UNIVERSITY OF WYOMING

MONTEITH SHOP

HAUB SCHOOL OF ENVIRONMENT & NATURAL RESOURCES

WYOMING COOPERATIVE FISH & WILDLIFE RESEARCH UNIT

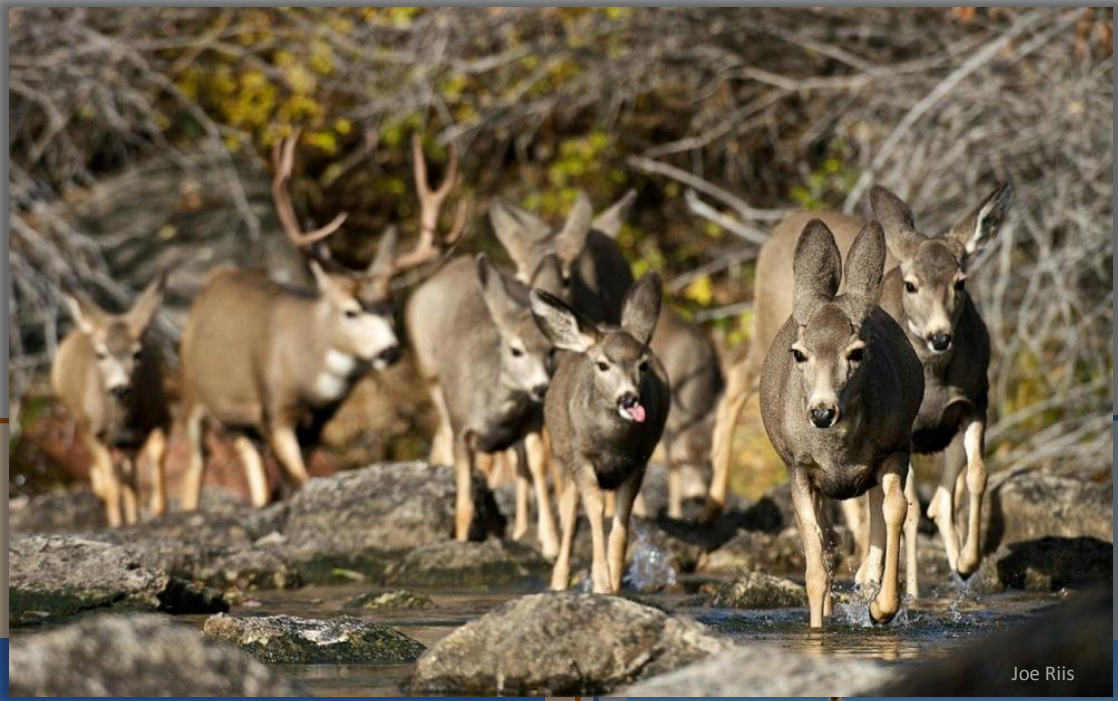
RISK-EFFECTS OF A HUMAN-ALTERED LANDSCAPE: NUTRITIONAL TRADEOFFS IN BEHAVIOR OF MULE DEER

Samantha P.H. Dwinnell[1], Matthew J. Kauffman[1,2], Hall Sawyer[3], Gary L. Fralick[4], Jill Randall[4], and Kevin L. Monteith[1,5]

[1] Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming; [2]WEST, Inc.; [3]USGS; [4]WGFD, [5]Haub School of Environment and Natural Resources, University of Wyoming

Living in a Seasonal Environment

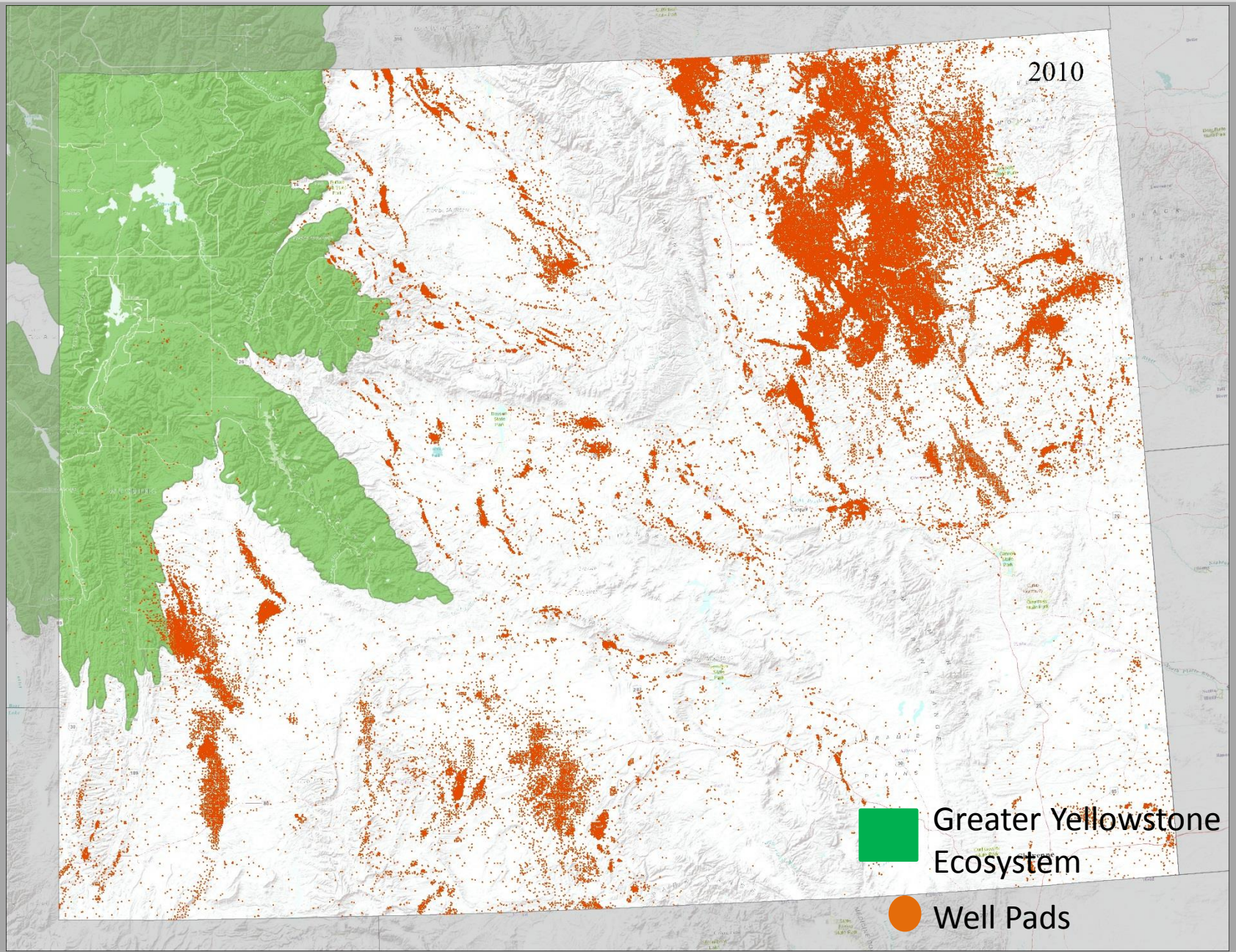
What Happens When Human Disturbance is Introduced?



