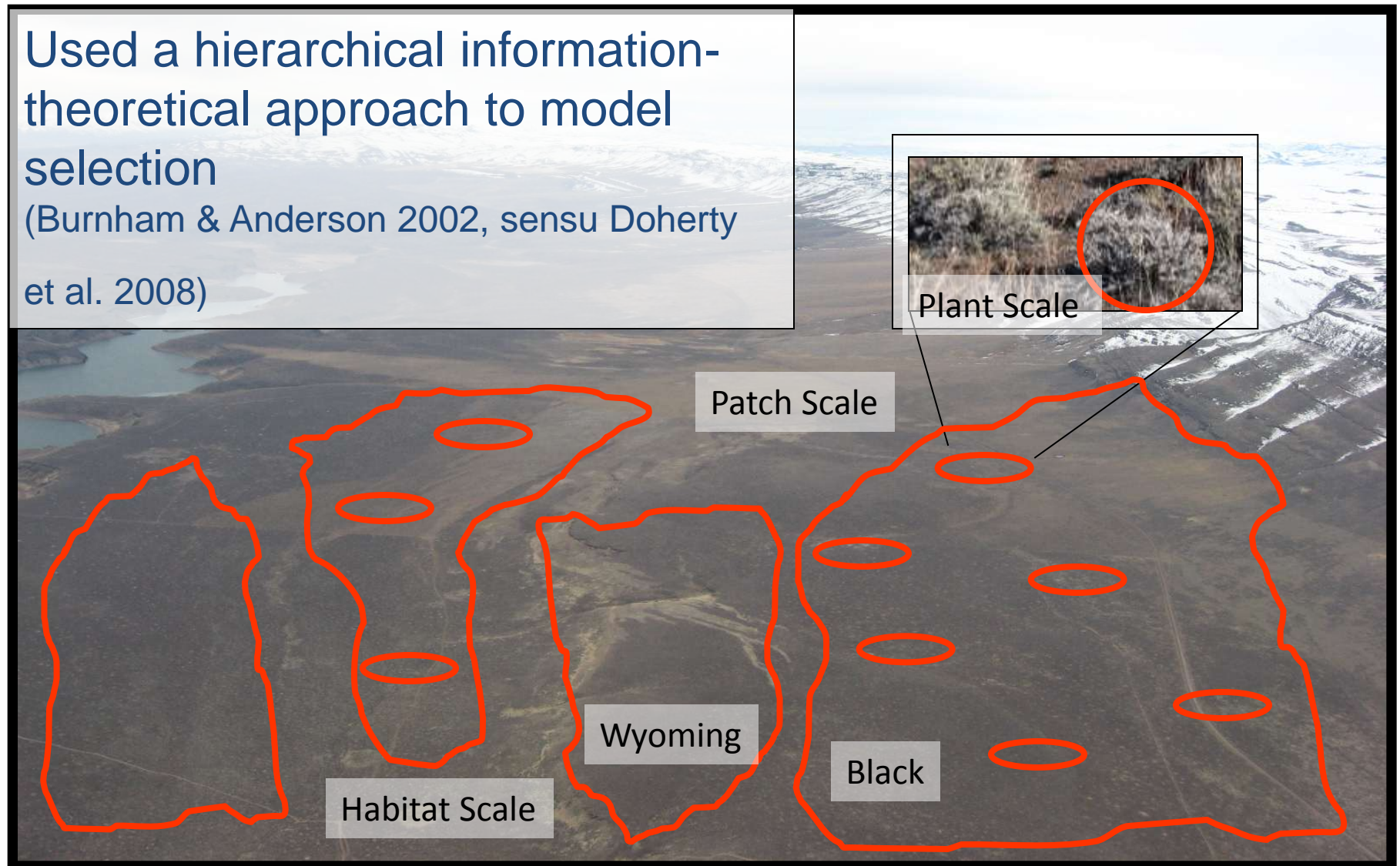
Sage-grouse are selective for sagebrush at multiple spatial scales



Sage-grouse avoid toxins at multiple spatial scales

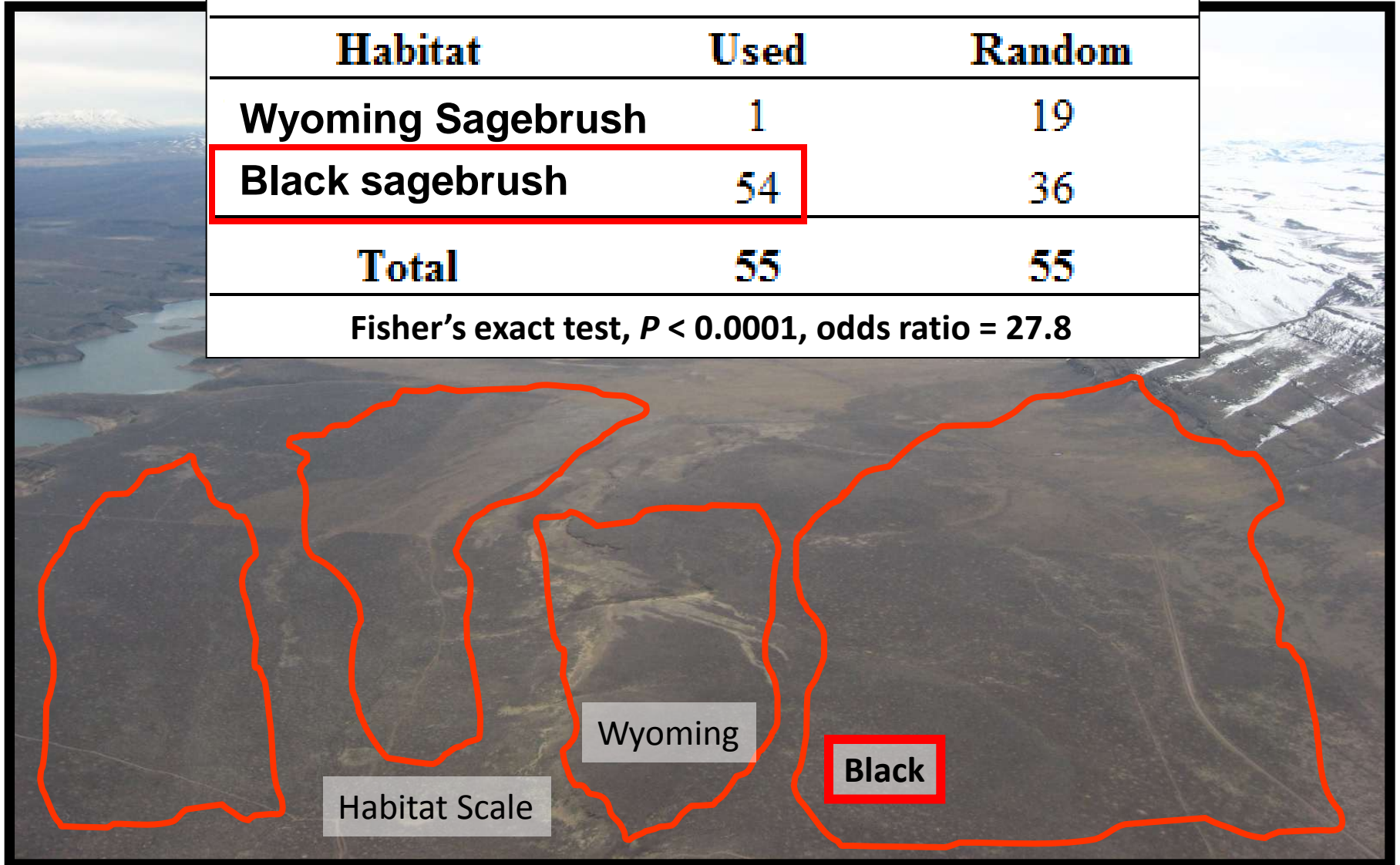
Used a hierarchical information-theoretical approach to model selection

(Burnham & Anderson 2002, sensu Doherty et al. 2008)

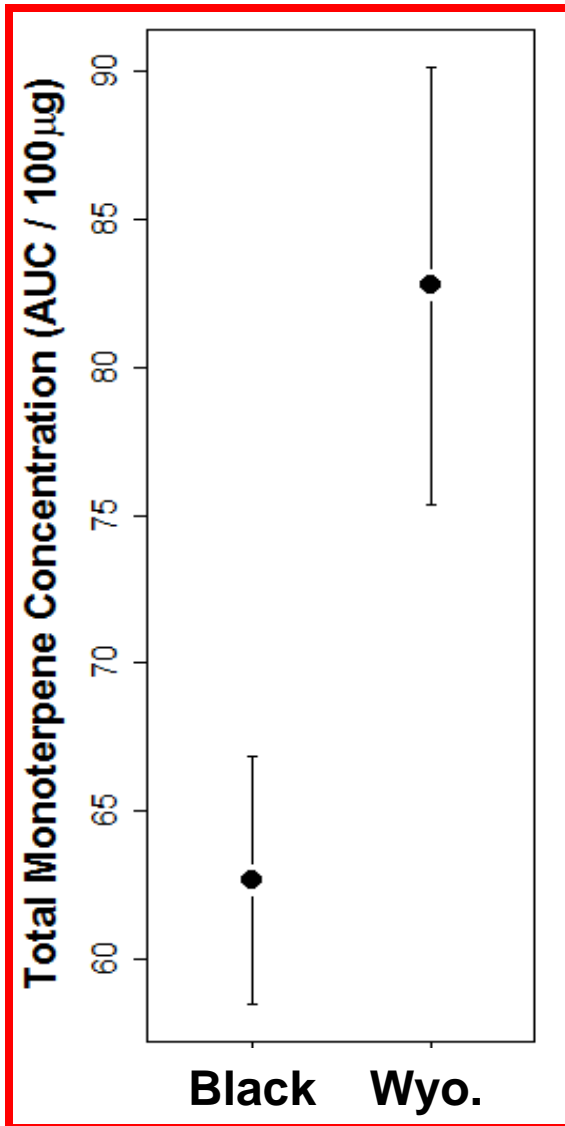


Habitat Scale: Sage-grouse selected habitats with black sagebrush

Habitat	Used	Random
Wyoming Sagebrush	1	19
Black sagebrush	54	36
Total	55	55
Fisher's exact test, $P < 0.0001$, odds ratio = 27.8		



