AN ASSESSMENT OF HERBICIDE TREATMENT AND GRAZING ON LESSER PRAIRIE-CHICKEN SURVIVAL, NEST SITE SELECTION, AND BROOD SITE SELECTION IN EASTERN NEW MEXICO

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Shinnery Oak

- Historically co-dominated by grasses and shrubs
- Unmanaged grazing ultimate changed community composition to shinnery oak monoculture
- Range of lesser prairie-chicken overlaps distribution of shinnery oak communities

Tebuthiuron: Problem/Solution?

- Haukos and Smith 1989
  - 8 of **10** hens nested in untreated shinnery oak pastures
  - All nests were found in residual grasses
- Johnson et al. 2004
  - 13 of **14** nests were located in untreated shinnery oak pastures
  - "This study suggests that herbicide treatment to control shinnery oak might adversely impact nesting lesser prairie-chickens"

Tebuthiuron: Problem/Solution?

TYPICAL APPLICATION

- Ultimate goal is to eliminate shinnery oak to promote forage for cattle
- Little or no desire to assess effects of application on wildlife populations

Herbicide Application

- 2000
  - The herbicide tebuthiuron was applied at 0.60 kg/ha to 518 hectares (ha)
    - Plots were 65 ha, except for one, which was 80 ha
    - Application rate was less than one half of the recommended dose
  - 518 ha of public land adjacent to treatment plots was not treated