Summer Range

Winter Range

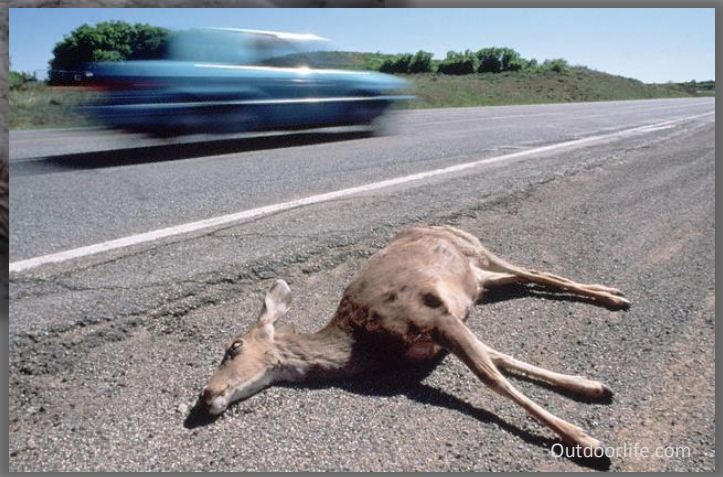
Energy Development in Wyoming



Energy Development in Wyoming

Risk Effects of Human Disturbance

Perceived Risk



Risk Effects of Human Disturbance

Perceived Risk

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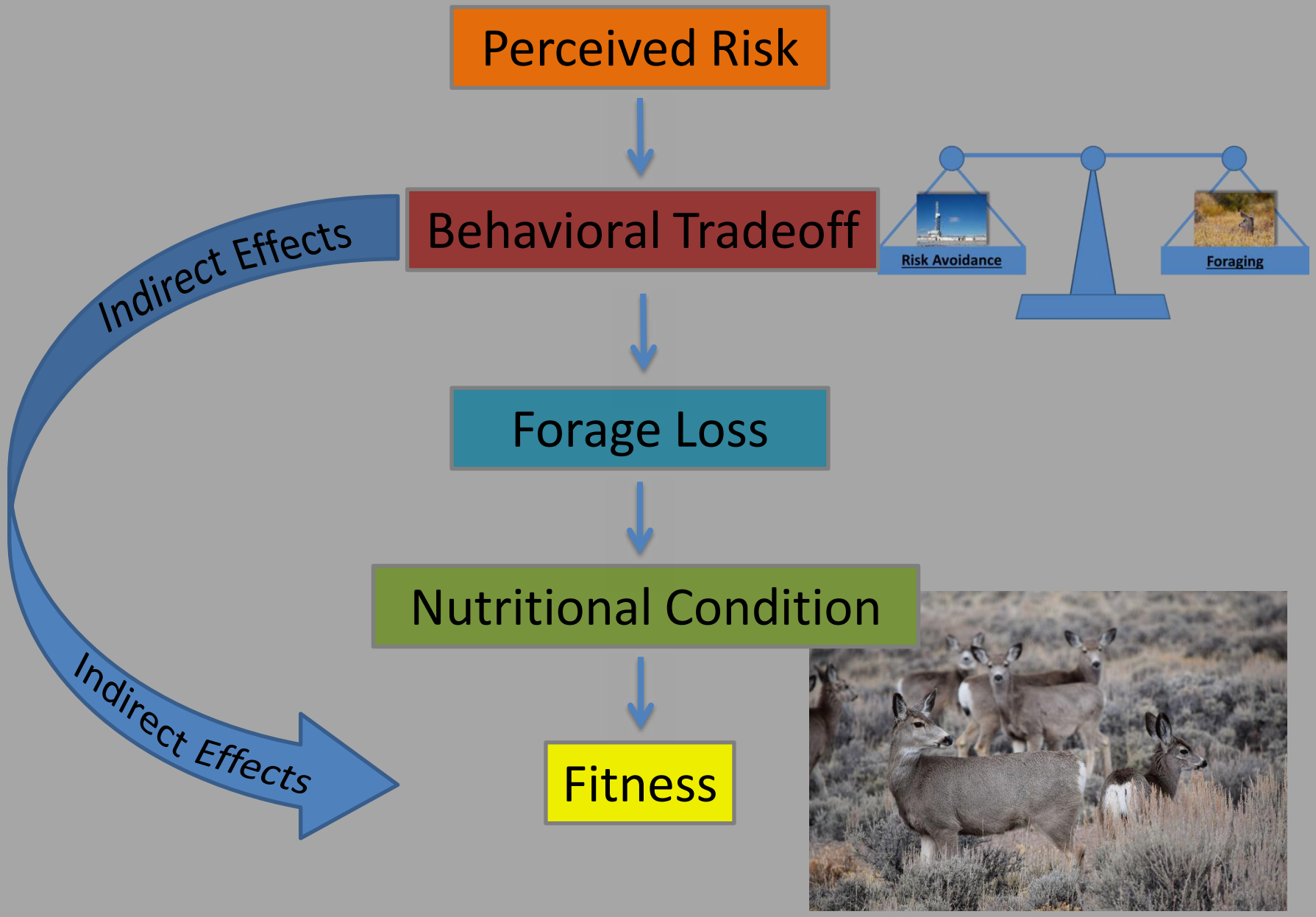
Behavioral Tradeoff

