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Oak Regeneration Under Varying Treatment Regimes

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OAK REGENERATION UNDER VARYING TREATMENT REGIMES: MANAGEMENT GUIDELINES AND IMPLICATIONS FOR AT-RISK AVIAN SPECIES

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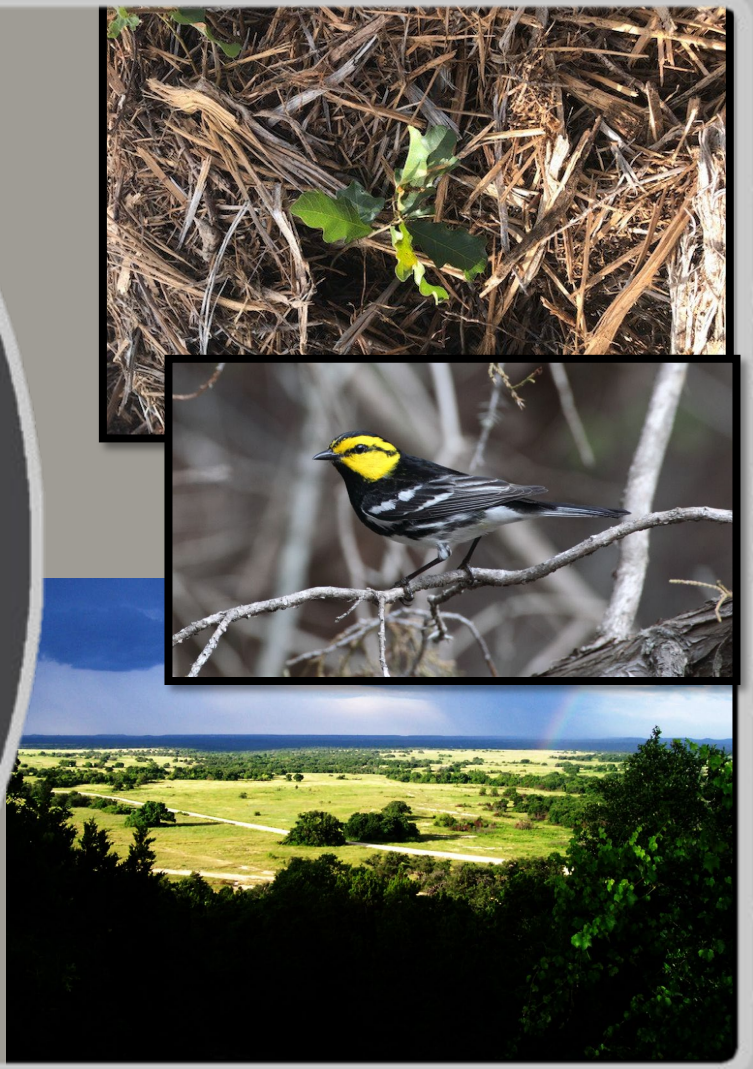