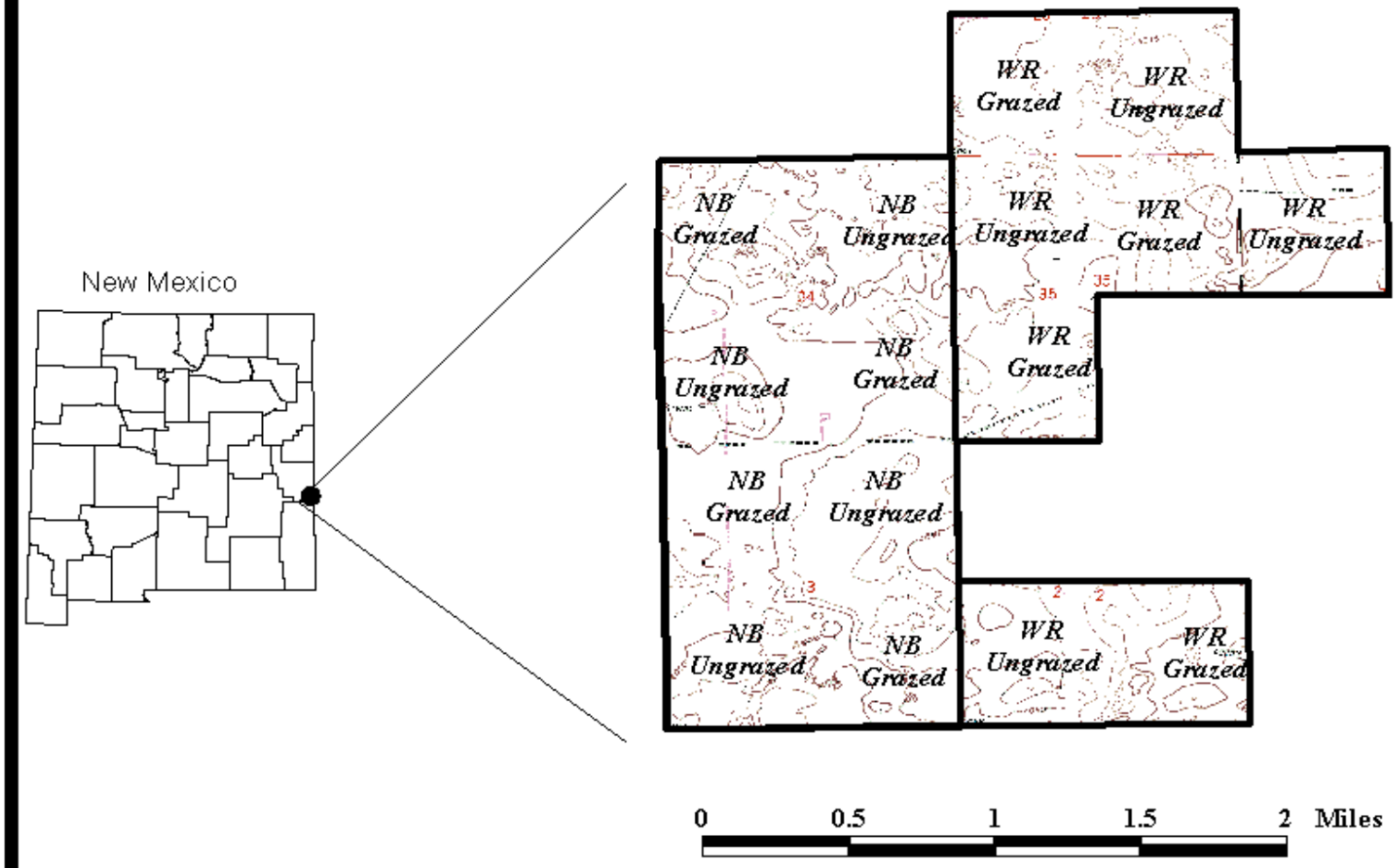
Grazing

- Short duration system
  - Plots were grazed once during dormant season and once during the growing season
  - Designed to remove 25% herbaceous material
  - Meant to break soil cap-litter incorporation, water penetration, and seed germination (Savory and Parsons 1980)
  - No grazing two years post herbicide treatment



Treatment Combinations

- Plots consisted of two treatments arranged in four combinations
  - Tebuthiuron with grazing (T-G)
  - Tebuthiuron without grazing (T-NG)
  - No tebuthiuron with grazing (NT-G)
  - A control of no tebuthiuron or grazing (NT-NG)



Experimental plots for monitoring the effects of shrub control and grazing on lesser prairie chickens in eastern New Mexico. NB signifies the North Bluitt Prairie Chicken Area plots. WR signifies the Weaver Ranch plots. The configuration of plots differed on the Weaver Ranch because of the presence of abandoned cultivated fields.
Geographic Location is T7S, R37E, Sec. 34 and T8S, R37E, Sec. 3.


Texas Orthoimagery Program
© 2011 Google
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Imagery Date: 3/31/2008
13 S 673663.05 m E 3726527.28 m N elev 4048 ft
Eye alt 27547 ft

Before-After Photos

Ultimate Project Goals

JENNIFER ZAVALETA

- Vegetation response
- Small mammal /herpetofauna /invertebrate abundance

PHIL BORSDORF

- LEPC spatial distribution/home range/movements in context to different land use patterns

BLAKE GRISHAM

- LEPC reproductive ecology/survival/demography
- Assess potential influence of climate change on LEPC nesting ecology/nest survival