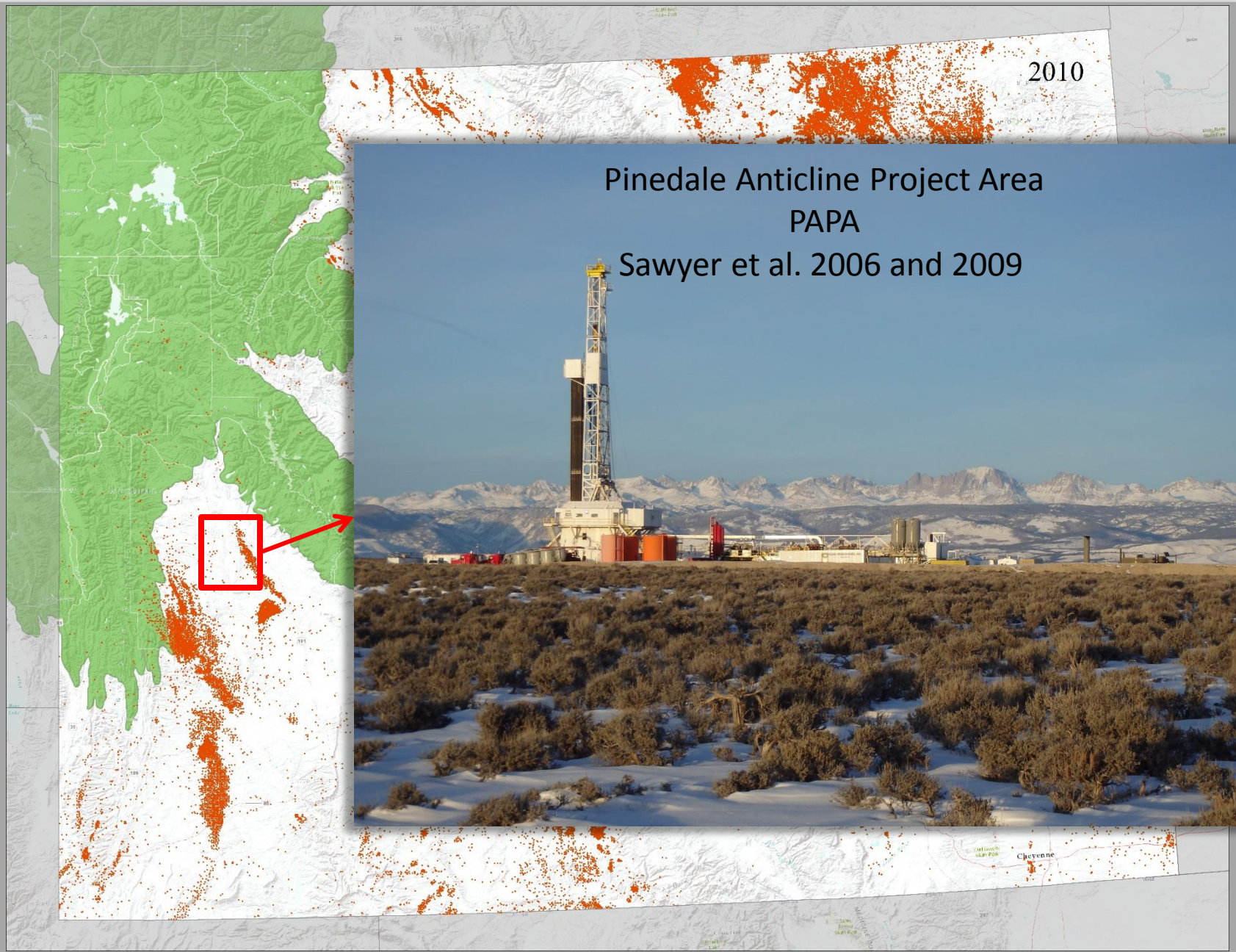
Risk Avoidance

Foraging

Risk Effects of Human Disturbance



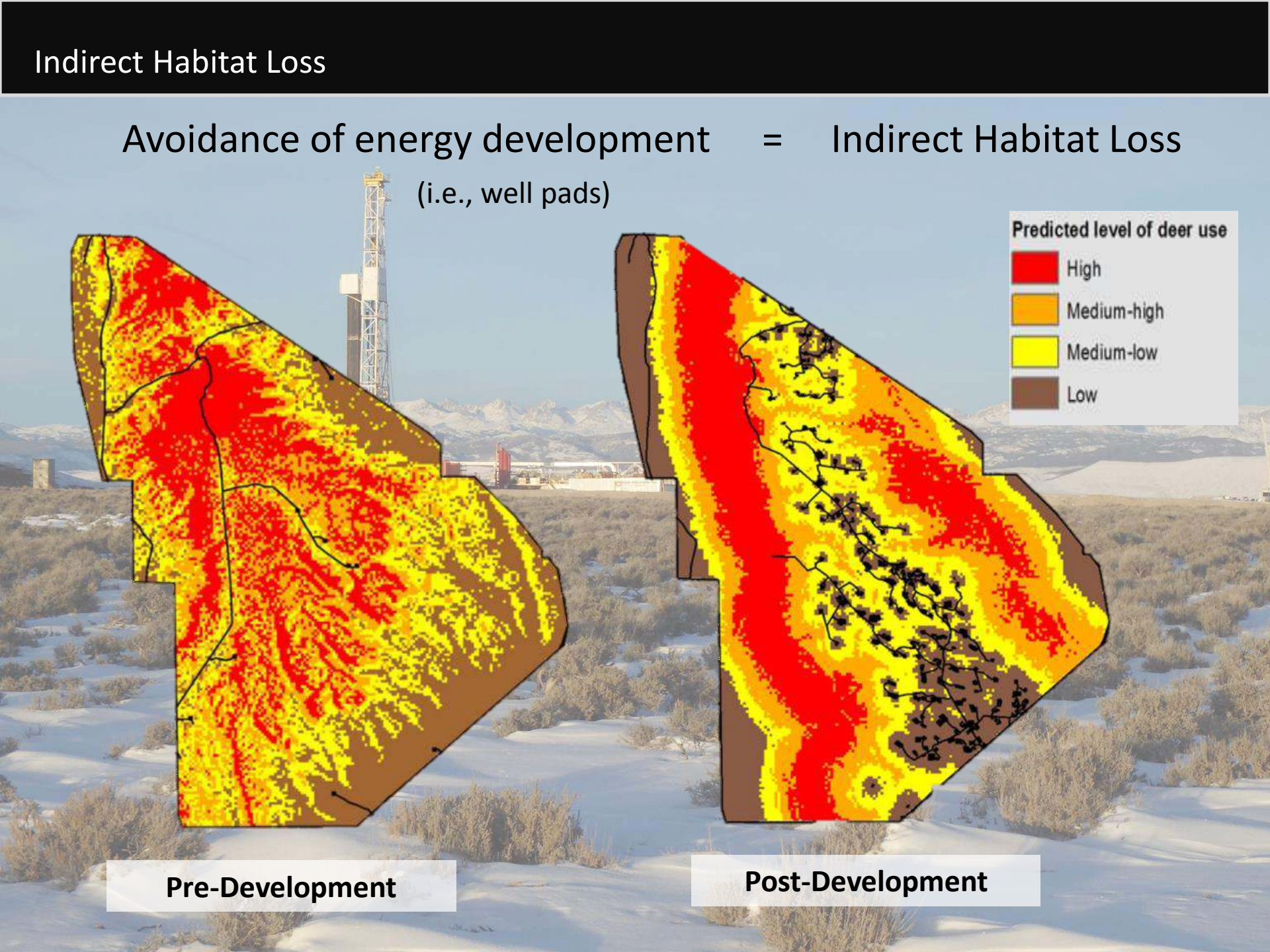
Energy Development in Wyoming



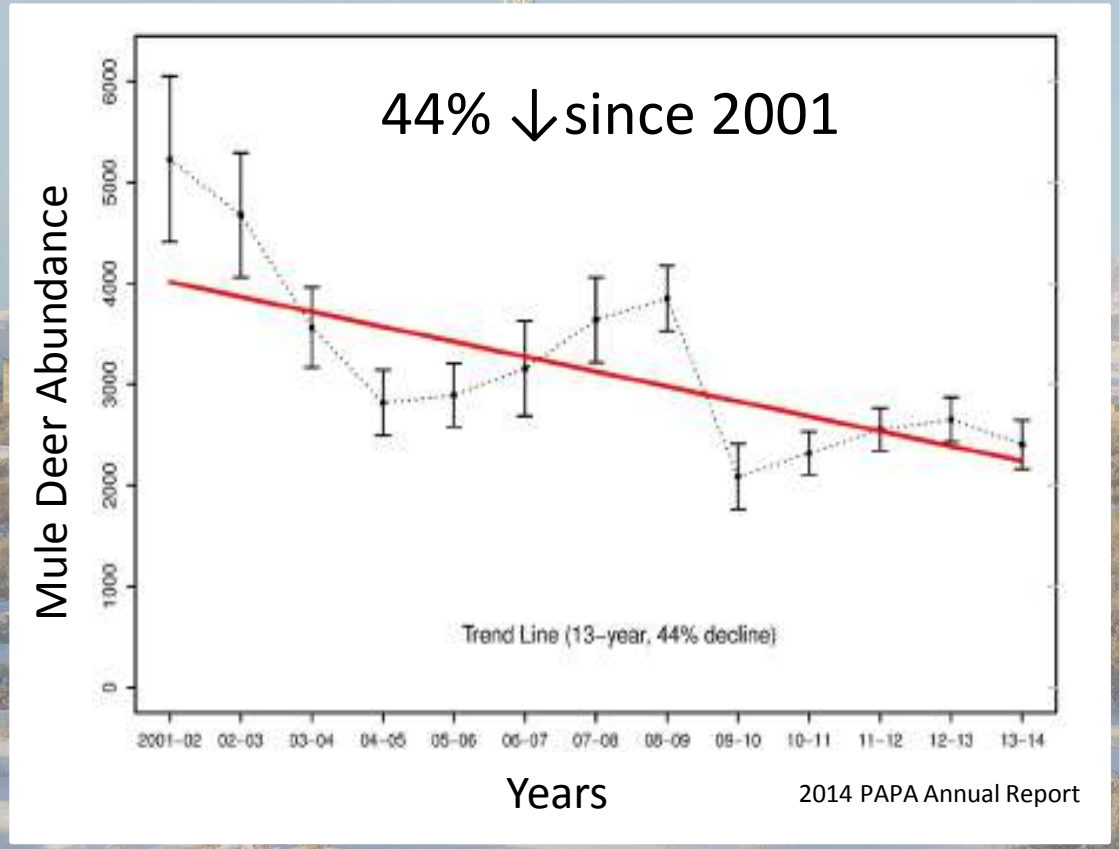
Indirect Habitat Loss

Avoidance of energy development = Indirect Habitat Loss

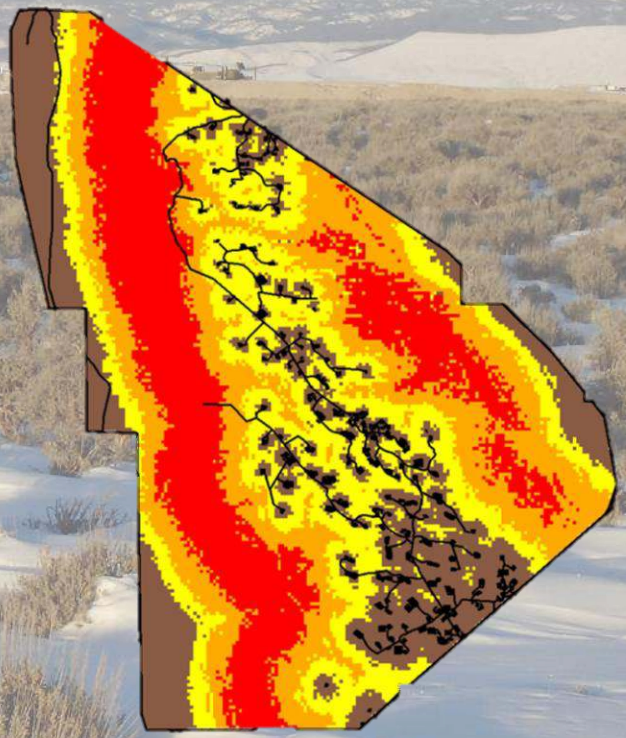
(i.e., well pads)