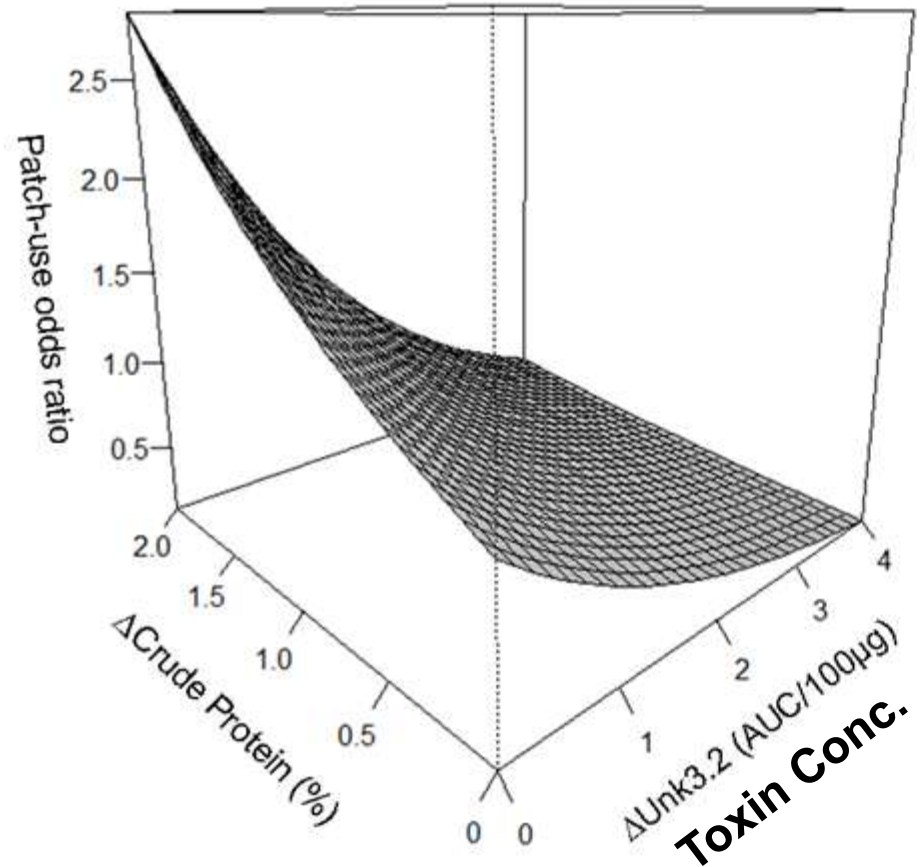
Habitat Scale: Sage-grouse selected habitats with black sagebrush **to avoid toxins**



Patch Scale: Sage-grouse **avoid toxins** and select for protein



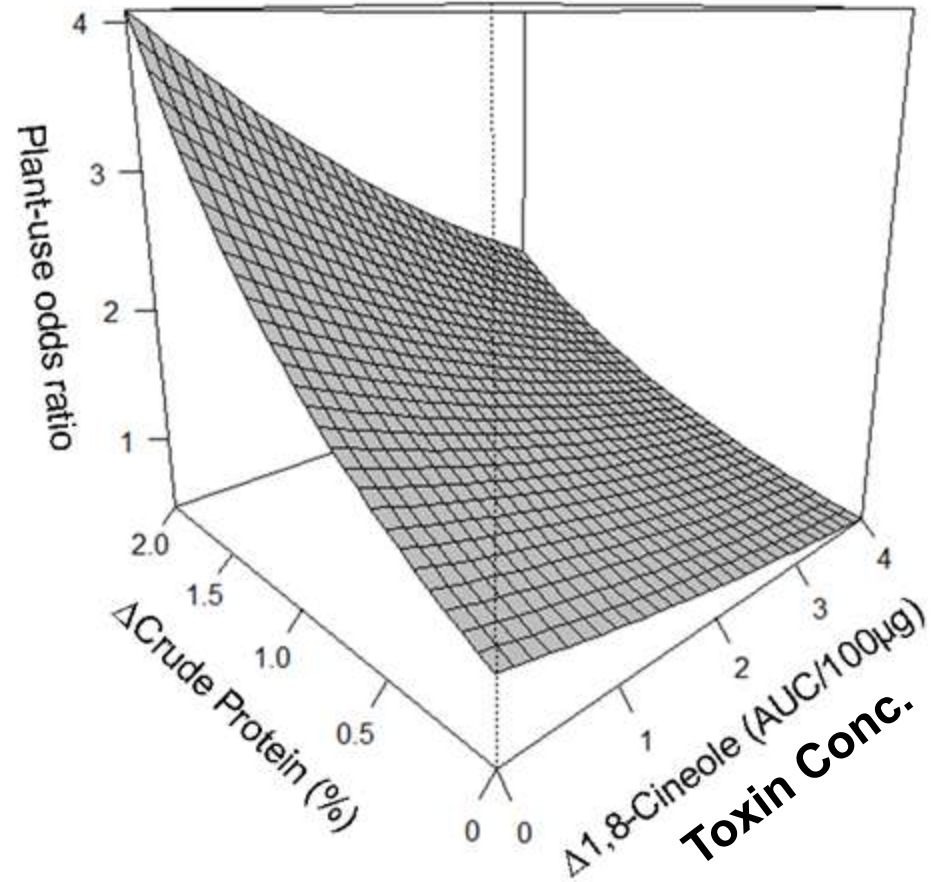
Patch Scale



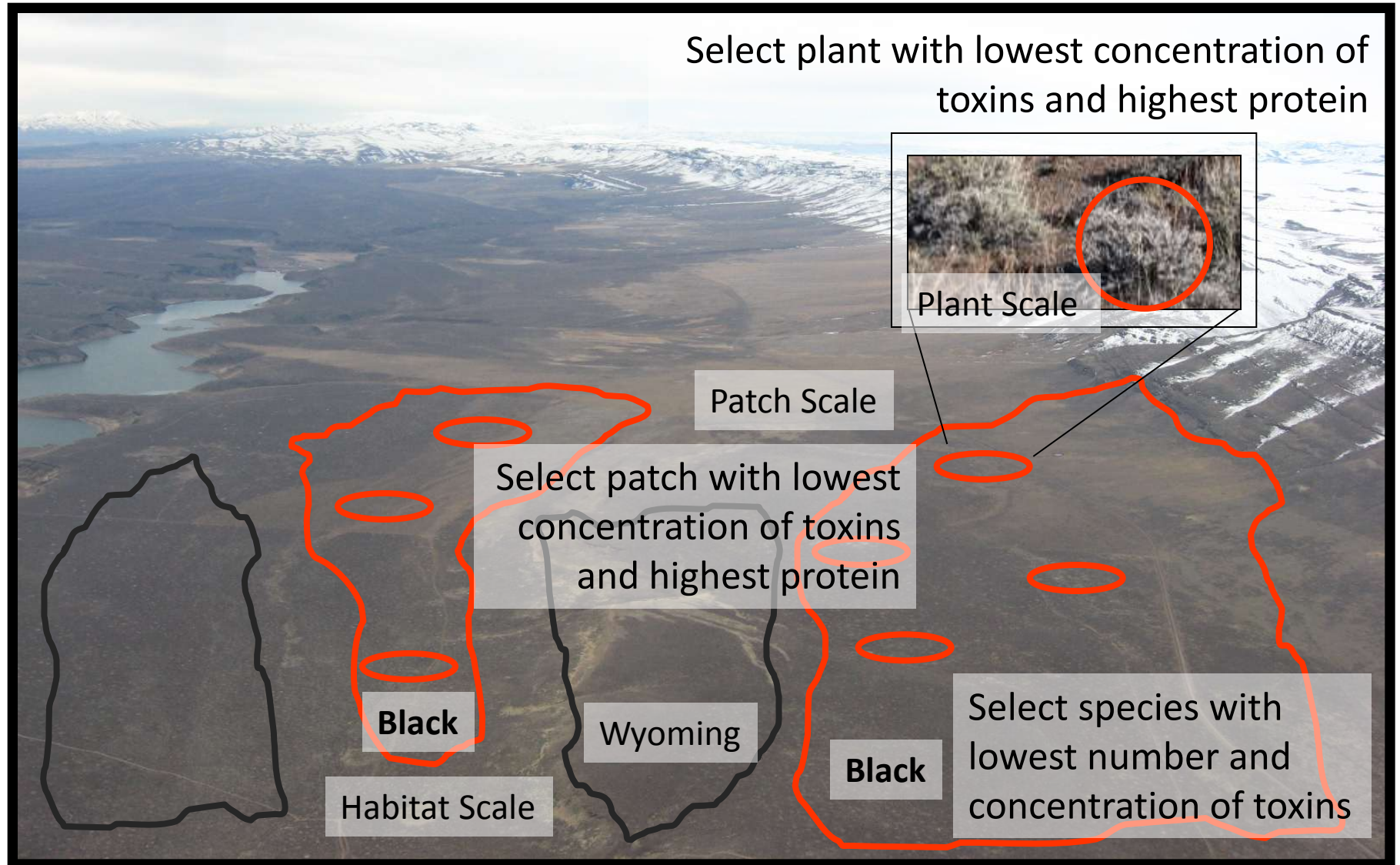
Plant Scale: Sage-grouse **avoid toxins** and select for protein