Additional Information

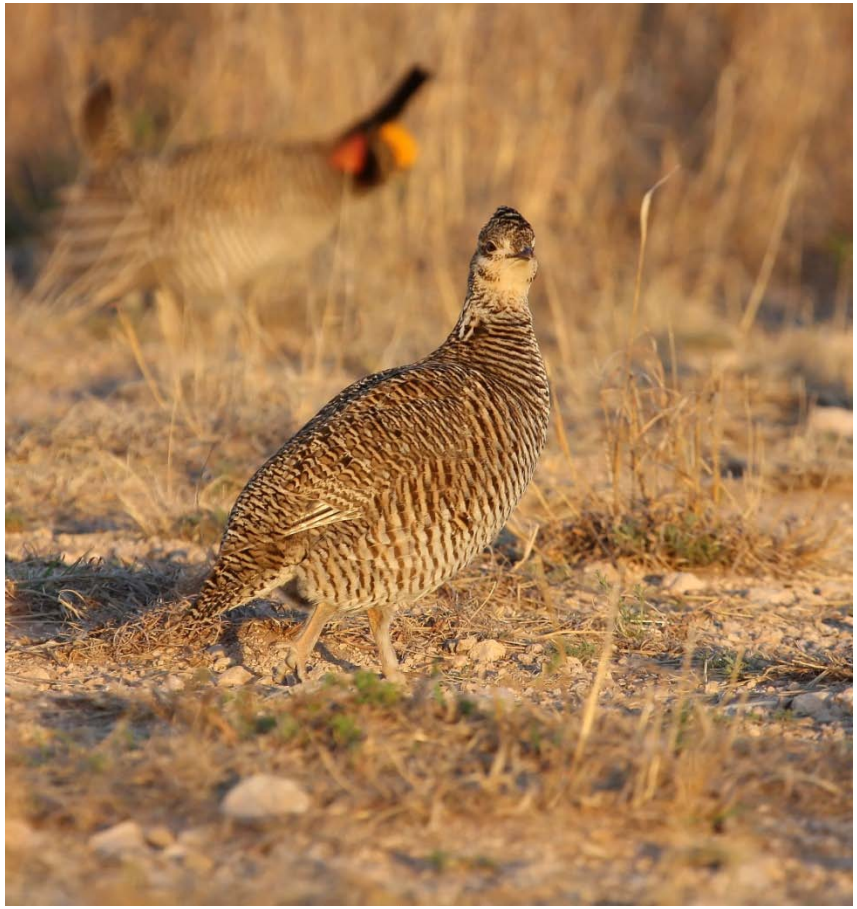
- LEPC nest survival
- Nest site structure
  - Brood/random
  - Among treatment plots
- Brood survival
- Brood site structure
  - Brood/random
  - Treated v. Untreated plots
- Invertebrate abundance at brood locations

Overview of Information

- Breeding season survival
  - 2006-2010
- Nest site selection
  - 2001-2010
- Brood site selection
  - 2006-2010
- Discussion

Breeding Season Survival

- Survival assessment
  - Females only
  - 2006-2010
  - Known fate models
  - Assessed # of locations in each treatment type per individual
  - Grouped each individual by treatment where the greatest proportion of locations were recorded



Breeding Season Survival

Name	Description
All Treatments Same	No difference in survival across treatments
Grazing	No difference in survival across similar grazing treatments
All Treatments Different	Daily survival differs across all treatments
Reciprocal	No difference in daily survival between treatments that have different herbicide and grazing treatments
Herbicide	No difference in survival across similar herbicide treatments

Smythe and Haukos 2009

Breeding Season Survival

- 66 encounter histories from 53 unique individuals
  - 3 had the greatest proportion of locations in T-NG areas
  - 5 had the greatest proportion of locations in NT-NG areas
  - 27 had the greatest proportion of locations in T-G areas
  - 32 had the greatest proportion of locations in NT-G areas