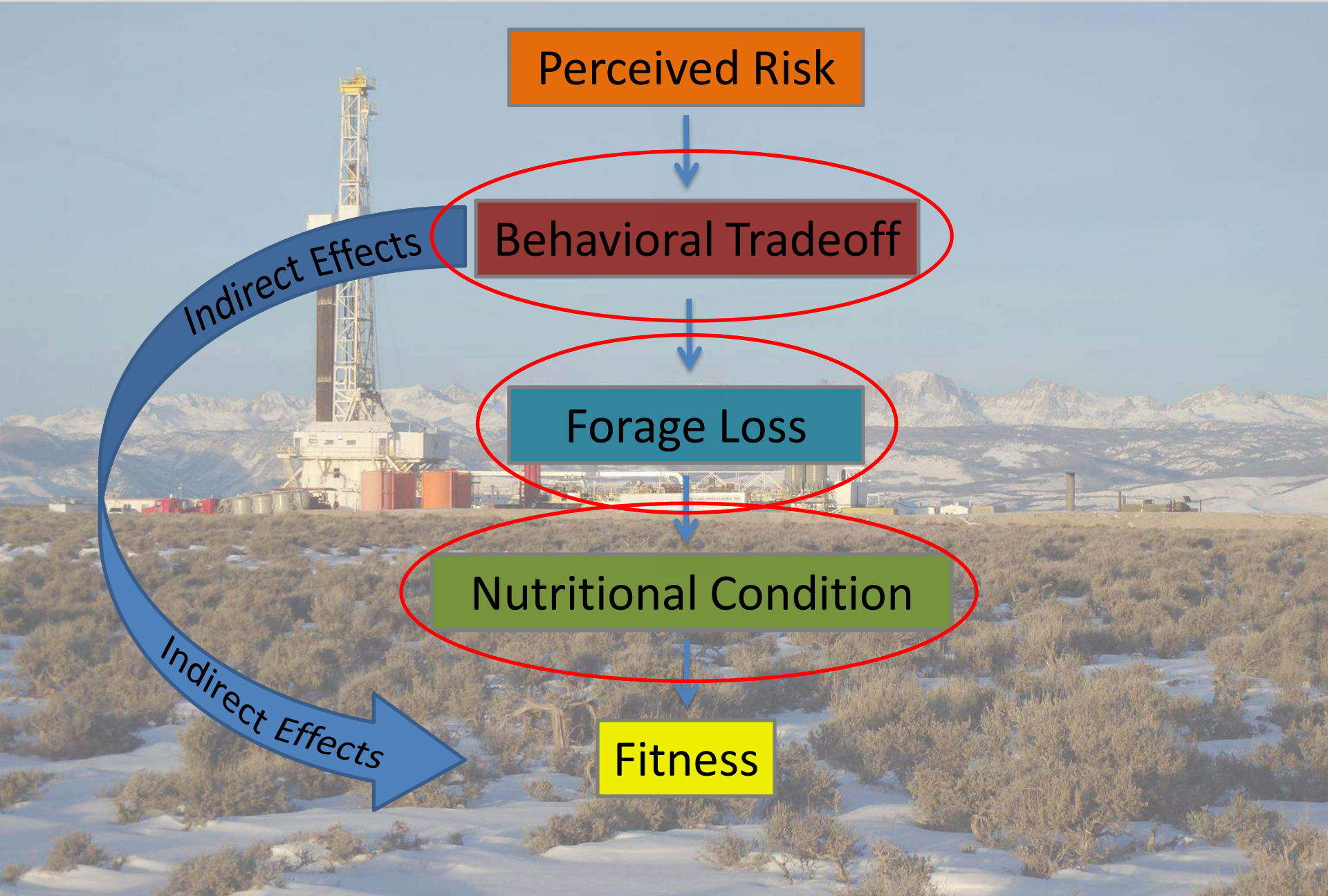
Indirect Habitat Loss



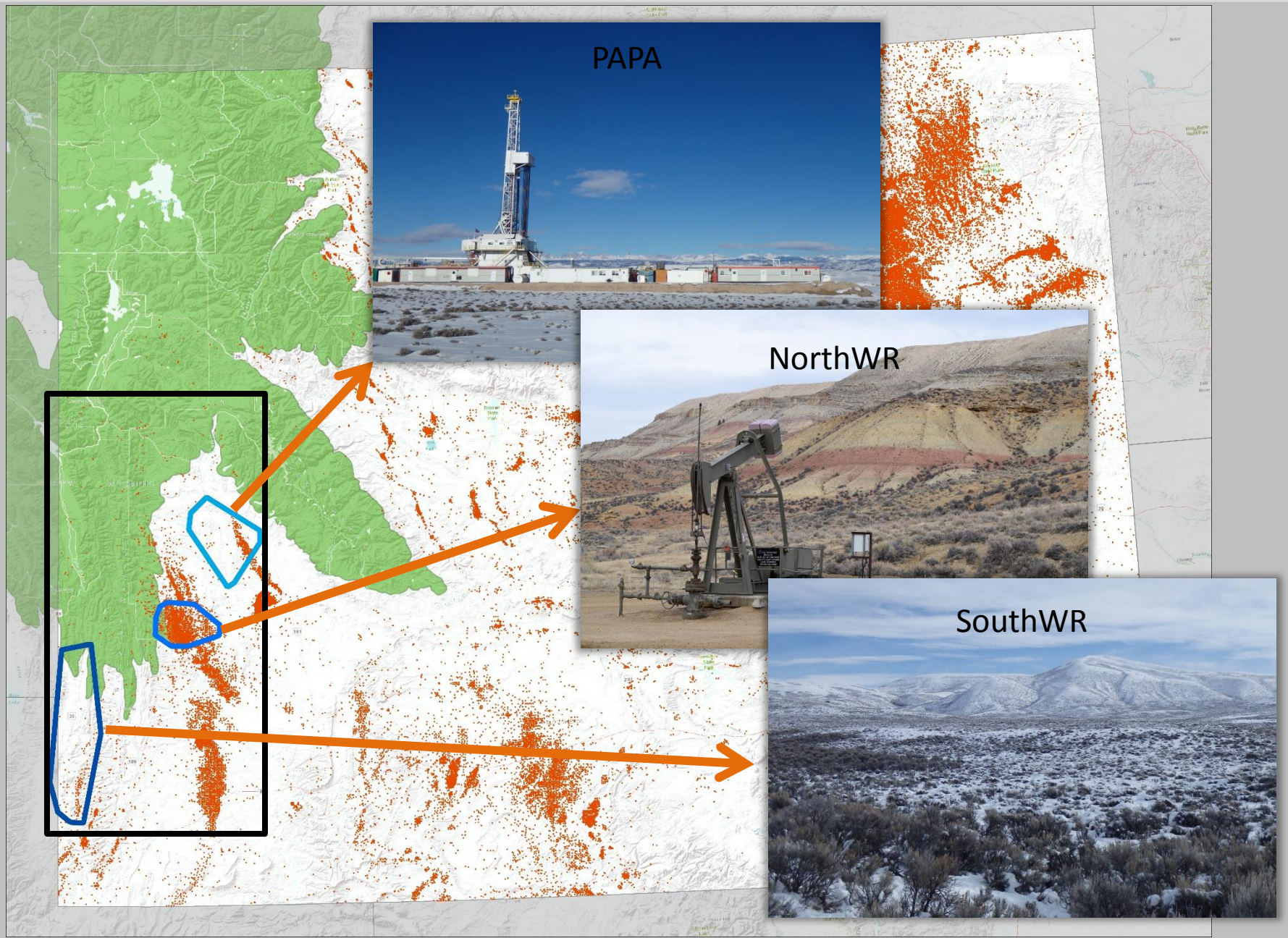
2014 PAPA Annual Report



Effects of Human Disturbance

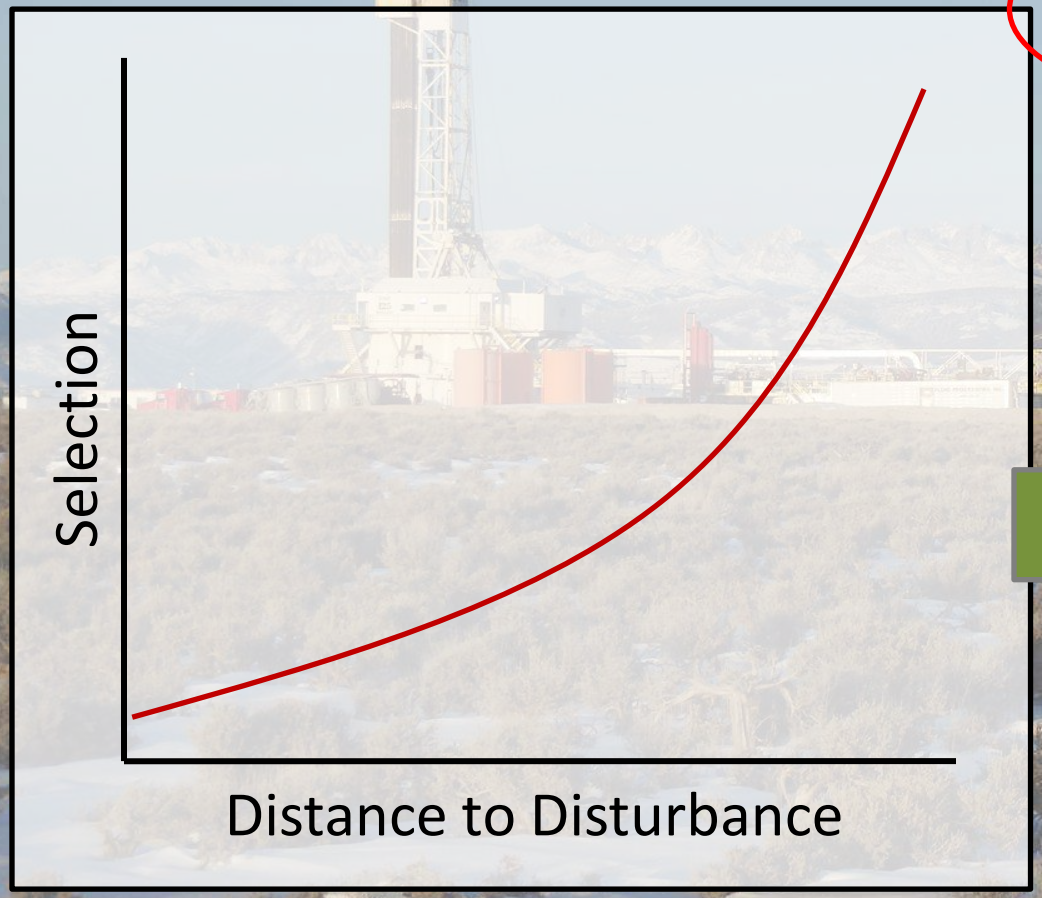


Study Area



Is There a Behavioral Tradeoff?

Mule deer will avoid human disturbance regardless of foraging opportunities.



Perceived Risk

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Behavioral Tradeoff

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Forage Loss

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Nutritional Condition

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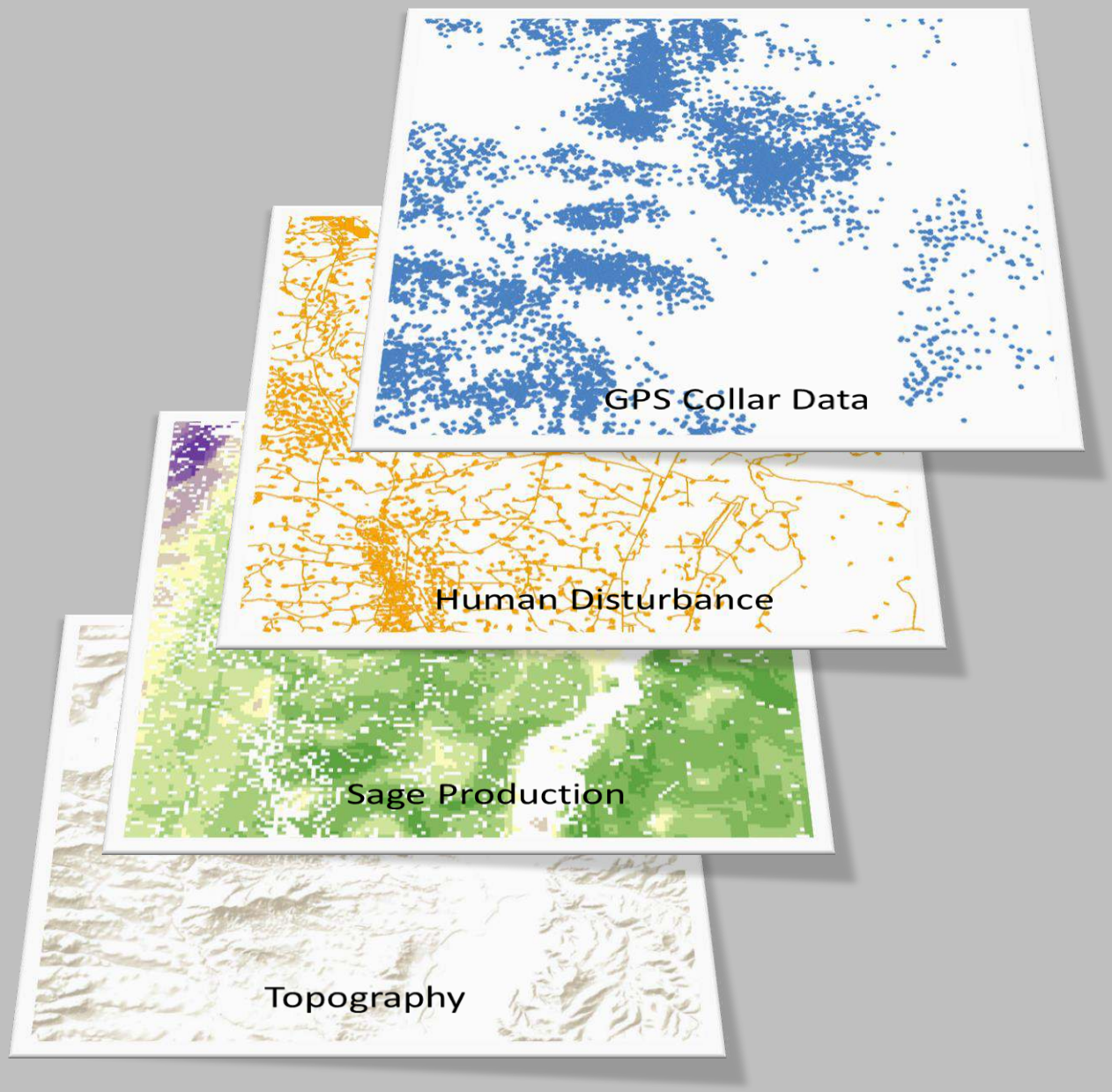
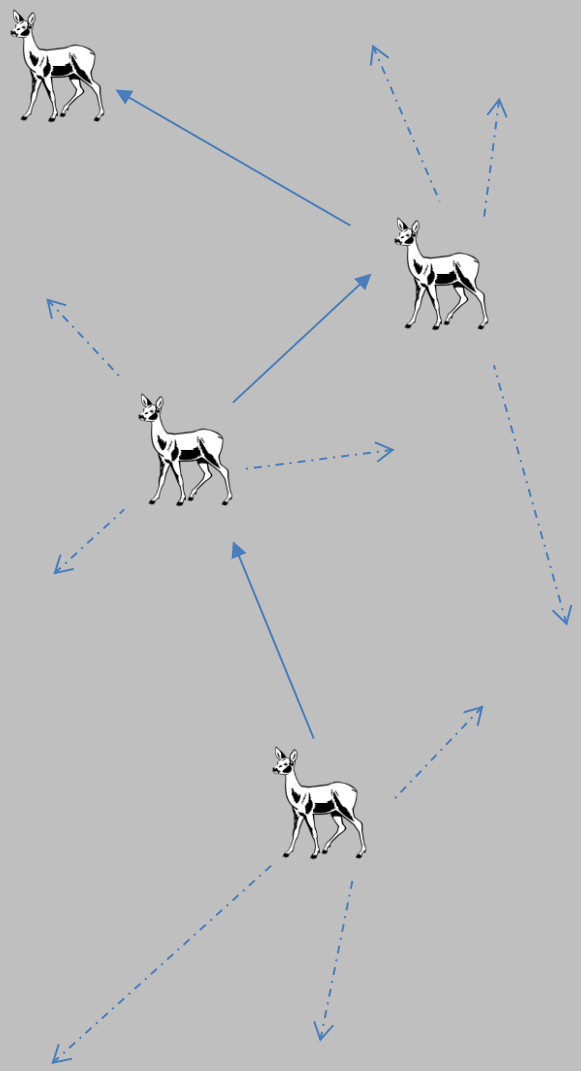
Fitness