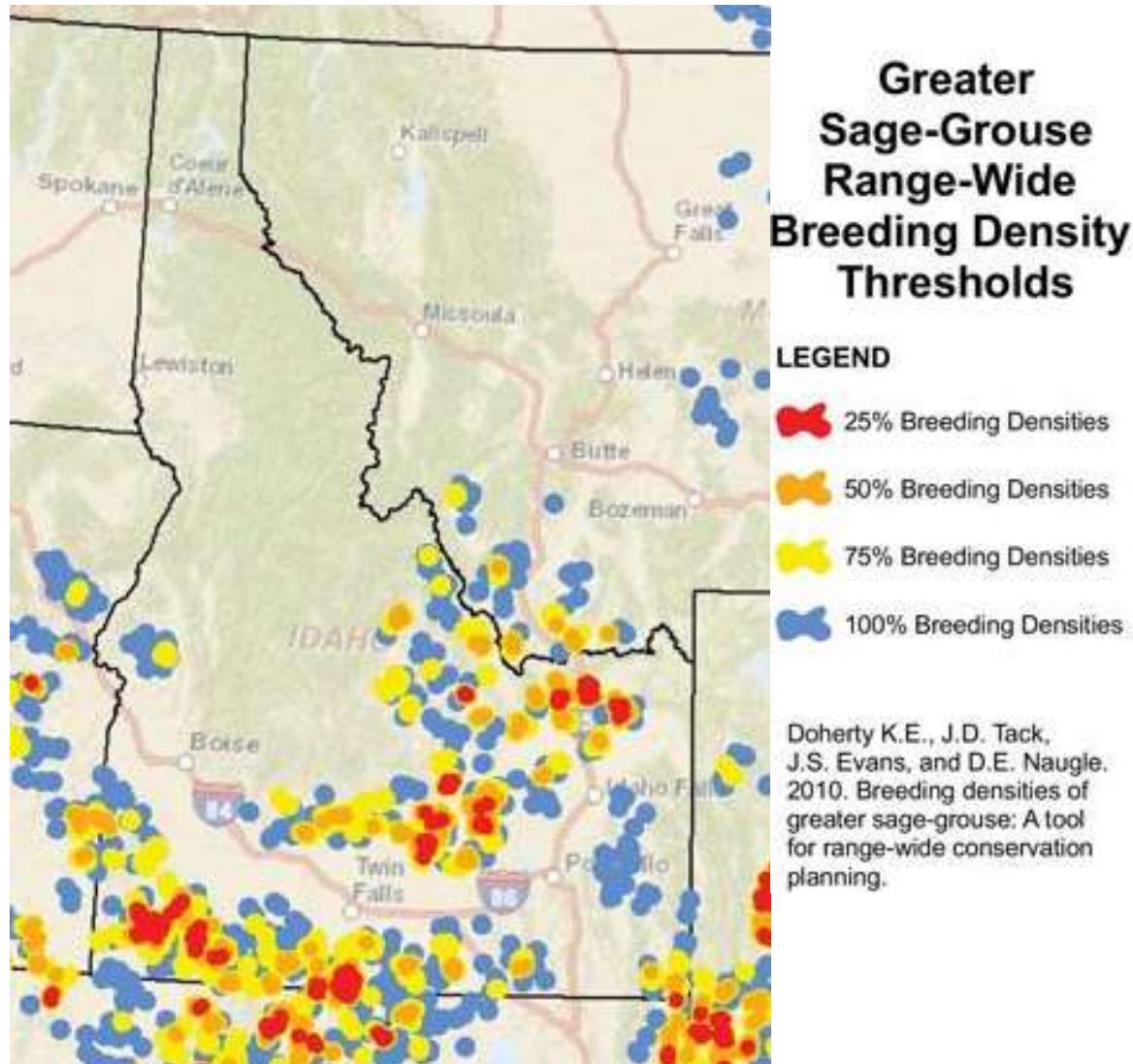
Plant Scale



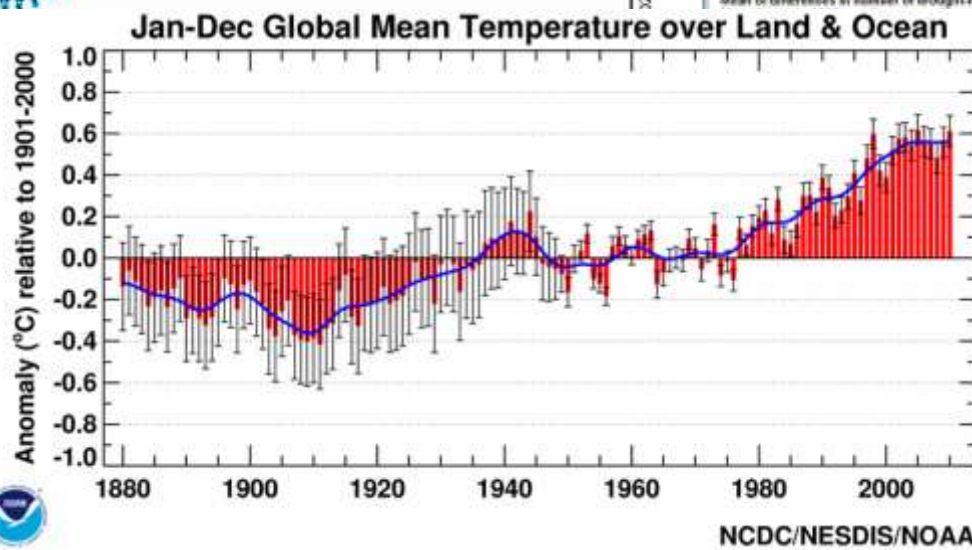
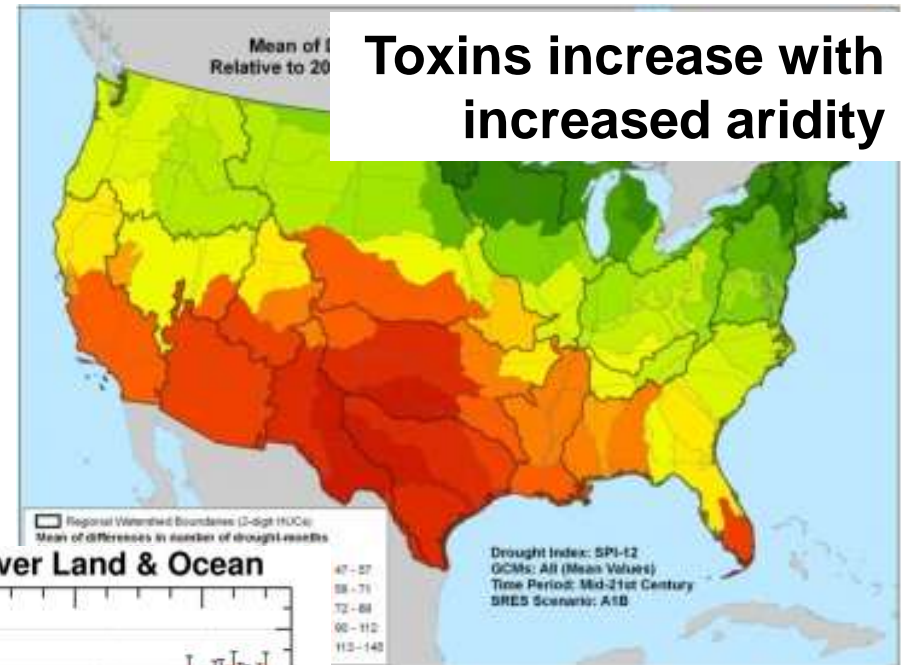
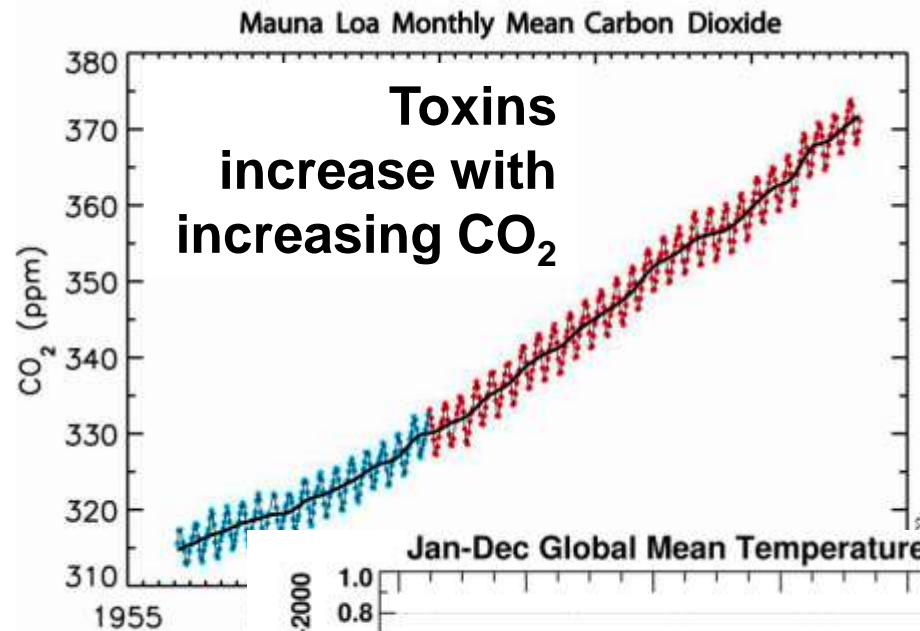
The functional quality of sagebrush influences habitat use by sage-grouse