UNCLASSIFIED

Well documented global decline of oak populations

Land use change, fire suppression and herbivory

Photo Credit: Tara Keyser, USFS

Photo Credit: worlddeer.org

Declines in oak dependent species

Oak regeneration on military lands

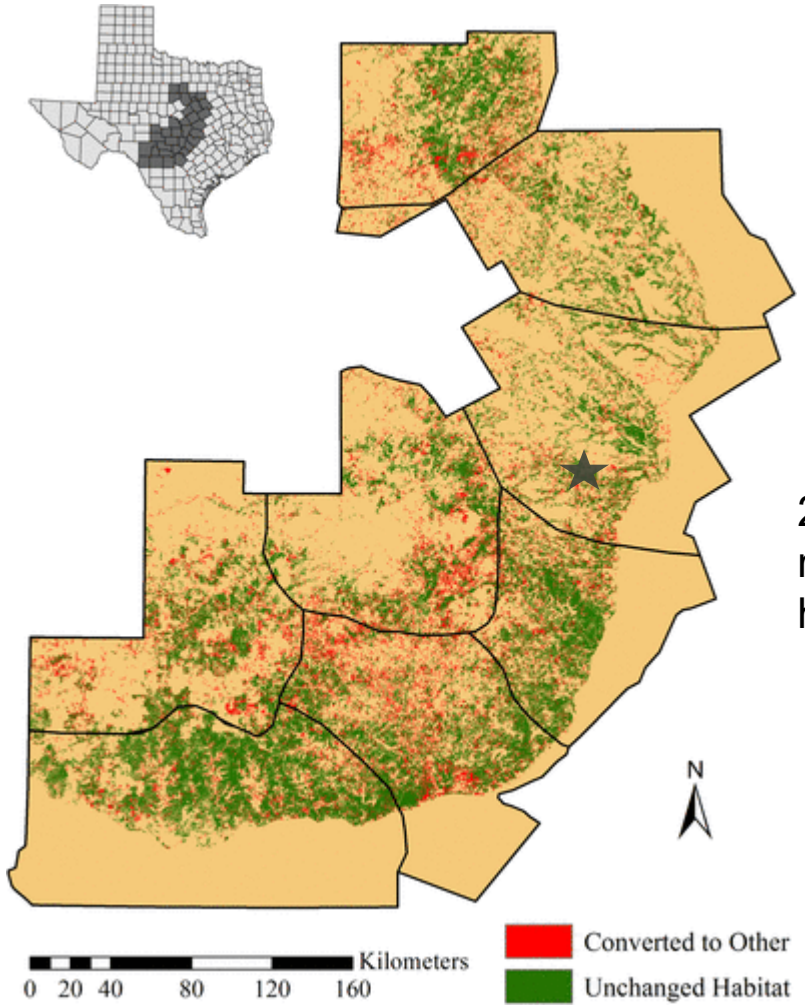
Wildfire

Mechanical Thinning