Methods – Behavioral Tradeoff

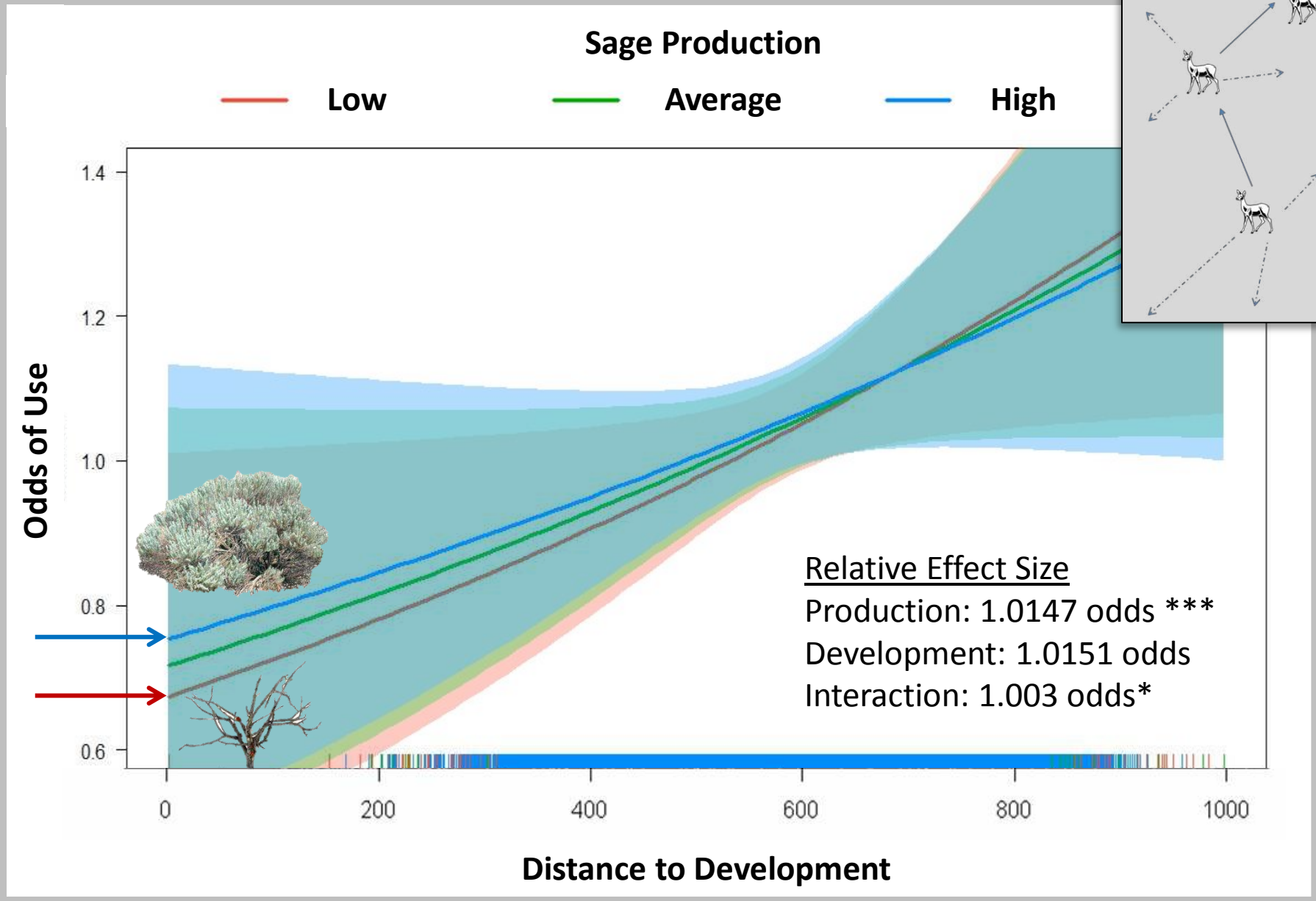
Methods – Behavioral Tradeoff

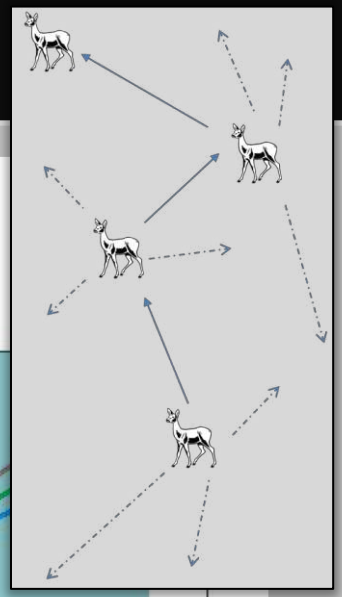


Step-Selection Function



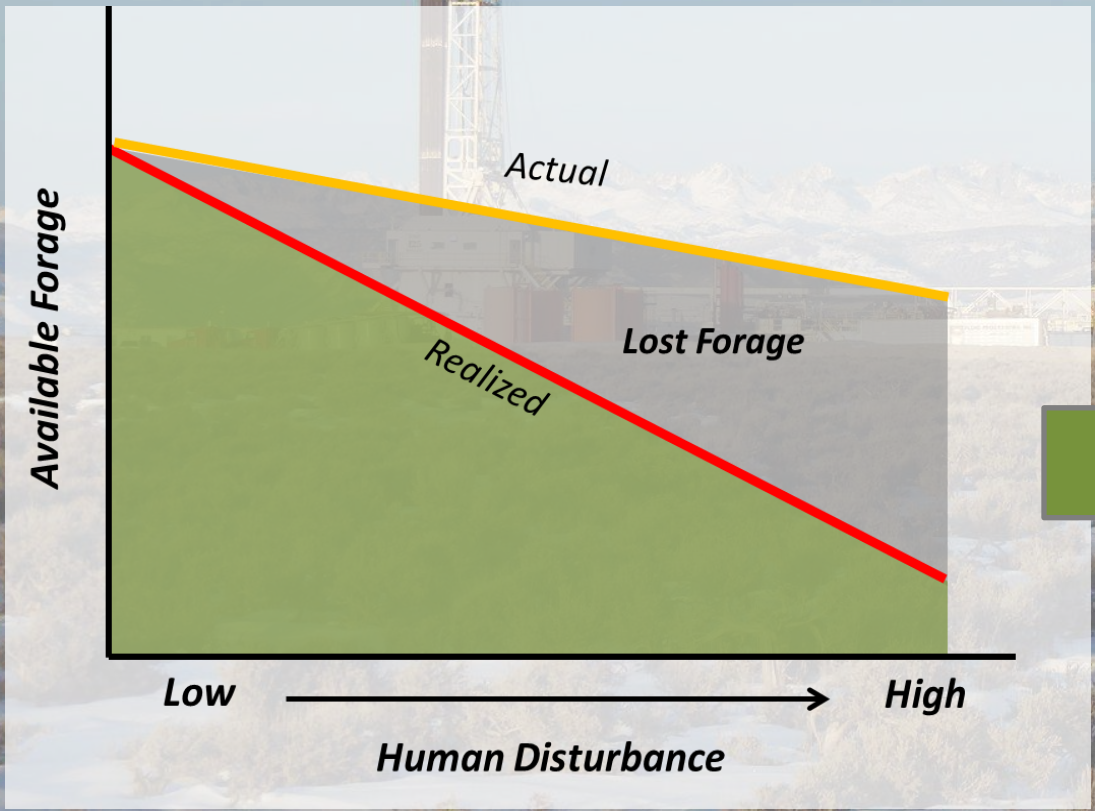
Results –Behavioral Tradeoff





Is There a Measureable Loss of Forage?