Need to identify thresholds to habitat risks for sage-grouse

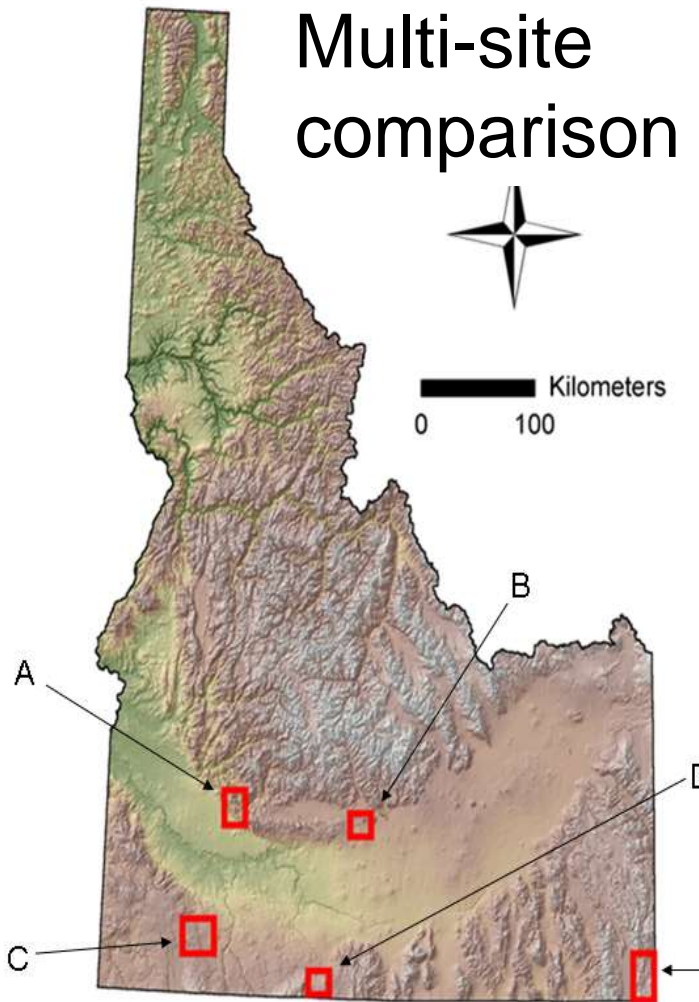


Risks of toxins are predicted to increase with climate change

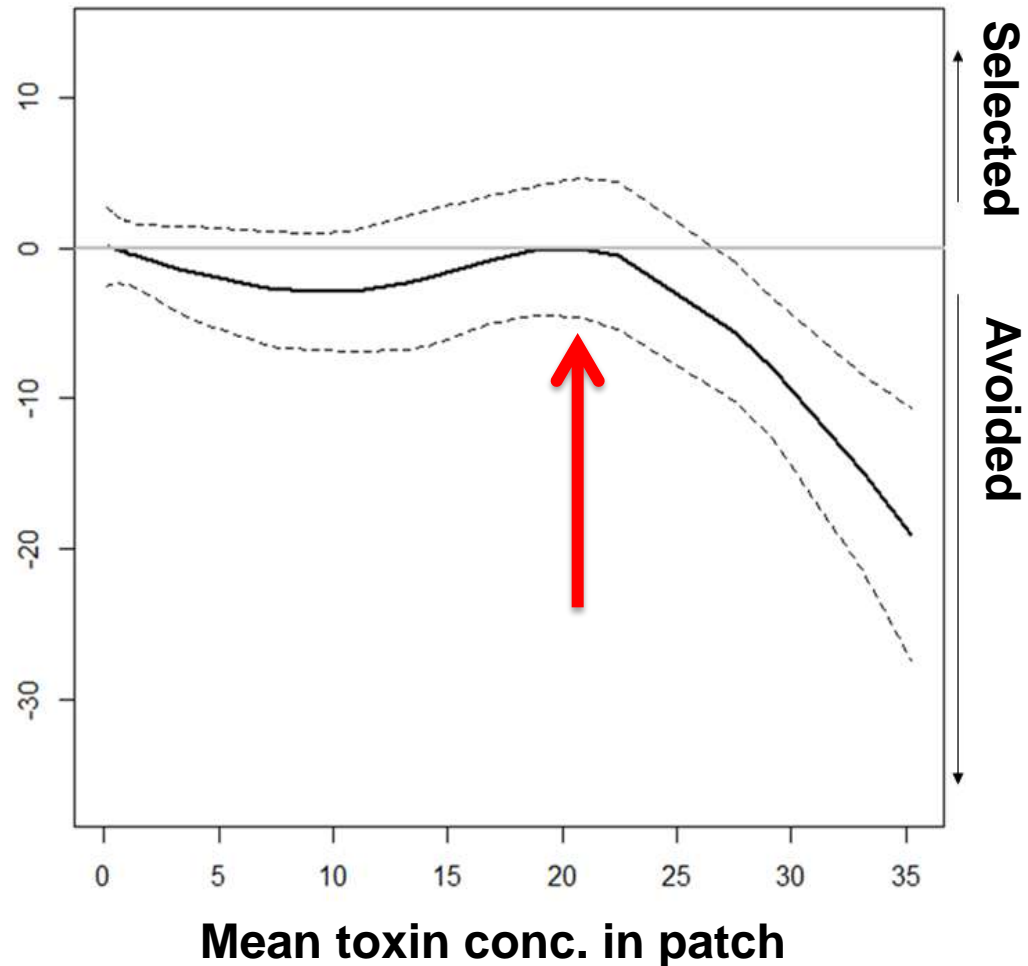


Lower tolerance to toxins with increased temperatures

Sage-grouse may have thresholds to risks of dietary toxins



**Difference in toxin conc. in plants
(browsed - non-browsed)**



What factors could increase toxin concentrations?