Prescribed Fire

Golden-Cheeked Warbler

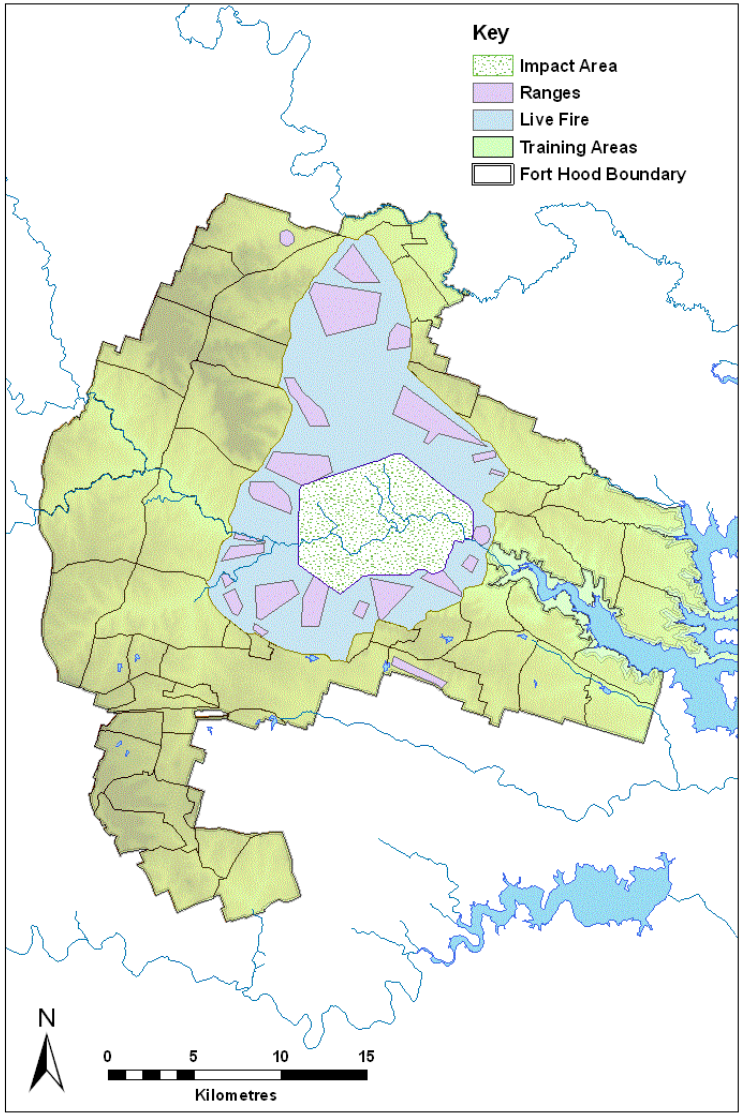
Photo by Gill Eckrich



29% reduction in habitat

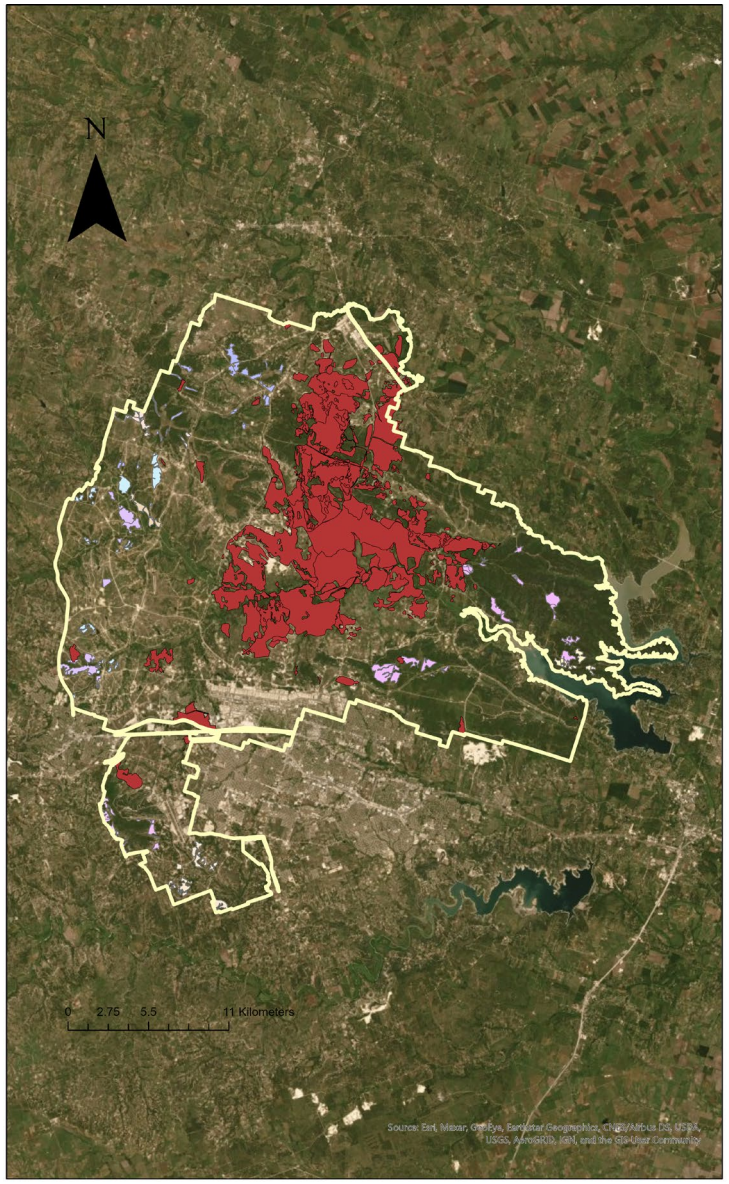
Figure: Duarte et al. 2013, Ecosphere

Fort Hood, Texas



Gaffney 2007

Fort Hood, Texas



Oak Species of Fort Hood

Red Oak (*Quercus buckleyi*)