Avoidance of human disturbance (i.e., indirect habitat loss) will result in lost foraging opportunities on the landscape.



Perceived Risk

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Behavioral Tradeoff

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Forage Loss

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Nutritional Condition

↓

Fitness

Methods – Forage Loss

Fall

Forage Availability

Sage Production
(i.e., Leader Growth)
Shrub Density
Available Biomass

Forage Quality

Crude Protein
Toxins (PSMs)
Digestibility

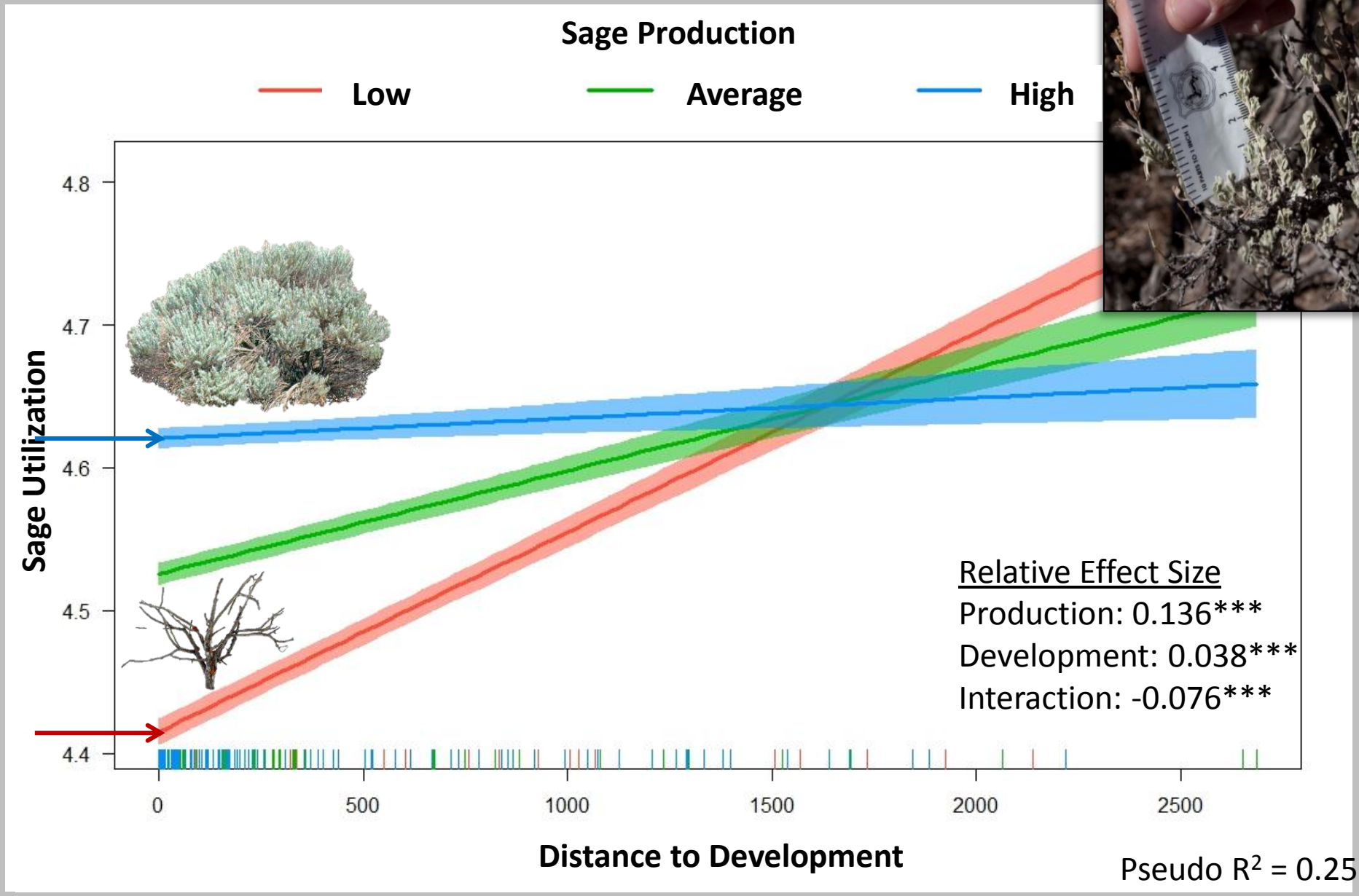
Spring

Forage Use

Sage Utilization
(i.e., Count of Leaders Browsed)

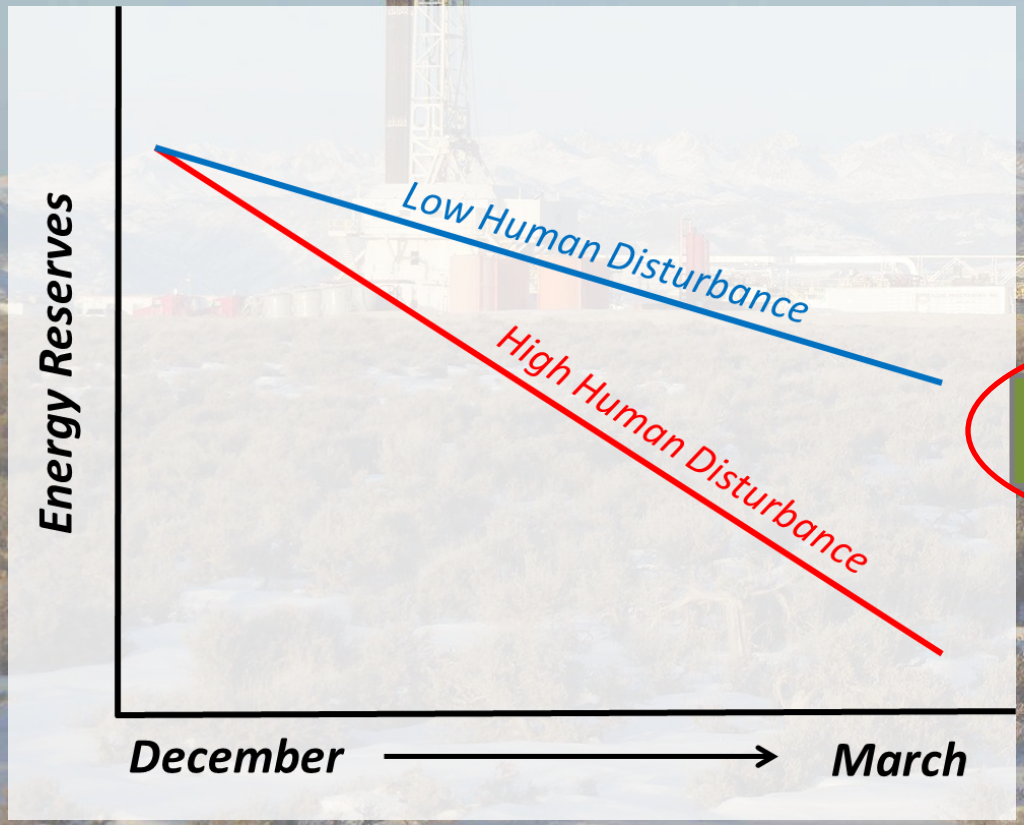
Forage Use ~ Forage Availability/Quality + Topography + Human Disturbance

Results – Forage Loss



Is There a Nutritional Consequence?

Mule deer will lose more fat overwinter when exposed to higher levels of disturbance.