Fires



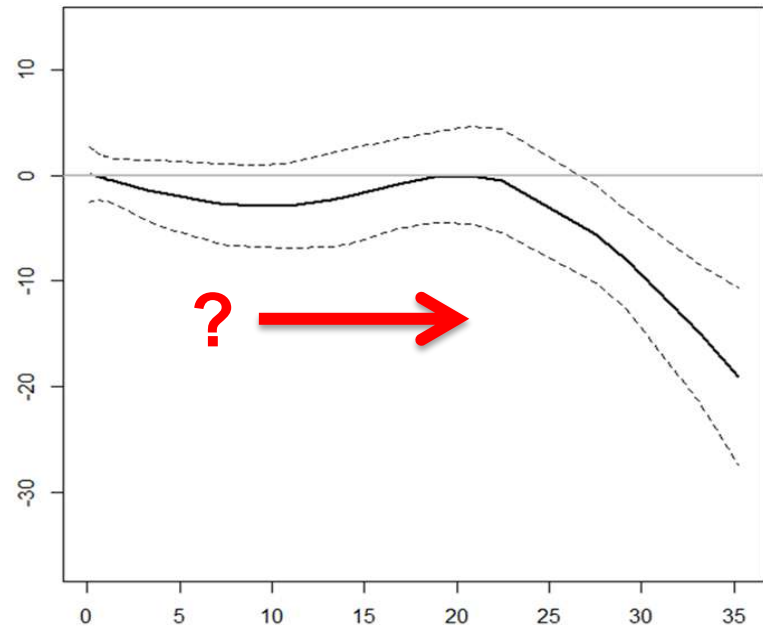
Encroachment



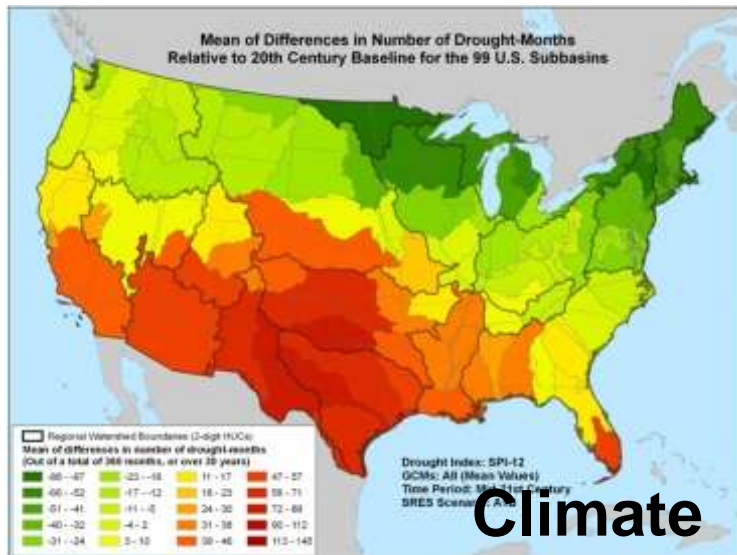
Grazing

Selected
Avoided

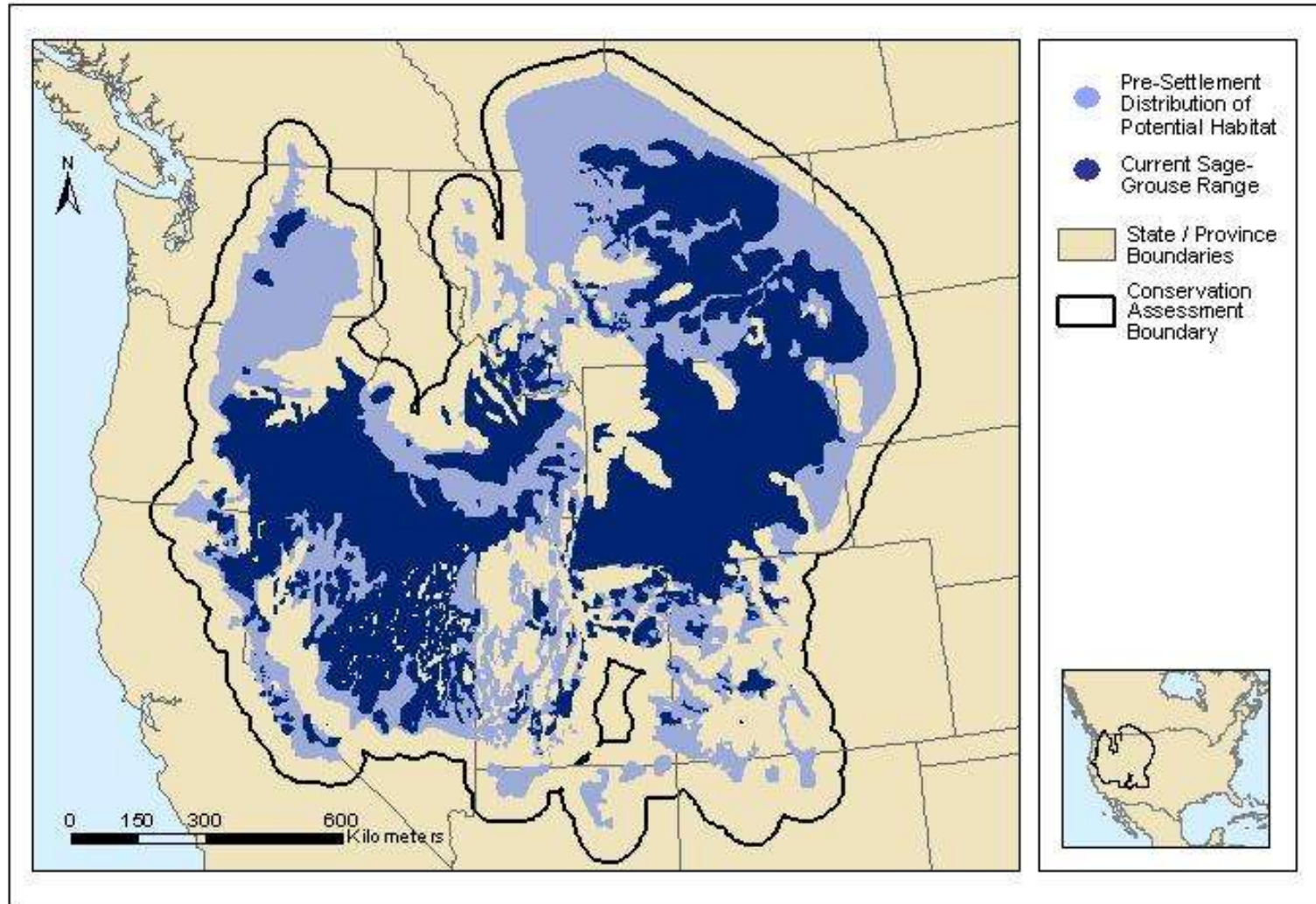
Difference toxin conc.



Mean toxin conc. in patch

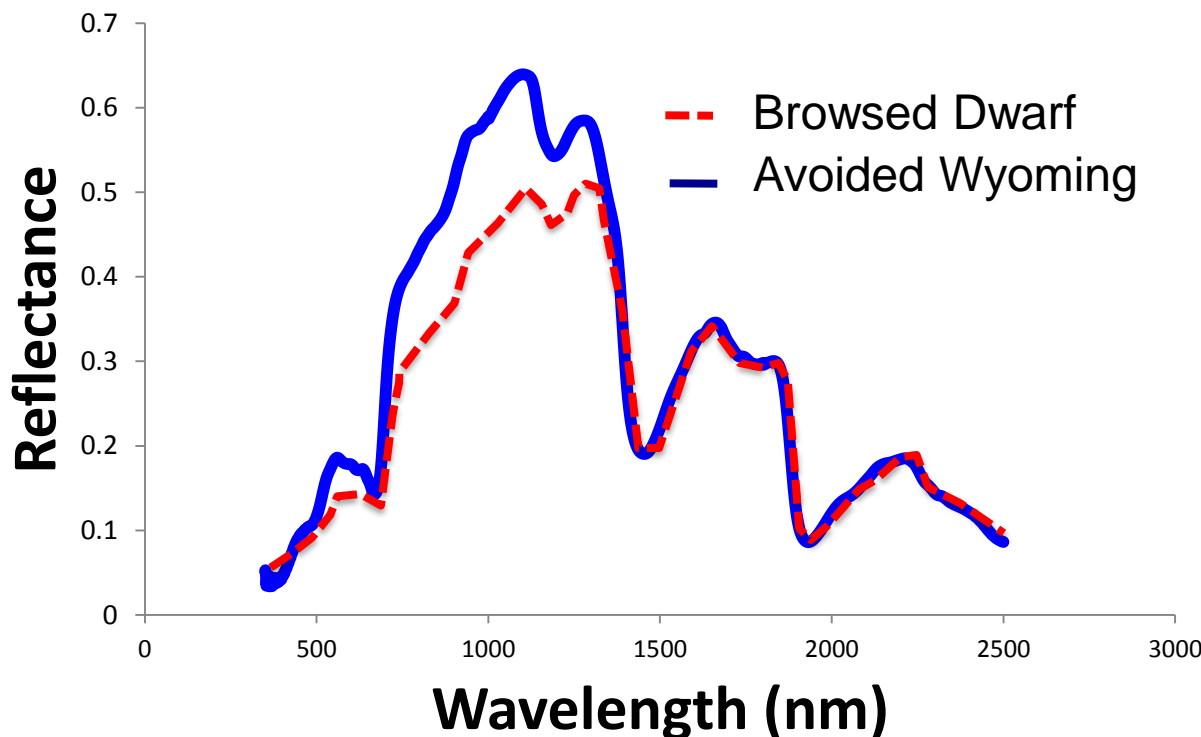
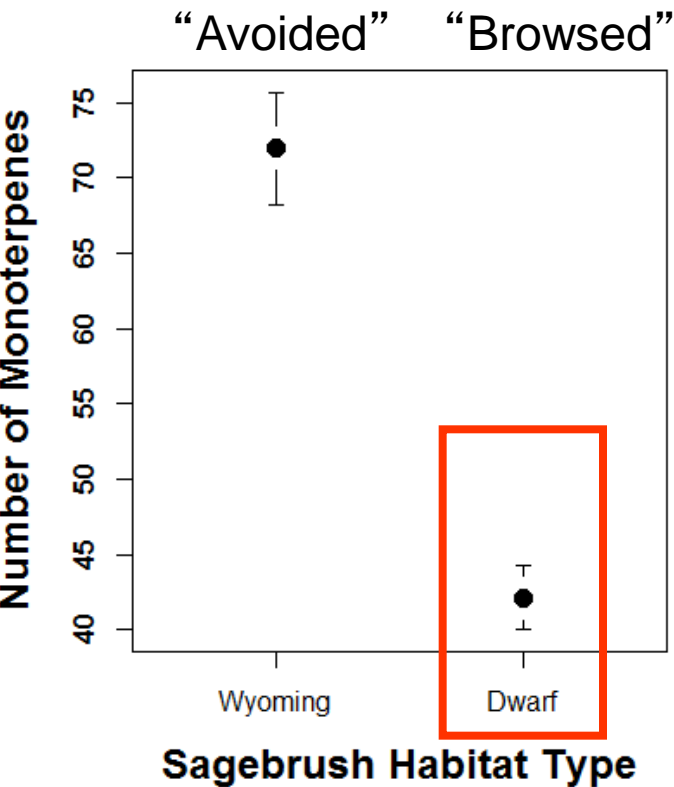


Future: Map and Monitor “Foodscapes”