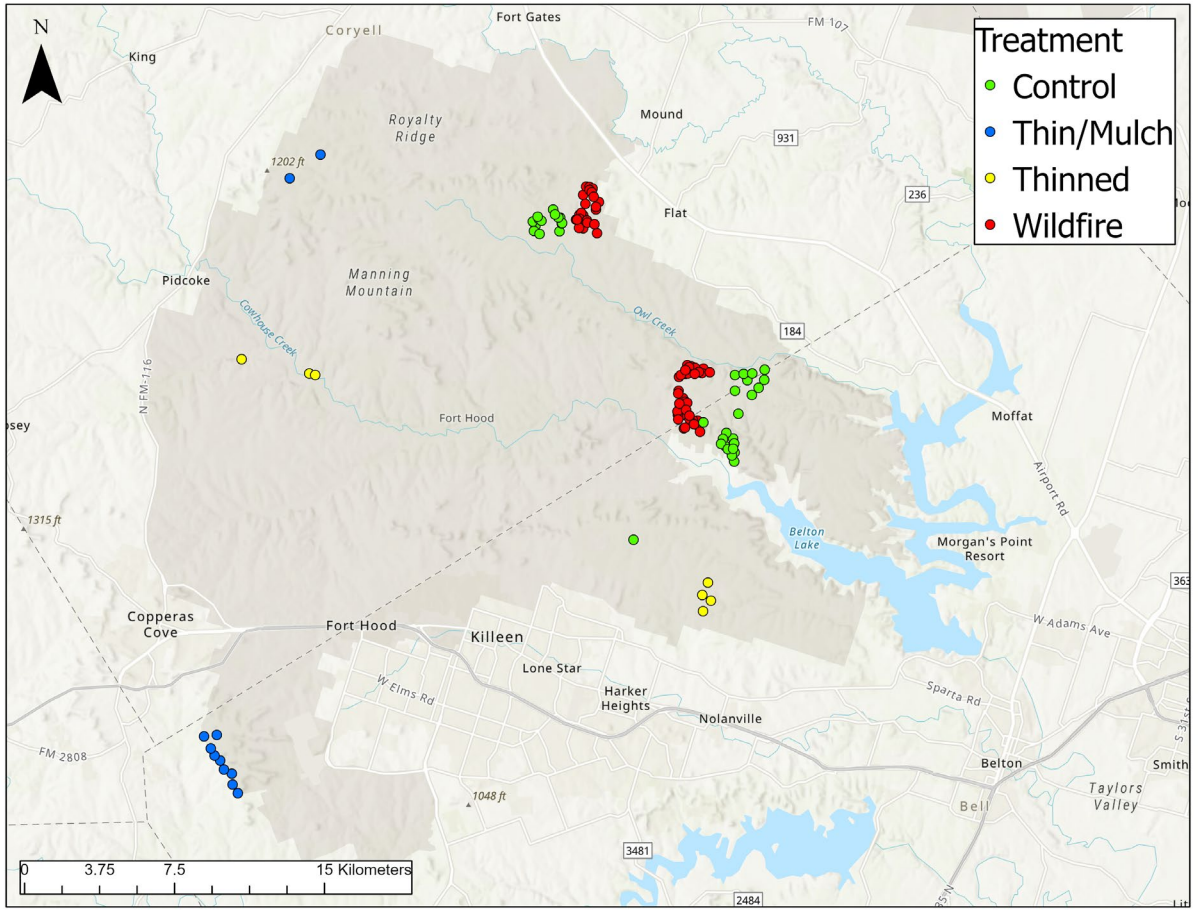
Live Oak (*Q. fusiformis*)

Post Oak (*Q. stellata*)

Texas A&M Forest Service Figures

Oak recruitment on Fort Hood: Methods

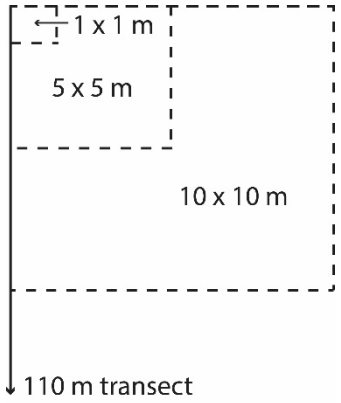
- Oak/juniper woodlands
  - Mechanically thinned (2018 – 2019)
    - Slash mulched and spread in place
    - Slash removed
  - Wildfire
    - 1996 or 2008
    - Long-term data available (Reemts and Hansen 2008)
  - Control
    - No management



Oak Recruitment on Fort Hood: Methods

- 2020 - 2021
- Randomly placed 110m transects
  - 7 random plots along transect
- Nested habitat assessment plots
  - Ground cover (1m)
  - Seedlings/shrubs/sapling density (5m)
    - # stems browsed
  - Tree density (10m)
  - Ungulate sign (10m)

