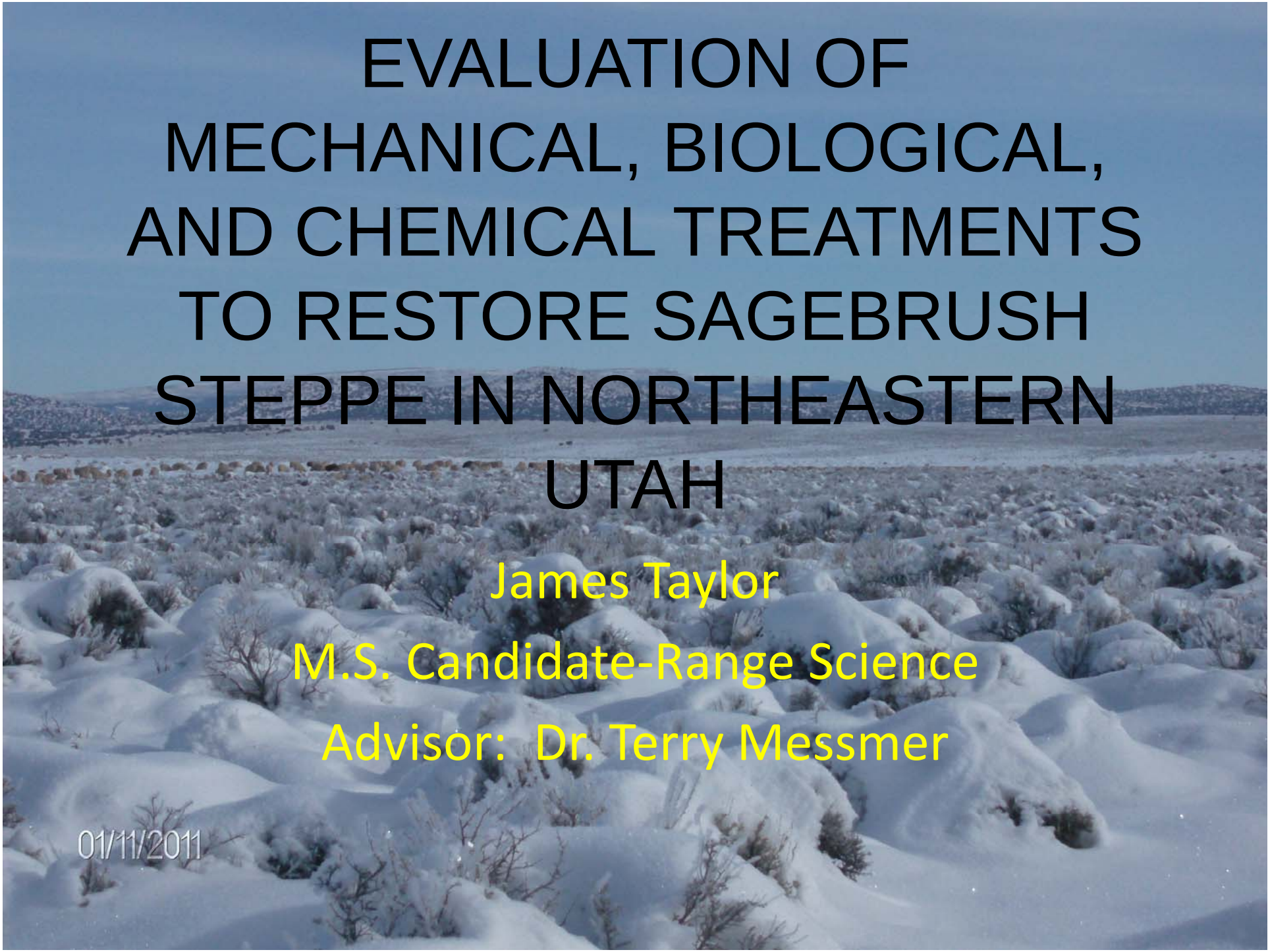


EVALUATION OF MECHANICAL, BIOLOGICAL, AND CHEMICAL TREATMENTS TO RESTORE SAGEBRUSH STEPPE IN NORTHEASTERN UTAH

James Taylor

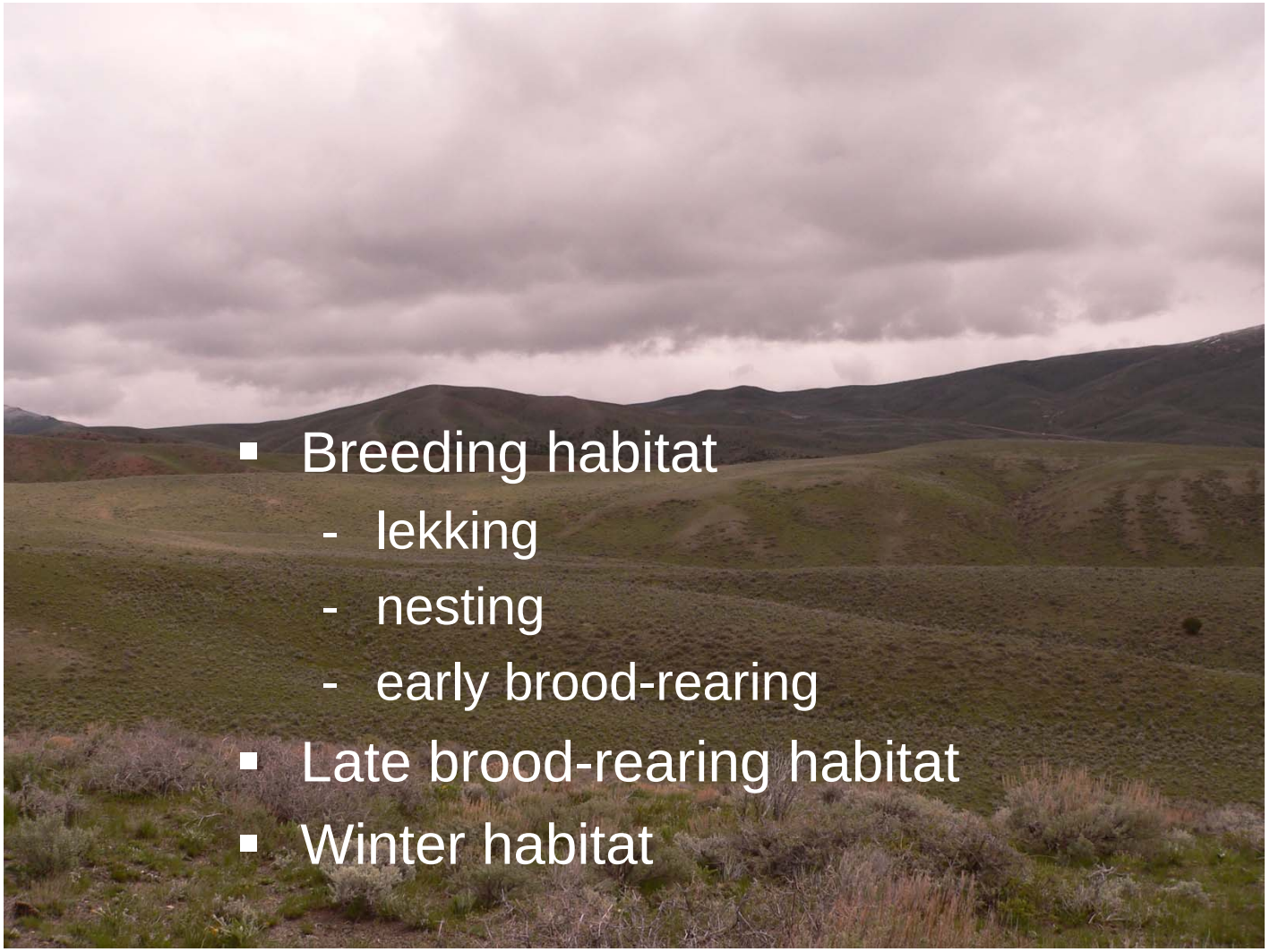
M.S. Candidate-Range Science

Advisor: Dr. Terry Messmer

Introduction

- Greater sage-grouse (*Centrocercus urophasianus*) populations are declining
- Candidate species for listing under ESA
- Sage-grouse biology is well-documented
- Species/population response to management at the landscape level

Sagebrush obligate



- Breeding habitat
  - lekking
  - nesting
  - early brood-rearing
- Late brood-rearing habitat
- Winter habitat

ALDO LEOPOLD

"Game can be restored by the creative uses of the same tools which have heretofore destroyed it- axe, *cow*, plow, fire, and gun"

Sagebrush-steppe Restoration Tools – (Leopold)

- “Lop and Scatter” of Pinyon-Juniper (axe)
- Biological manipulation (cattle and sheep)
- Dixie and chain harrow (plow)
- Chemical treatment (in lieu of fire)