Breeding Season Survival

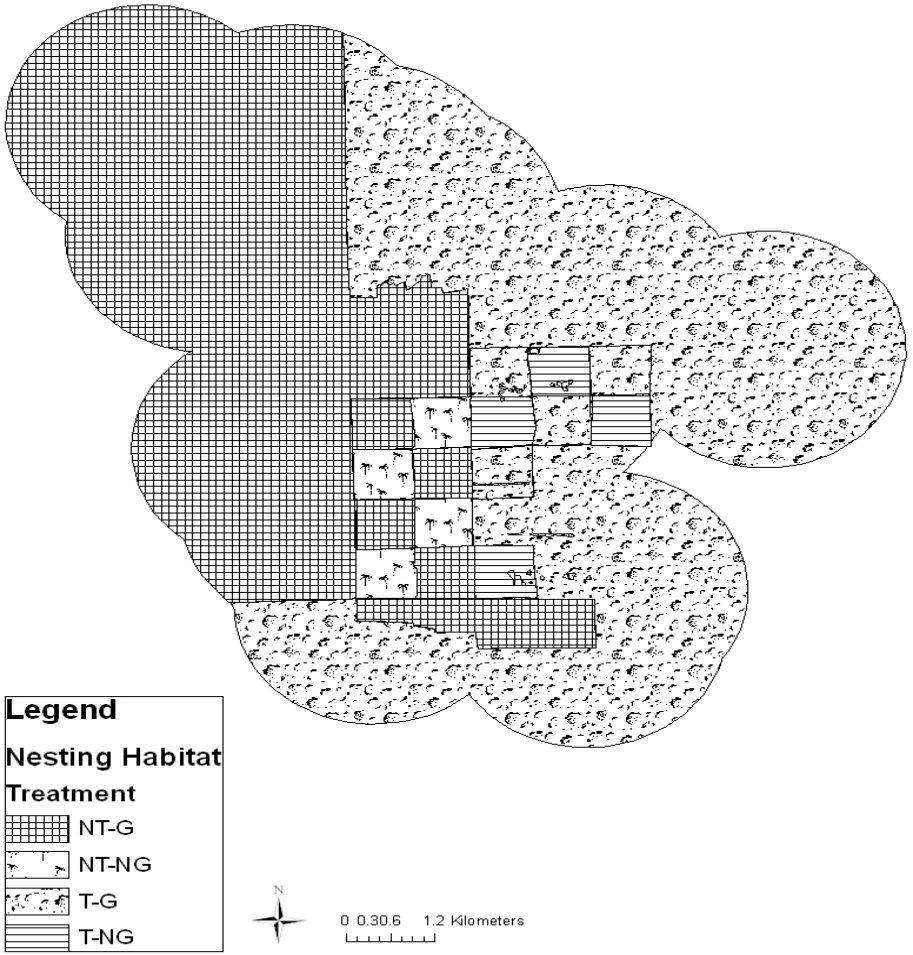
- No evidence of differences in breeding season survival across treatment types
  - 0.81(SE=0.07) for T-NG areas
  - 0.80 (SE = 0.06) for T-G areas
  - 0.76 (SE =0.08) for NT-NG areas
  - 0.79 (SE=0.06) for NT-G areas

Nest Site Selection

- Two assessments
  - Population level (Type II)
    - Availability determined by combining all individuals
    - Buffer leks by 1.9 km
    - 1,000 randomly placed points
    - Observed v. expected
  - Within each individual lek of capture (Type III)
    - Availability determined by breaking nest up by lek of capture
    - Buffer each lek by 1.9km
    - 100 randomly placed points per lek
    - Observed v. expected