- Generalized Linear Mixed Models
  - Random – plot ID nested transect ID



Oak Recruitment on Fort Hood: Methods

- Game cameras
  - Ungulate use of plots
  - Thinned and control

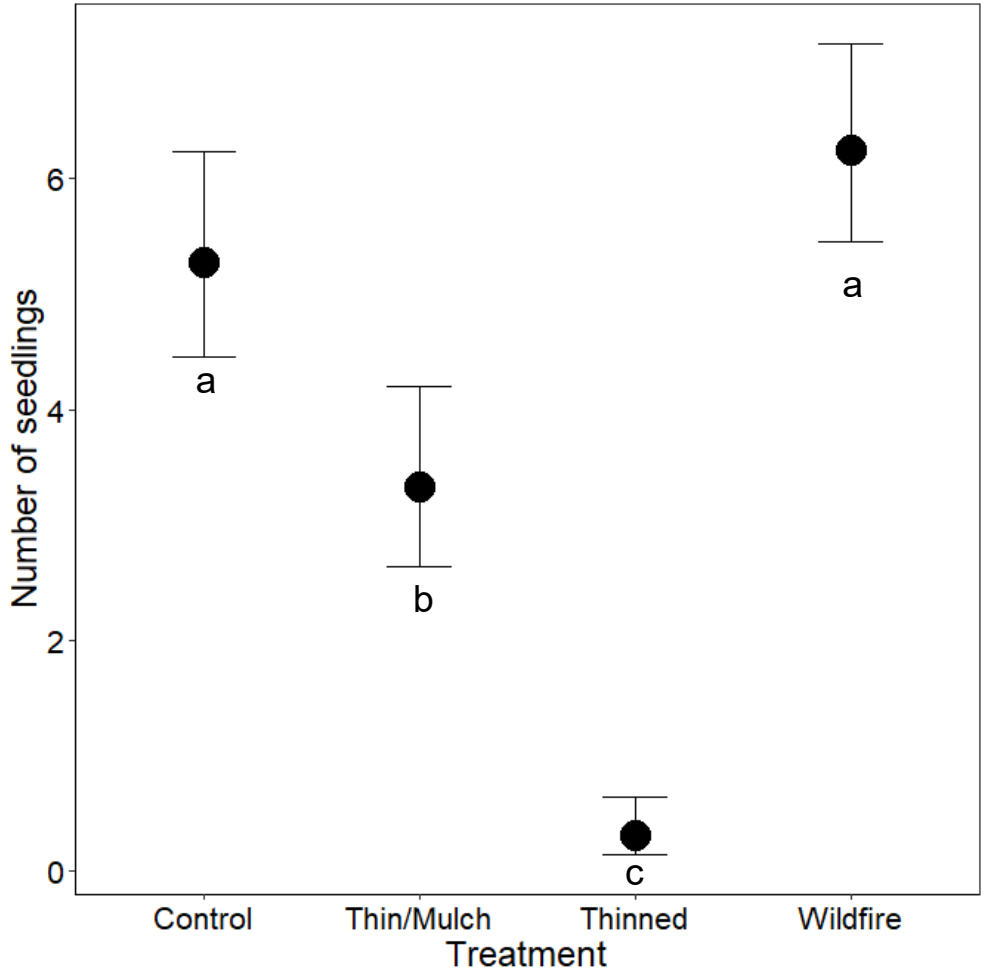
- Generalized Linear Mixed Models
  - Negative binomial
  - Detections/trap night
  - Time per detection

Oak Recruitment on Fort Hood: Results

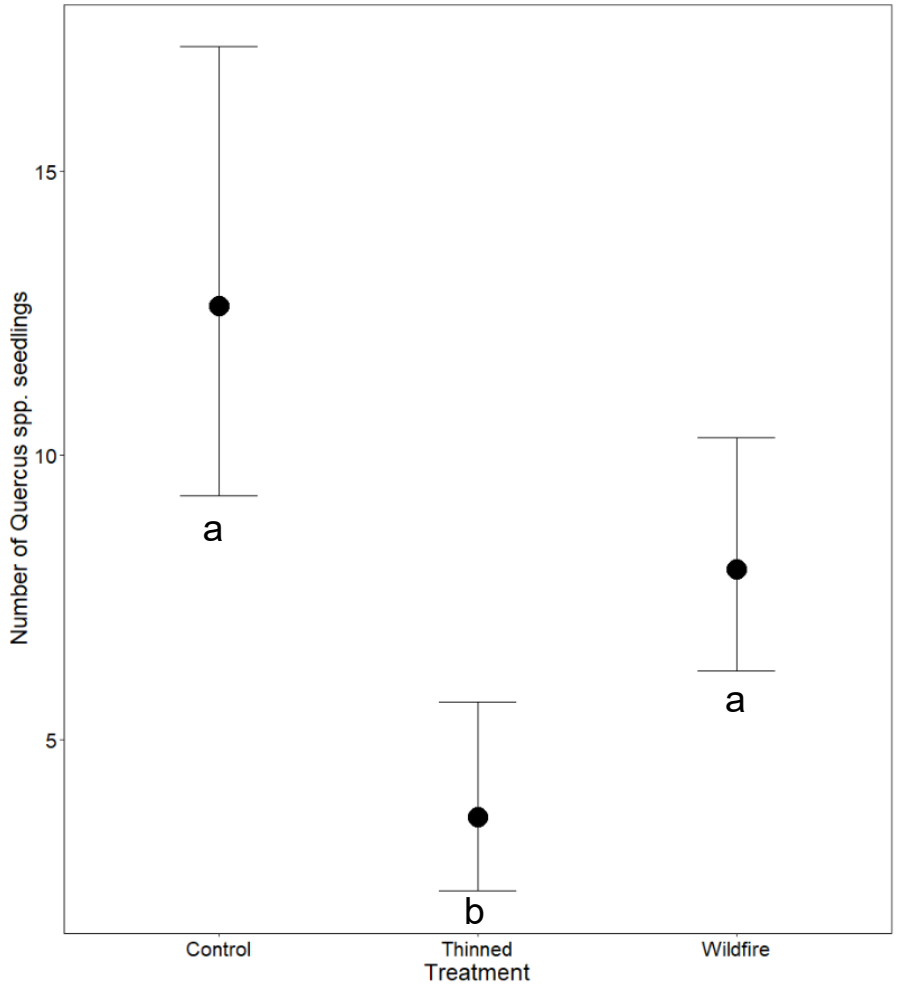
- Mechanically thinned
  - Mulch (n = 175)
  - No Mulch (n = 49)
- Wildfire (n = 455)
- Control (n = 308)

