

Sharp-tailed Grouse and Vegetation Responses to Fall Prescribed Fire and Mowing

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Early successional habitat: open grass & brushland

- Historically maintained by wildfires & Native American use of fire
 - During both dormant and growing seasons
 - 0-10 year intervals in grass, shrub, & understory forest

Management Today

- Prescribed fire
 - Labor intensive
 - Restrictive conditions
- Mechanical treatments: mowing & shearing
 - More expensive
 - May not simulate fire cues



Sharp-tailed Grouse and Fire

- "Fire bird"
- Numbers increase in burned areas
- Possible cues provided by fire
 - Flames
 - Smoke
 - Dark burned ground



Fall Focus

- Juveniles disperse in Sept & Oct <6 K from brood rearing areas
- Dance at leks in fall
- No regrowth of vegetation during winter
- Most DNR prescribed burns in spring
- H_o: Grouse use will increase with management: burn > mow > control

Goals

Compare STGR USE of sites PRE & POST management at burns, mows, & controls in fall

Relate vegetation metrics to differences in sites where STGR were detected vs not detected

Measure <u>vegetation response</u> at burns, mows, & controls





Study Design: BACIP

- Managers selected sites for treatment & identified controls
 - Similar in size (2-269 ha) & composition (grass, forbs, shrubs, trees) <6 K apart
- Sampled 5x per site: PRE & 1WK, 1MO, 1YR, & 3YR post-treatment
 - Similar temporal framework for controls



Grouse Methods

- Quantifying grouse use
 - o 25 m pellet transect/ha
 - Traverse site to capture edge & interior
 - Parallel transects <u>>150</u> m apart
 - Count & remove fecal pellets <0.5 m from transect
 - Record grouse observed (heard, flushed, tracks)
- Pellet detection transects to quantify detection in different vegetation types

Vegetation Methods

- Point-intercept sampling to determine %cover & mean height of trees, shrubs, forbs, graminoids
- 20 m transects perpendicular to pellet transect, measurements every 1.0 m

Analytical Methods



Difference in pellet counts between paired sites by time period (PRE, 1WK, 1MO, 1YR, 3YR)

Linear mixed-effect model: Random effect = Site; Fixed effects = Trt, Time,

Trt:Time

Analytical Methods



MANOVA to examine vegetation metrics across treatment groups and time periods

Logistic model to evaluate individual predictor effects

Sharp-tailed Grouse Responses





Time

Control Burning Mow Burn Vegetation height largely unaffected by burning PRE 1WK 1M0 1YR 3YR 0.9xht.forb 0.6-0.3height (m) 0.0-1.00 -0.75 xht.gram 0.50 -0.25 -4 -3xht.shrub 2-1-0 -Control Mow Burn Control Burn Control Mow Burn Control Mow Mow Burn Control Mow Burn

Trt

Burning Forb cover higher at 1YR and 3YR







Mowing/Shearing

- Reduced proportion & height of shrub cover
- Shrub cover returned to PRE levels <1YR
- Shrub height returned to PRE levels more slowly



Trt Control **Both Treatments** Reduced forb & Mow graminoid cover in short term Burn PRE 1M0 1YR 1WK 3YR 1.00 -0.75 pcov.forb 0.50 -0.25 -0.00 -1.00 pcov.gram 0.75 -0.50 -0.25 -

Sharp-tailed Grouse Detections during 5 Surveys

VEGETATION METRIC	DETECTED	NOT DETECTED
Mean proportion cover graminoid	0.82	0.92
Mean proportion cover forb	0.24	0.29
Mean proportion cover shrub	0.29	0.31
Mean height graminoid	0.43	0.43
Mean height forb	0.27	0.27
Mean height shrub	0.87	0.99
Tree presence/absence	0.52	0.47



Changes in Detection

- Management increased pellet detectability temporarily, but this cannot account for increases
 - Detectability returned to PRE levels <1YR, but site use remained elevated at burn sites
 - Counts increased at burn sites between 1WK & 1MO when detectability did not change
- Estimating magnitude of response difficult due to preponderance of zero counts preventing correction

Mowing/Shearing Applied to Sites with More Woody Invasion

- Managers selected sites for mowing/shearing that tended to have greater shrub cover & height before treatment (more woody invasion) & smaller
 - Initial site differences may influence grouse responses to management, especially if less brush preferred
 - Might also indicate mowing & shearing largely ineffective at more advanced stages of woody invasion



Sharp-tailed Grouse Site Use

- Site use increased after burning, but not mowing
- Both burning & mowing reduced cover, so another aspect of burning may increase use
- Vegetation metrics at apparently USED & UNUSED sites did not differ
 - Detection imperfect
 - High variability
 - Both habitat
 - Other factors may influence use



Temporary Changes

Most veg metrics back to PRE levels <1YR

- Mowed/sheared sites
 - Less shrub cover for <1YR, shrub height slower to recover
- Burned sites
 - Veg height largely unaffected
 - Forb cover higher at 1YR and 3YR
 - Shrubs unaffected

Take Home Messages

- Temporary veg & STGR responses → MANAGEMENT NECESSARY AT INTERVALS
 <3 YRS
- Prescribed fire & mowing/shearing produce different STGR & vegetation responses → apply to MEET DIFFERENT GOALS
- Mowing can maintain habitat at sites used by STGR by slowing woody encroachment
- Prescribed fire more effective than mowing at increasing STGR site use in fall

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The Effect of Season of Prescribed Fire on Minnesota Lowland Brush Ecosystems





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Prescribed fire as tool to control woody encroachment

- Most prescribed fire in spring
- Historically, more seasons
- Different effects
 - Fuel load, moisture, dormant and growing





Sampling points









Sampled:

- Pre-burn & 1 YR postburn (ongoing with sampling at 2 & 5 YR)
- Burn Severity: survival & topkill of woody stems
- Next growing season for summer & fall, spring ≥4 WK post-burn or lastfrost

Ten successful burns

Spring

- May 10, 2017 (HB)
- May 12, 2017 (HWY 29)
- May 16, 2018 (Gerzin)
- May 23, 2018 (Deer Run)

Summer

- August 11, 2017 (Hwy 29)
- September 12, 2017 (HB)
- August, 23, 2018 (Deer Run)

Fall

- November 16, 2016 (HB)
- October 19, 2017 (Hwy 29)
- October 18, 2018 (Gerzin)



Spring 57 of 64 plots burned

SpringFall57 of 6416 of 31plots burnedplots burned









Plot Scale: Differentiated between plots that burned & did not burn





Stem density reduced in 1-2 m height class (all plots)



Pattern more pronounced in burned plots only



Stem density increased in 0-0.5 m height class (all plots)



Stem Height (m)

Pattern more pronounced in burned plots



Take-home: spring & fall burns reduce tall shrubs but stimulate resprouting



	Spring	Summer	Fall
Area burned	Most	Least	Intermediate
Severity	All similar	All similar	All similar
Reduction of tall shrubs	High	Moderate	High
Resprouting	High	Low	High

Spring burns carry easily, high topkill, but homogeneous structure

What are benefits to burning in different seasons? Burn more frequently to reduce resprouting? Burn later when reserves above ground

More seasons = more opportunity

Lots of resprouting in dormant seasons

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Questions?

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