Research Question 1

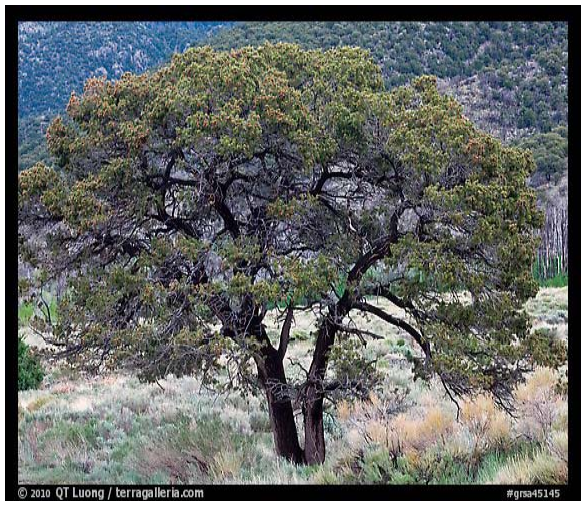
- Can biological (strategic intensive sheep grazing), mechanical (Dixie and chain harrow), and chemical (Plateau herbicide) manipulations improve the ecological site conditions and enhance sage-grouse brood-rearing habitat on lower elevation xeric sites?

Research Question 2

- **Can the combined effect of mechanical hand-cutting of pinyon (*Pinus spp.*) and juniper (*Juniperus spp.*) trees and cattle grazing (biological manipulation) reduce bromegrass (*Bromus inermis*) dominance and improve ecological site conditions and sage-grouse habitat on mesic sites?**

Research Question 3

- Can the combined effect of mechanical mastication of juniper and pinyon-pine trees and grazing improve the ecological site conditions and enhance sage-grouse habitat on higher elevation, mesic sites?



Research Sites

Deadman's Bench (1)

Anthro Mountain (2)

Rock Springs Mesa (3)

Deadman's Bench

- Located in Uintah County, southeast of Vernal
- 1700 m
- Historically used for sheep/cattle grazing
- Recent natural gas field development
- Remnant sage-grouse population

Anthro Mt

- Ashley NF south of Duchesne
- 2700 m
- Historically used for cattle grazing – sagebrush reseeded to brome in 1950's
- Small resident sage-grouse population – site of recent sage-grouse translocation
- PJ encroachment
- Energy development

Rock Springs Mesa

- Located in Grand County near Moon Ridge (Book Cliffs)
- 2000 m
- Historically used for cattle grazing
- Sage-grouse status unknown
- Bison herds
- Energy development

Cooperative Sagebrush Initiative (CSI)

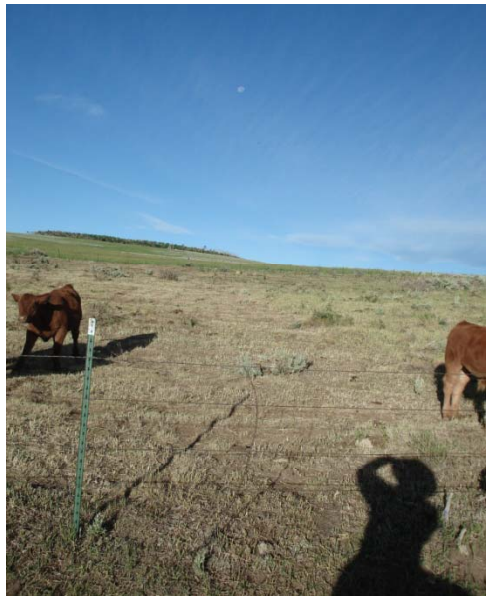
- Public/private/industry partnership
- Partners agree that energy foot print will disappear
- How to best restore sites and pay for it
- Mitigation credits to off set energy development
- Credits cost tied to restoration effects
- Funding research

Deadman's Bench Treatments (In Chronological Order)

- Chemical application (Plateau –Fall 2010)
- Mechanical treatments – (Fall 2010)
- Broadcast seeding (Fall 20100
- Sheep grazing (Winter 2010)