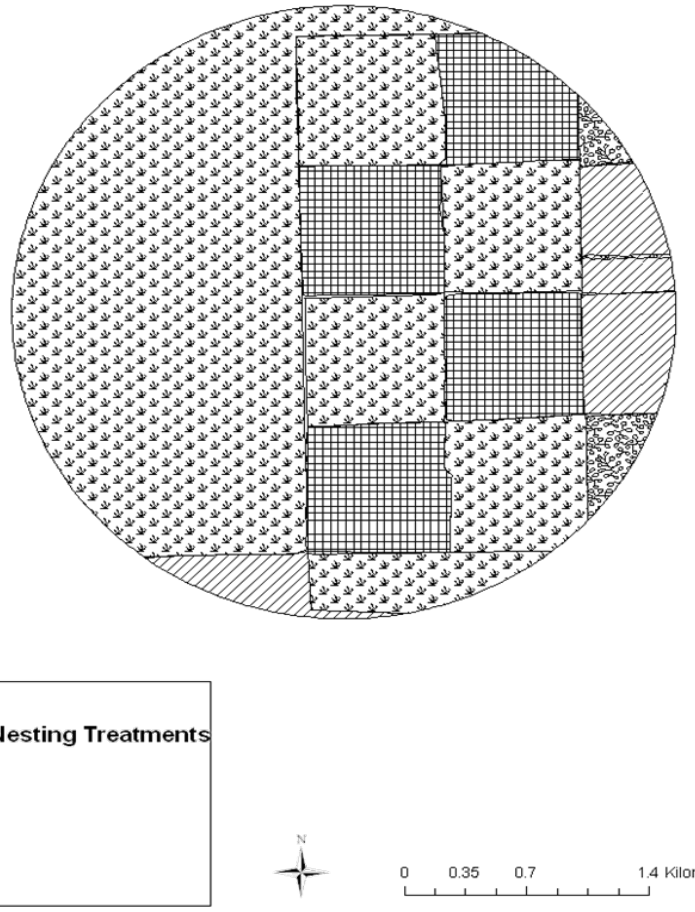
Population Level Assessment

- 2001-2002
  - 50 nests
  - NT-G -Used as expected
  - NT-NG- Used more
  - T-NG- Used less
- 2003-2010
  - 132 nests
  - NT-G- Used as expected
  - NT-NG- Used more
  - T-NG- Used as expected
  - T-G- Used as expected



Individual Lek Assessment

- 2001-2002
  - 18 nests from 1 lek of capture
  - All treatment types were used as expected
- 2003-2010
  - 84 nests from 5 leks of capture
  - Treatments used disproportionately to expected for 4 of 5 leks
  - No noticeable pattern of use/avoidance



Nest Site Selection

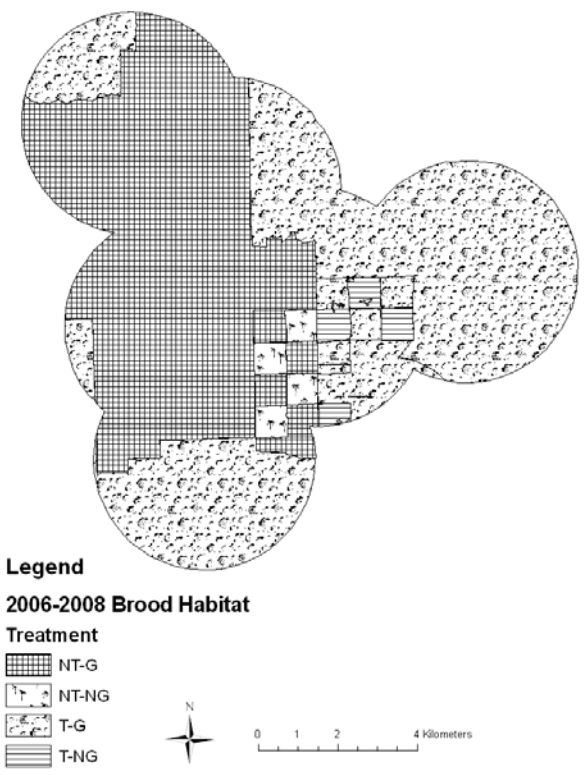
Lek	TRT	Observed	95% Confidence Interval	Expected	Outcome
1	NT-G	0.14	0.08-0.20	0.53	Used Less
	NT-NG	0.50	0.41-0.59	0.31	No Difference
	T-G	0.14	0.08-0.20	0.08	No Difference
	T-NG	0.14	0.08-0.20	0.08	No Difference
4	NT-G	0.56	0.48-0.64	1.00	Used Less
	NT-NG	0.06	0.02-0.10	0.00	No Difference
	T-G	0.38	0.30-0.46	0.00	Used More
	T-NG	0.00	0.00-0.00	0.00	No Difference
7	NT-G	0.32	0.24-0.40	0.00	Used More
	NT-NG	0.04	0.01-0.07	0.00	Used More
	T-G	0.64	0.56-0.72	0.93	Used Less
	T-NG	0.04	0.01-0.07	0.07	No Difference
17	NT-G	0.08	0.04-0.12	0.63	Used Less
	NT-NG	0.67	0.59-0.75	0.29	Used More
	T-G	0.25	0.18-0.32	0.08	Used More
	T-NG	0.00	0.00-0.00	0.00	No Difference