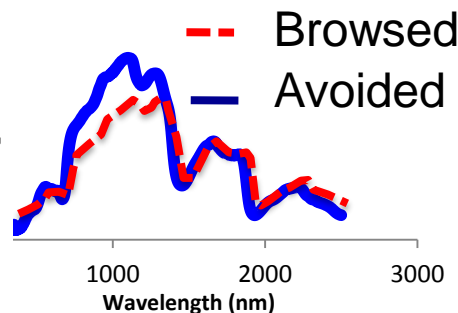
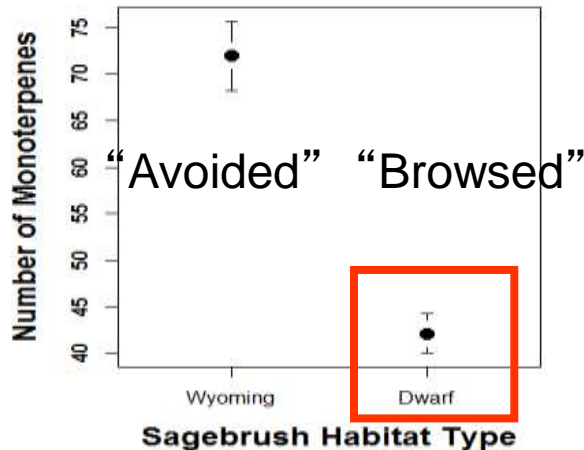
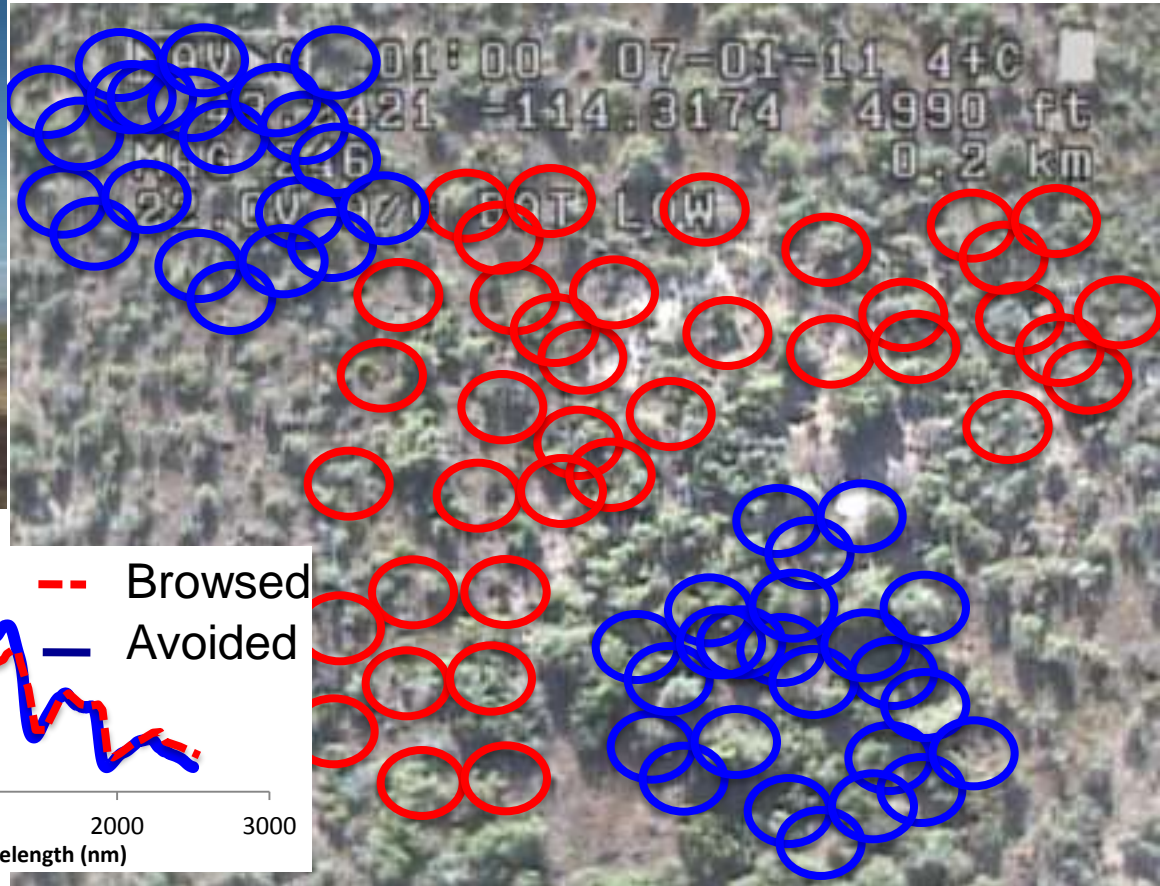




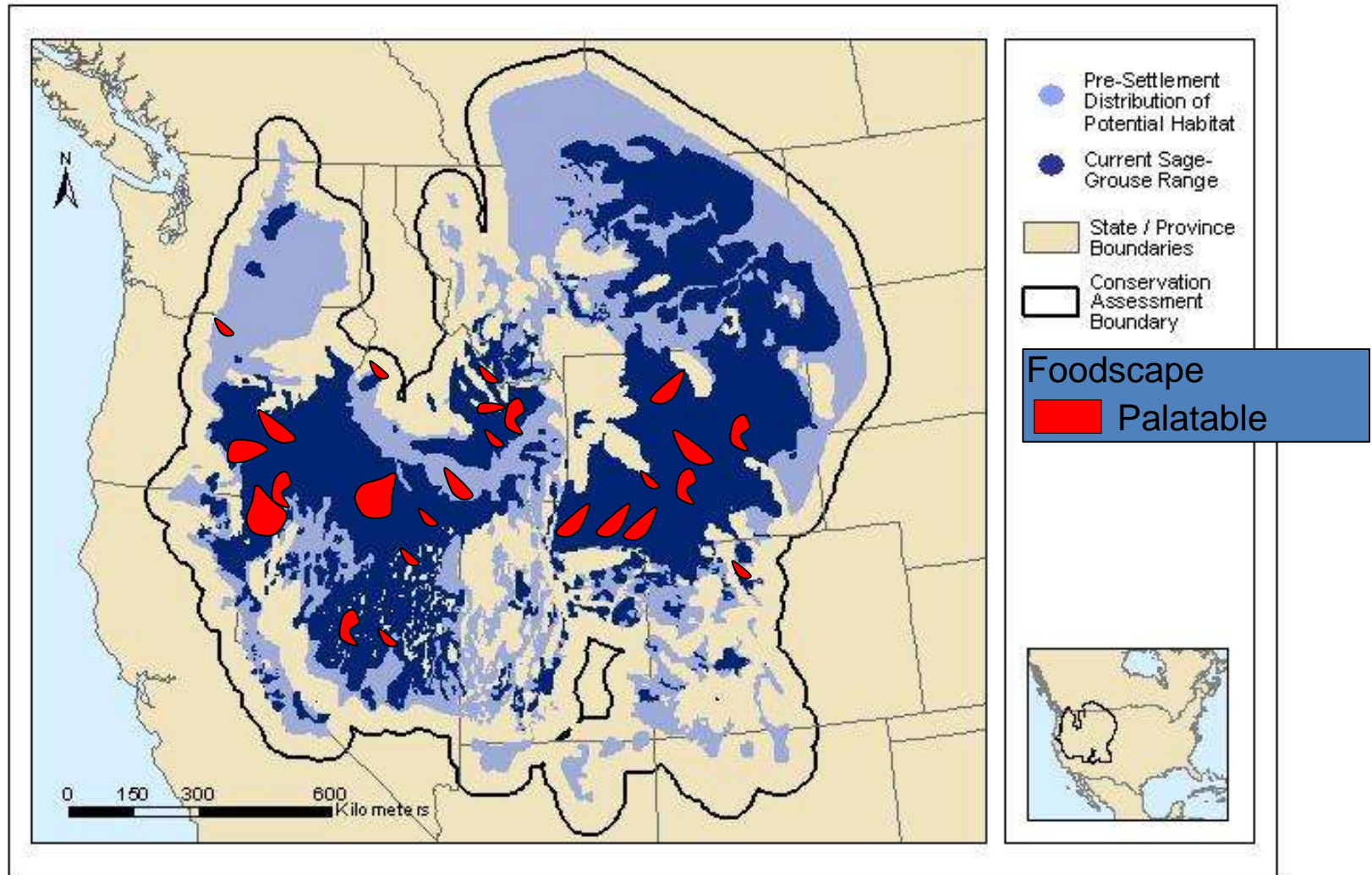
Mapping foodscapes: Remotely sense diet quality using near infrared (NIR) sensors



Mapping foodscapes: Remotely sense diet quality using near infrared sensors



Foodscape maps may improve management: prioritize and monitor





Herbivore's eye view of habitat provides information on functional habitats for wildlife