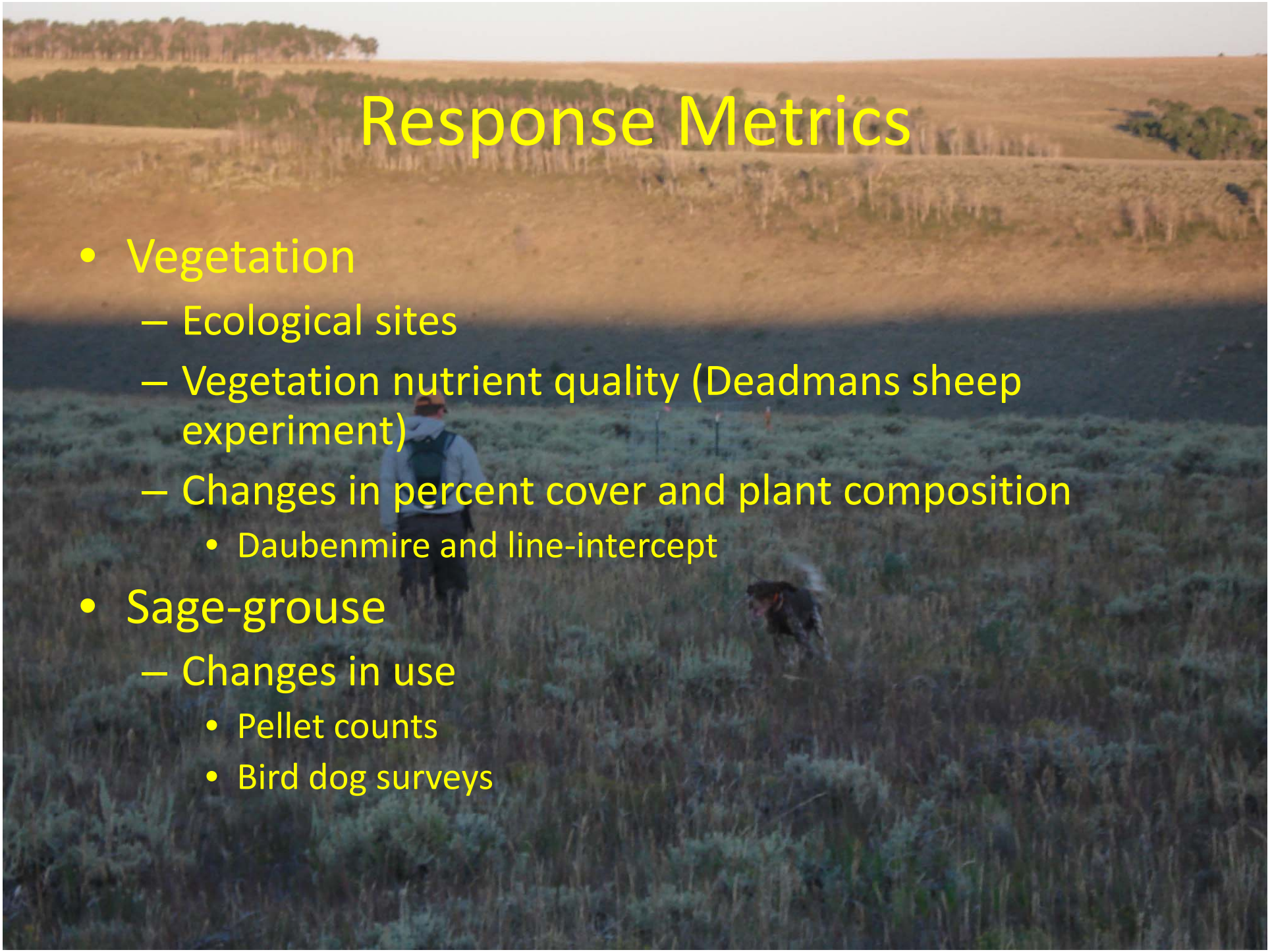
Anthro Mt - Treaments

- Hand-cutting of pinyon (*Pinus spp.*) and juniper (*Juniperus spp.*) trees (November 2009)
- Cattle grazing (June 2009)



Rock Springs Mesa - Treatments

- Mechanical mastication of pinyon/juniper (Bullhog machine – Nov 2010)
- Material left on site
- Cattle grazing



Response Metrics

- Vegetation
  - Ecological sites
  - Vegetation nutrient quality (Deadmans sheep experiment)
  - Changes in percent cover and plant composition
    - Daubenmire and line-intercept
- Sage-grouse
  - Changes in use
    - Pellet counts
    - Bird dog surveys

Desired Results

- Deadman's Bench-(xeric site)
  - Reduction of invasive species
  - Increased diversity of forb and grasses
  - More grouse
- Anthro Mountain- (mesic site)
  - Decreased competition – Brome and PJ
  - Increased native forbs and grasses
  - More grouse
- Rock Springs-(intermediate mesic)
  - Increased native forbs and grasses

Expected Benefits

- Knowledge will assist state and federal land management agencies and private landowners in managing sage-grouse habitat

QUESTIONS OR COMMENTS?