Perceived Risk

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Behavioral Tradeoff

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Forage Loss

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Nutritional Condition

↓

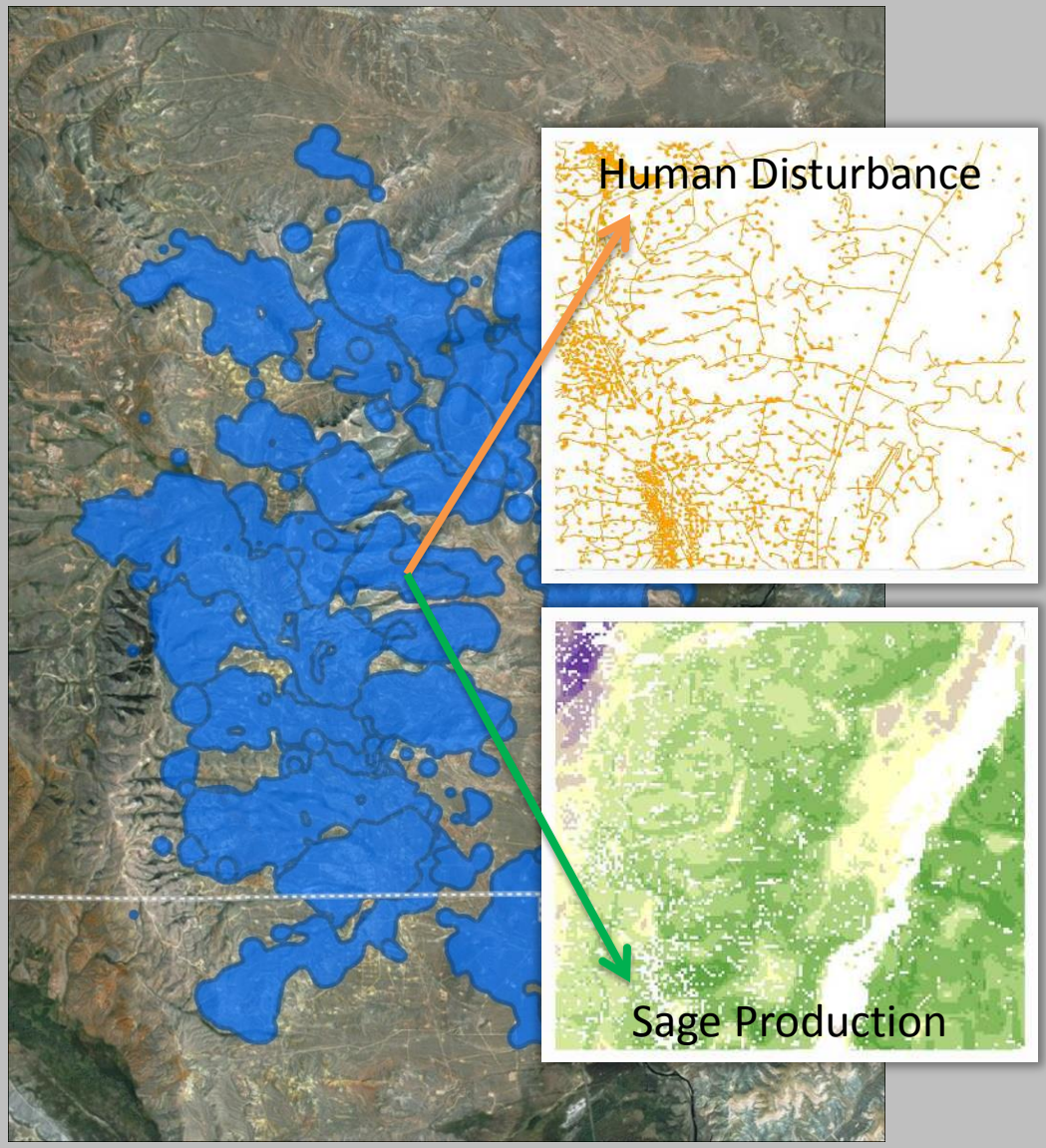
Fitness

Methods

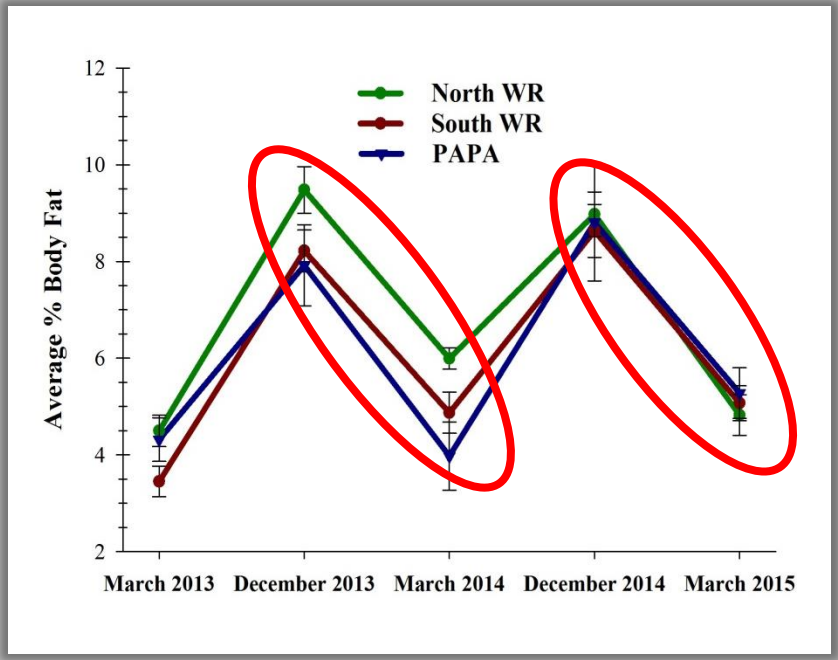
Changes in nutritional condition and reproductive status

Methods – Nutritional Condition

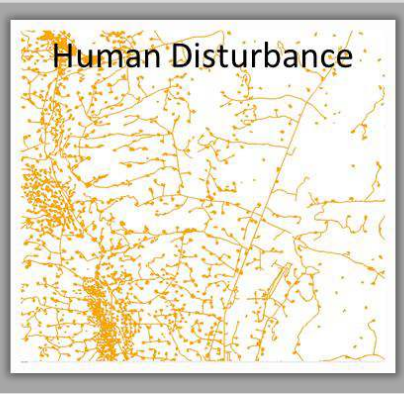
Core Home Ranges

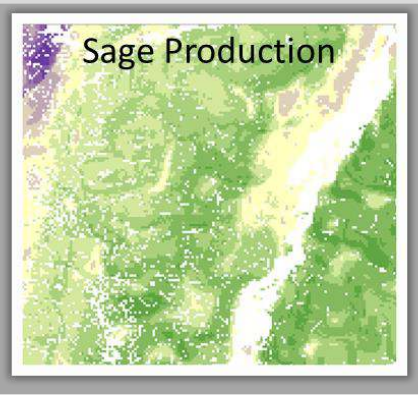


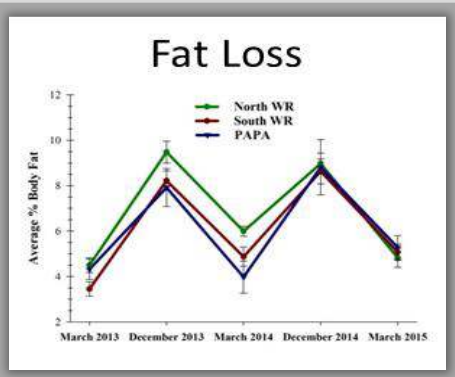
Fat Loss

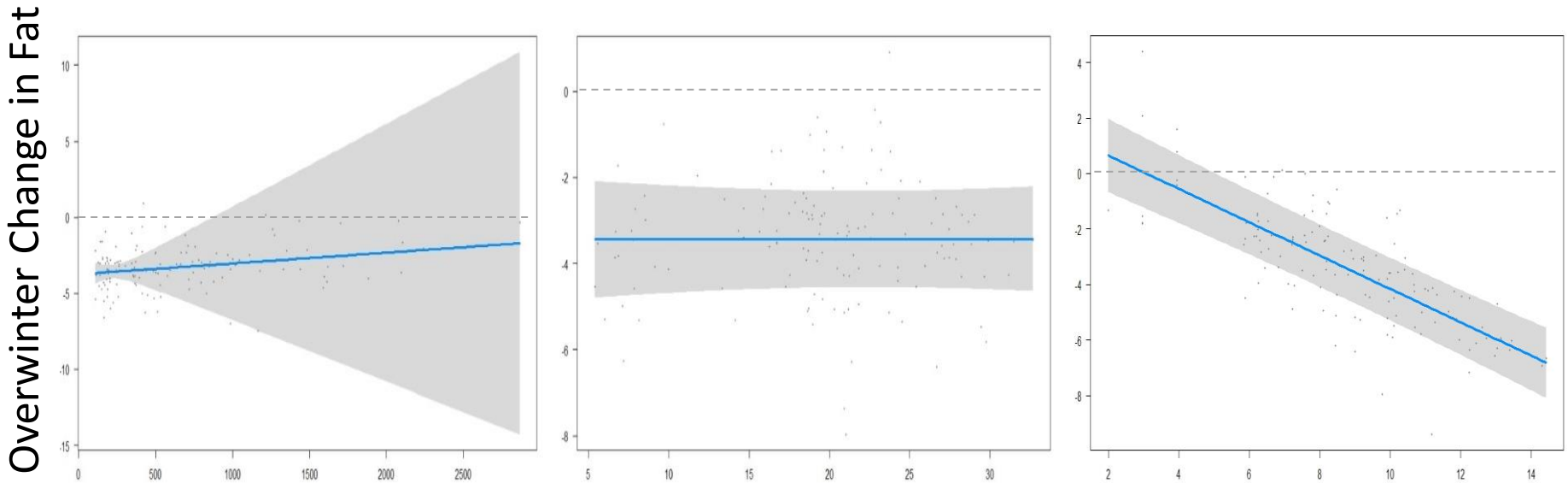


Results – Nutritional Condition





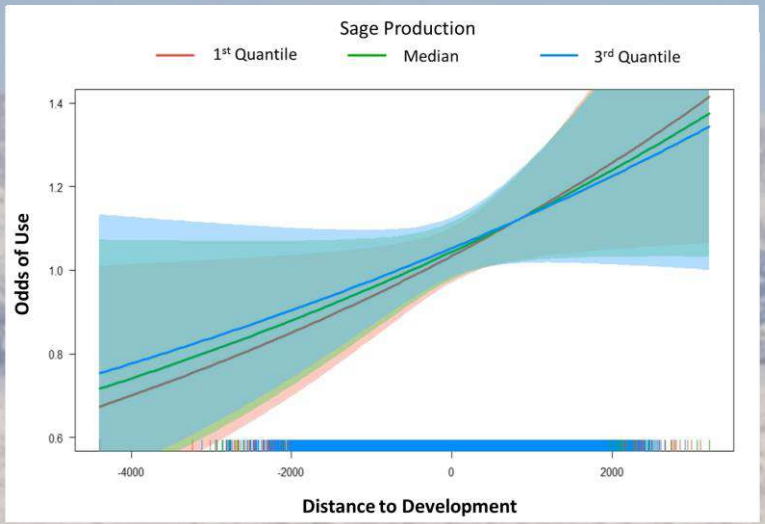




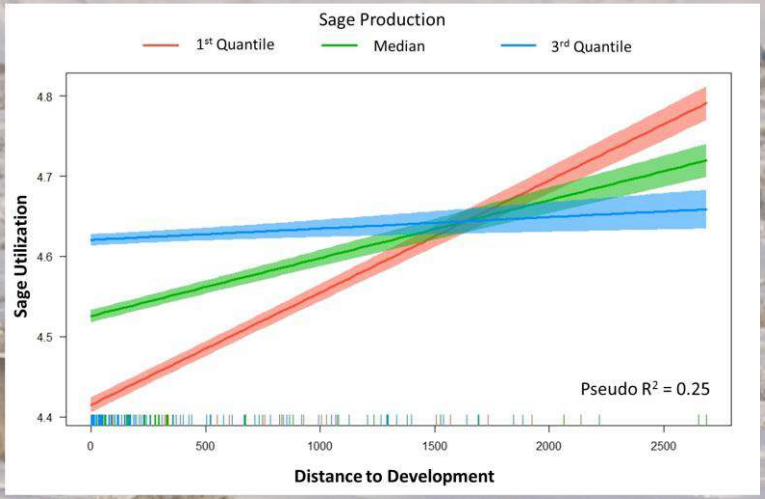
Relative Effect Size	Relative Effect Size	Relative Effect Size
0.388	0.003	-0.601***