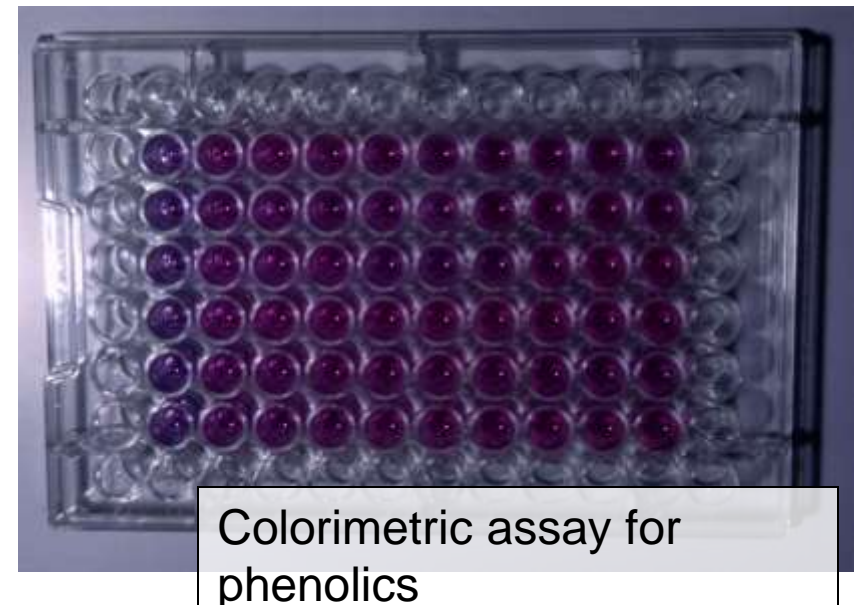
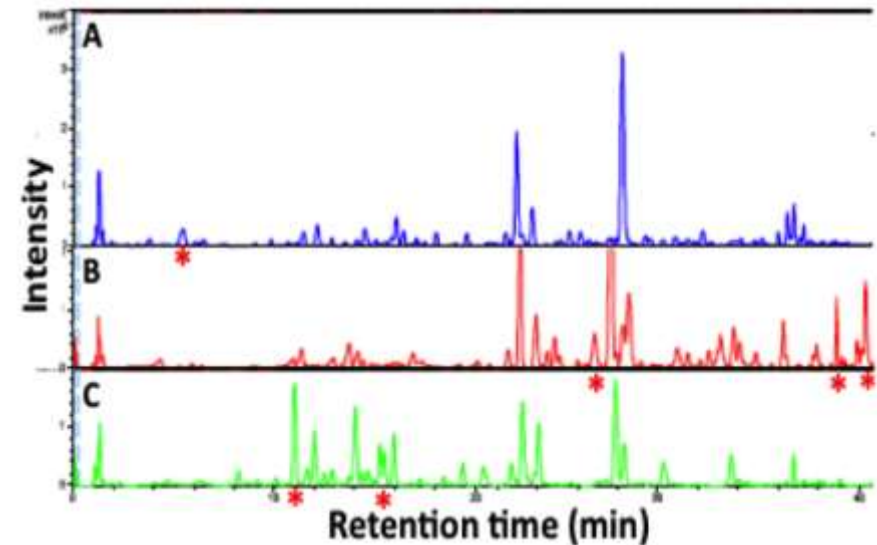
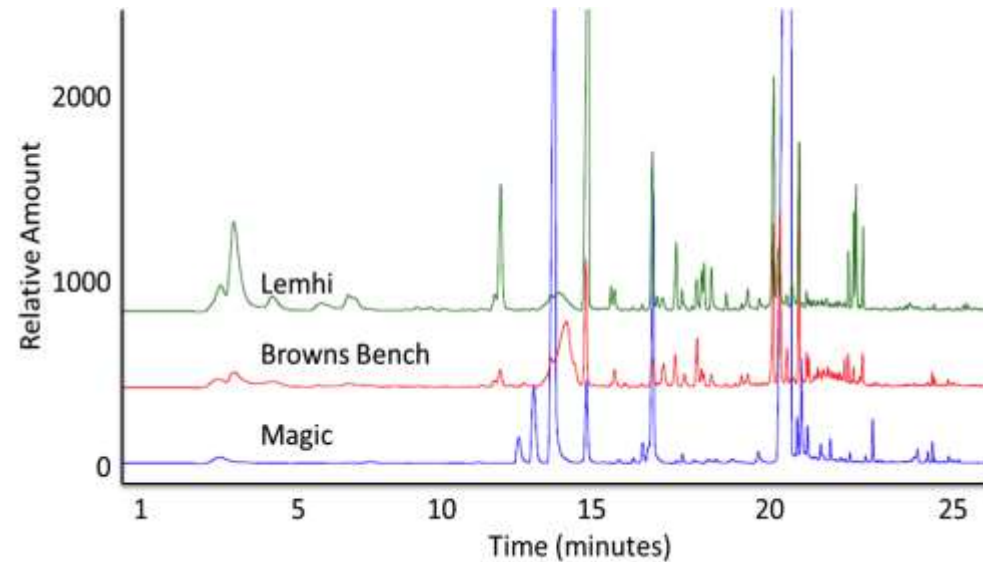
Acknowledgements

- Sage-grouse advisory committee and local working groups in Idaho
- BLM: Paul Makela
 - CESU and CCS: Sage-grouse and pygmy rabbit diet quality
- IDFG: Jack Connelly, Lisa Cross, Dave Musil, Ann Moser, Michelle Commons-Kemner, Rick Lowell
- Individuals
 - Janet Rachlow (UI), Lisa Shipley (WSU), Nancy Glenn (ISU)
 - David Skinner - USFS housing
 - Rick Kelsey and Shin Pu – chemistry
 - Matt Germino (USGS) – climate and fire manipulations
 - BSU students

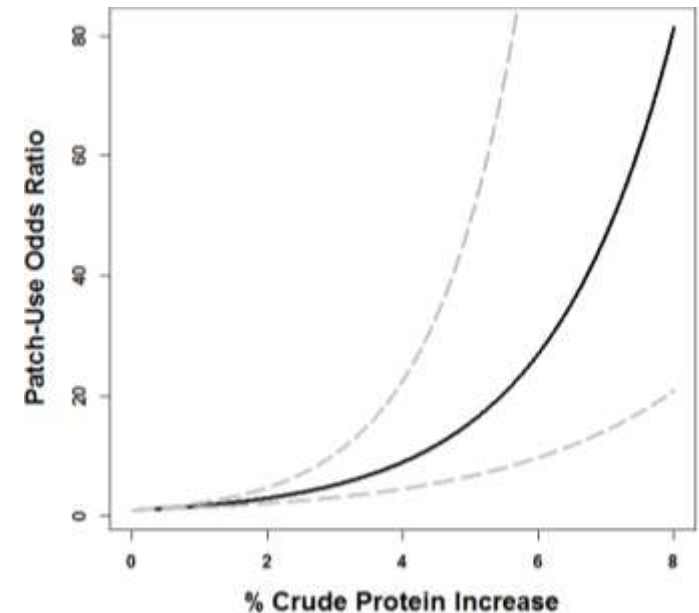
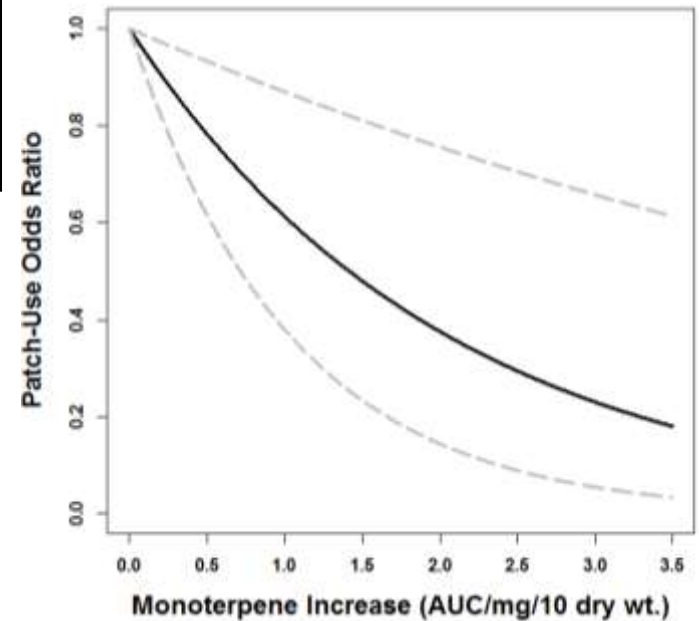
Questions?



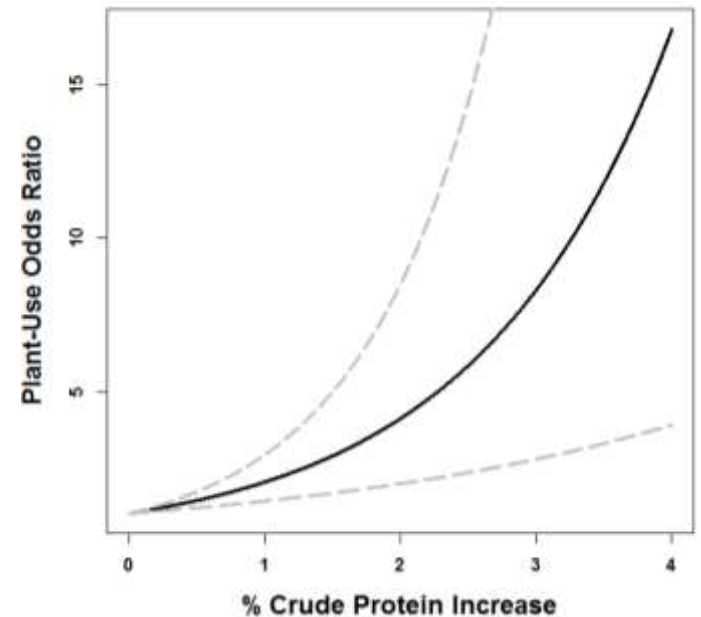
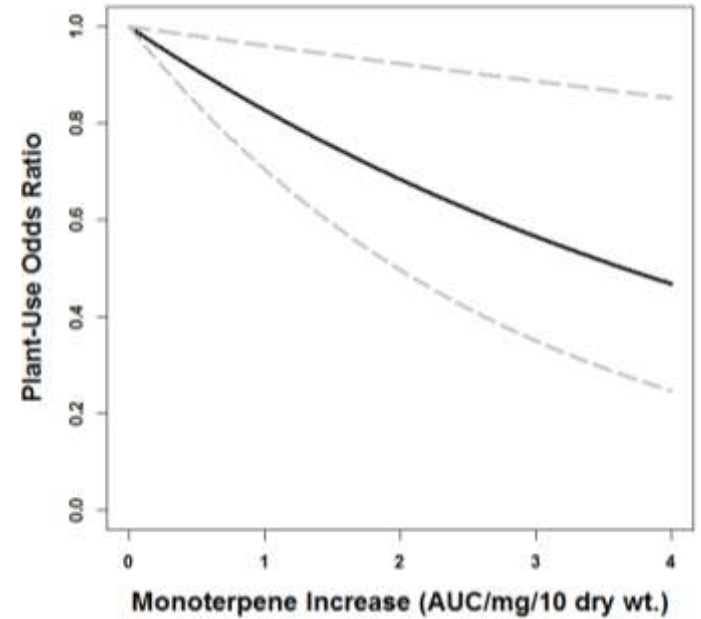
Measured toxins: monoterpenes and phenolics