Brood Site Selection

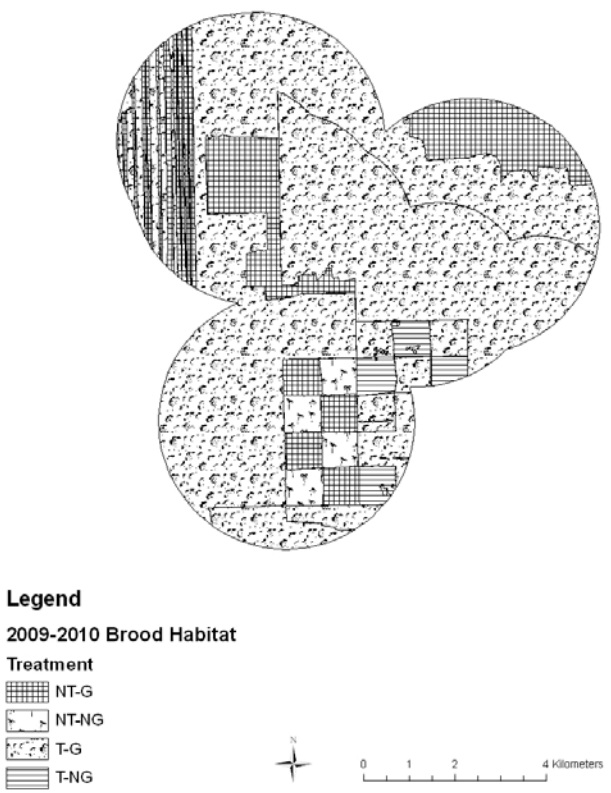
- Two assessments
  - 2006-2008
  - 2009-2010
  - Nearby ranch was treated with tebuthiuron in 2008 and changed availability
  - Population level (all brood locations combined)
    - Low sample sizes of brood locations
    - 44% of all broods were lost 1-4 days post hatch

Available Brood Habitat

2006-2008



2009-2010



Brood Site Selection

2006-2008

- 27 locations from 9 brood rearing hens
- All treatments were available
- All locations were either in T-G or NT-G areas
- Brood rearing hens did not use treatment types disproportionately to what was expected

2009-2010

- 48 locations from 8 brood rearing hens
- All treatments were available
- All locations were either in T-G or NT-G areas
- Brood rearing hens did not use treatment types disproportionately to what was expected

Discussion

- Appears to be no effect of herbicide and grazing treatments on female survival during the breeding season
- Results differ from Patten et al. (2005)
  - Greater survivorship in areas >20% shrubs
  - Survivorship was higher in Kansas on Site II (4,000-6,000 sagebrush/ha)
- Spatial scale and temporal response of shrubs
  - Patten et al. (2005)- 2-3 years post treatment
  - This assessment – 6-10 years post treatment

Discussion

- Population level assessment for nest sites is inappropriate due to lek site fidelity
- At smaller scales (individual leks), there was no consistent use/avoidance patterns
- Nest survival did not vary among treatment type
- Nest had similar structure regardless of treatment type, suggesting all treatments provide sufficient nesting habitat

Discussion

- Brood rearing hens did not select treatment types differently from what was expected
- Differs from Bell et al. (2010)
  - Brooding hens selected for NT areas
  - Thermal refugia
- Temporal response of shrub cover
  - Shrub cover in treated areas improved 5-10 years post treatment
- Brood survival is boom-bust and not related to treatment type

It Appears…

- Treatments mimic natural disturbance
  - Can be detrimental in short term
  - Effects appear to be minimal to LEPC ecology in long term
- Benefits?
  - Smythe and Haukos (2009)- higher density of grassland songbird nest in treated areas
  - Zavaleta (2012)- study site reached ecological site description standards in 2009
  - The need to improve the quality of LEPC habitat, not just the quantity

Acknowledgements



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