Conclusions

Behavioral Tradeoff



Forage Loss



Perceived Risk

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Behavioral Tradeoff ✓

↓

Forage Loss ✓

↓

Nutritional Condition

↓

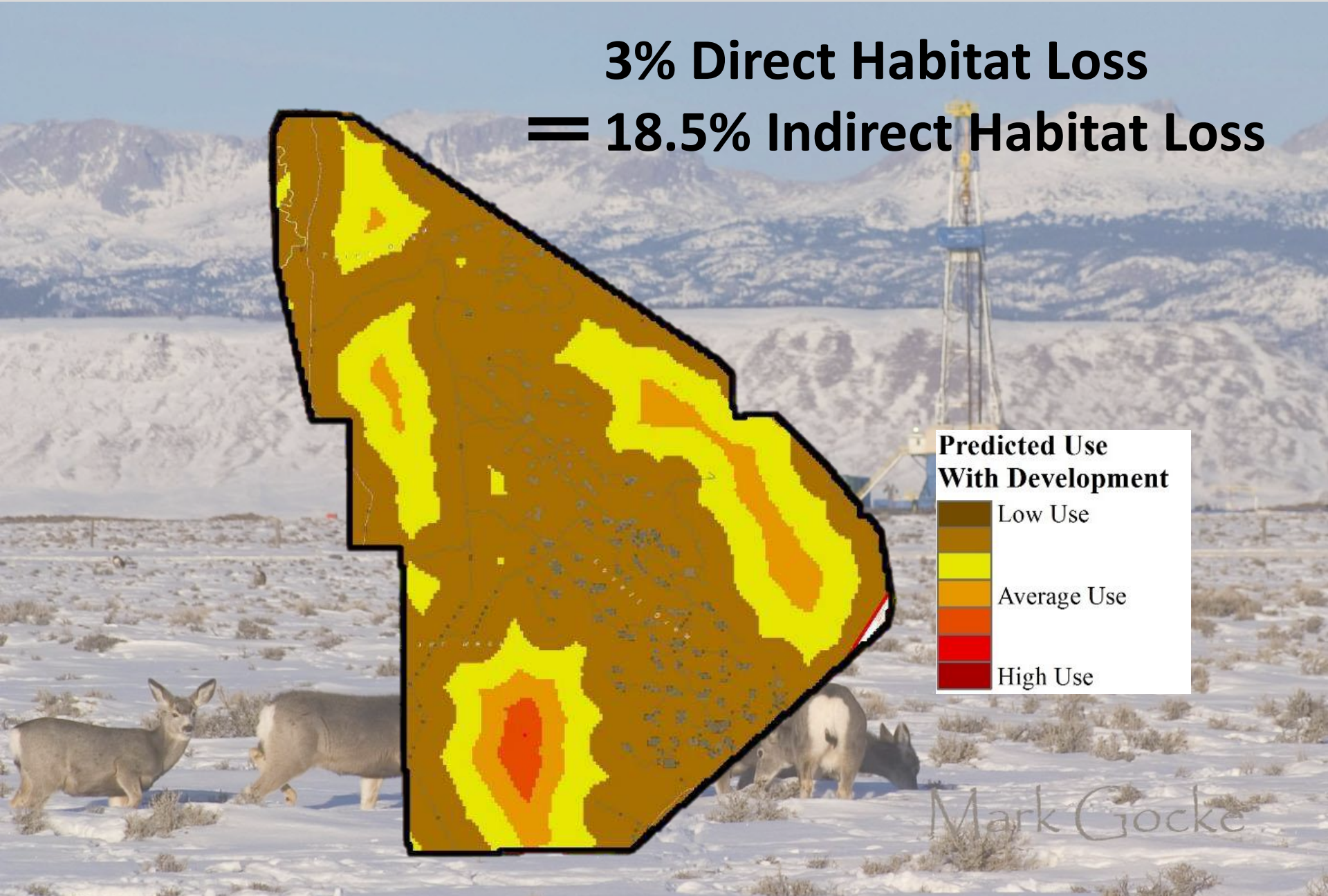
Fitness

Evidence that there is a reduction in the carrying capacity of these winter ranges

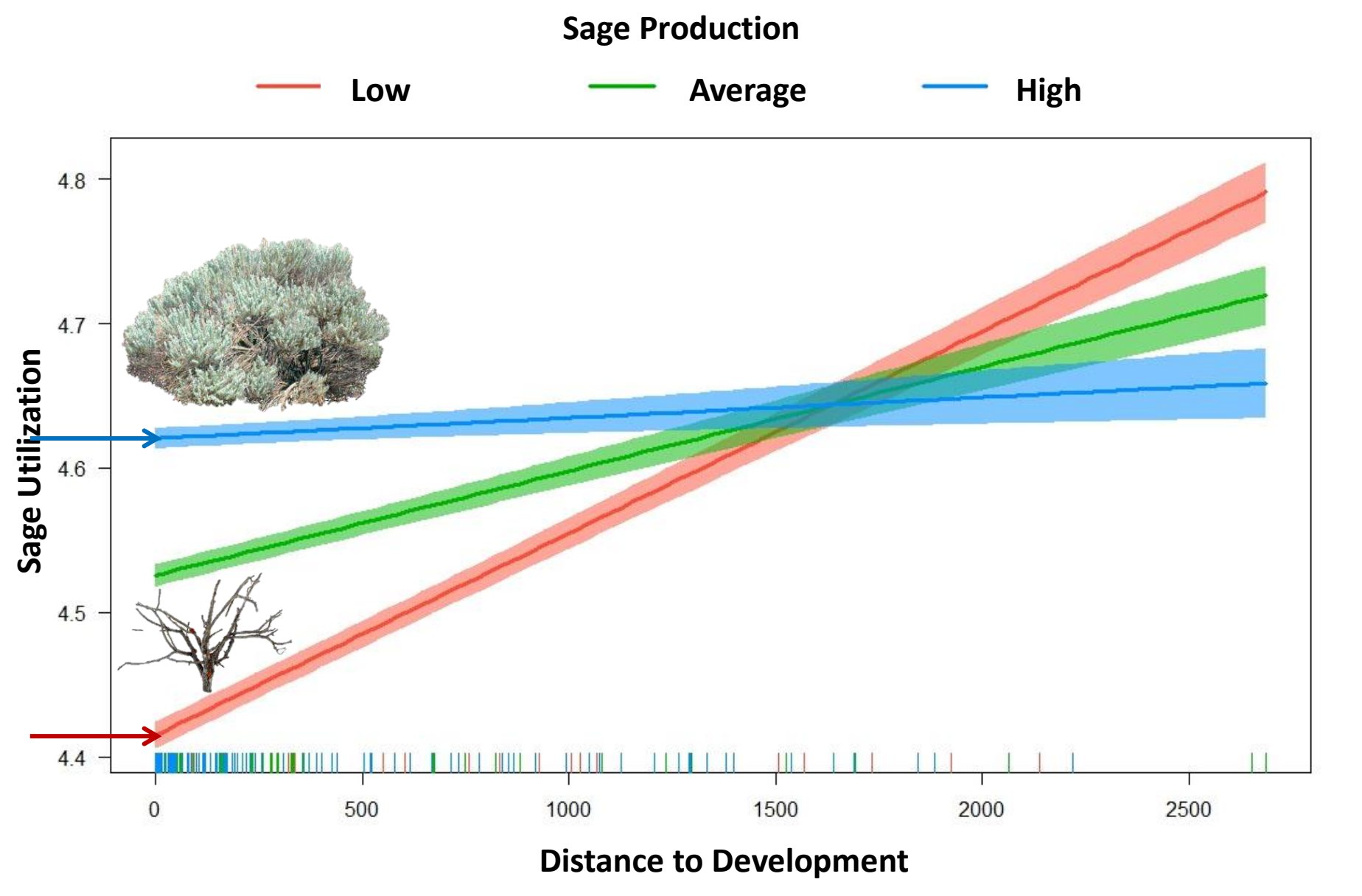
Conclusions

3% Direct Habitat Loss

= 18.5% Indirect Habitat Loss



Conclusions



Partners and Funders

Monteith/Kauffman Labmates

WGFD

Gary Fralick
Jill Randall
Alyson Courtemanch
Neil Hymas
Ben Wise
Scott Smith
Adam Hymas
Chris Baird
Jeff Short
Nick Roberts

MFF

Josh Coursey
Joey Faigl

BLM

Rusty Kaiser
Mark Thonhoff
Josh Hemenway

Field Technicians

Anna Ortega
Brian Miller
Jake Behrens
Shawn Opitz
Cole Bleke

Knobloch Family Foundation