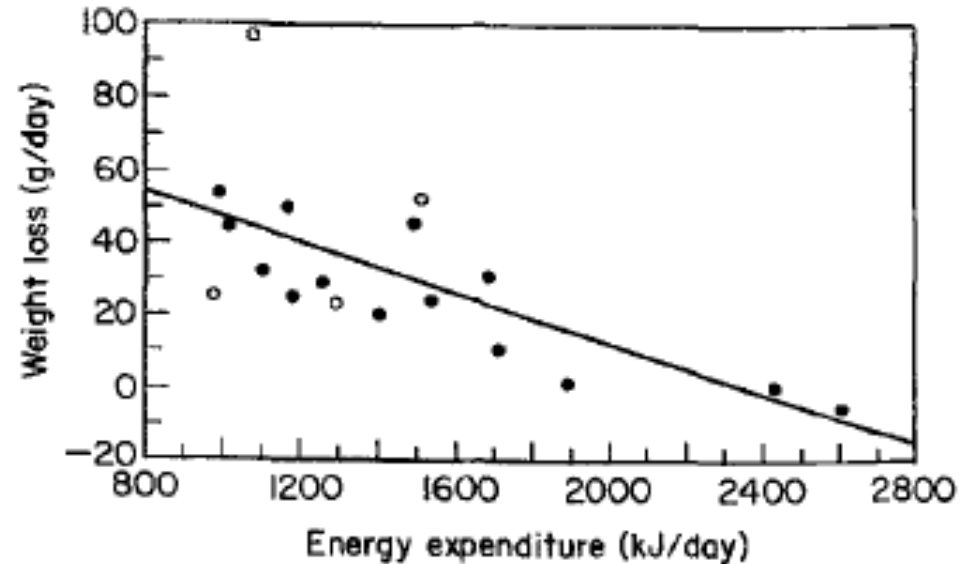
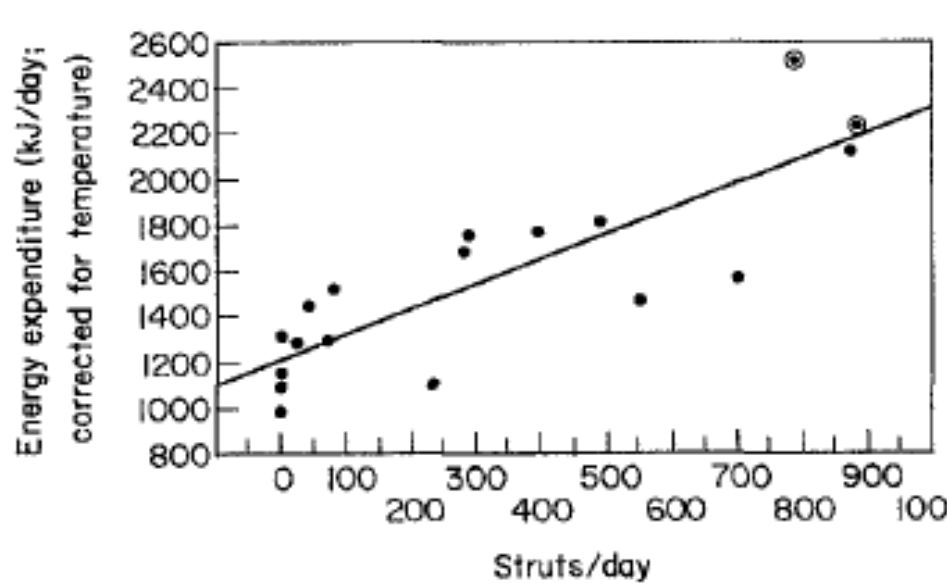
Patch Scale: Sage-grouse **avoid toxins** and select for protein



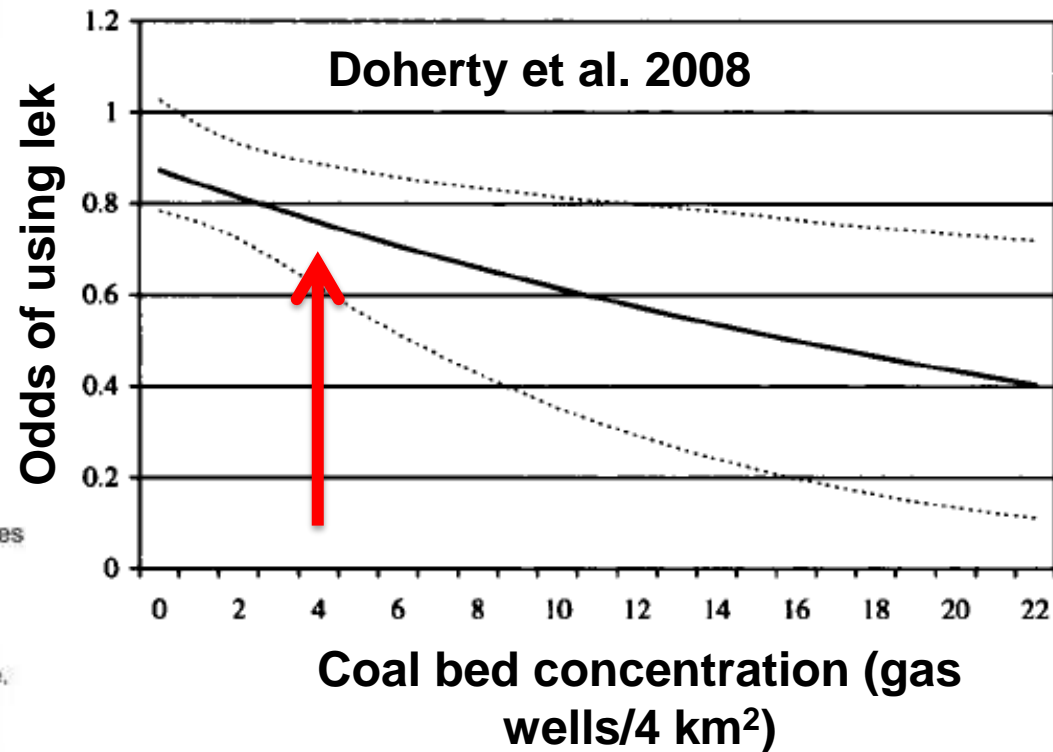
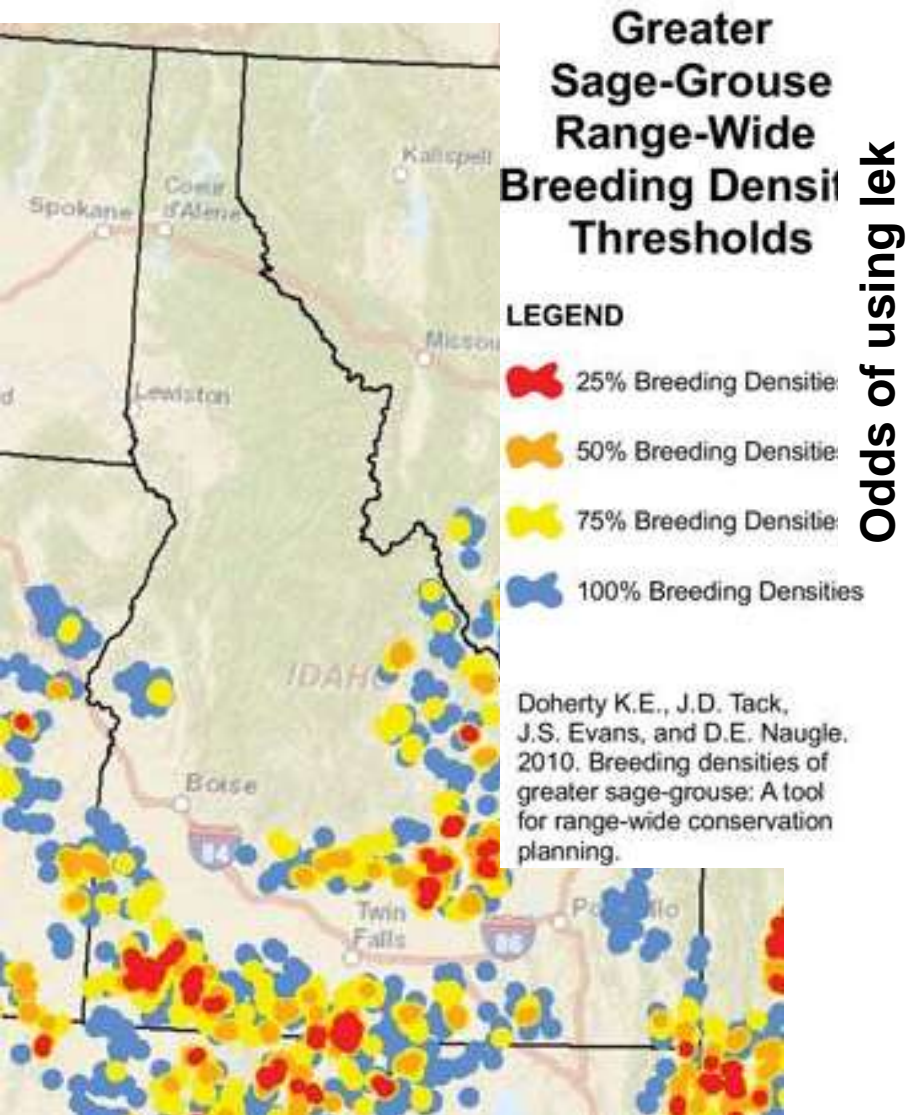
Plant Scale: Sage-grouse **avoid toxins** and select for protein



The functional quality of sagebrush may influence reproductive success of sage-grouse



The functional quality of sagebrush influences habitat use by sage-grouse



Need to identify thresholds to habitat risks