- Game cameras
  - Mechanically Thinned (1475 trap nights)
  - Control (9888 trap nights)

Fewer seedlings in mechanically thinned plots

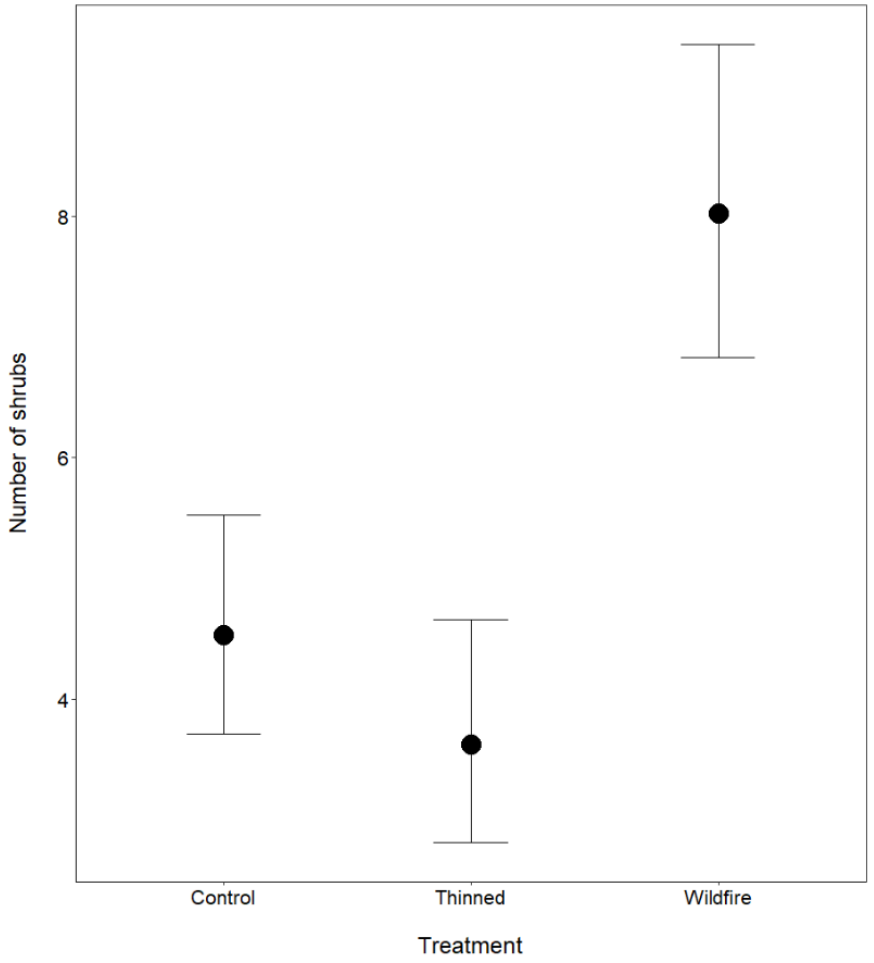


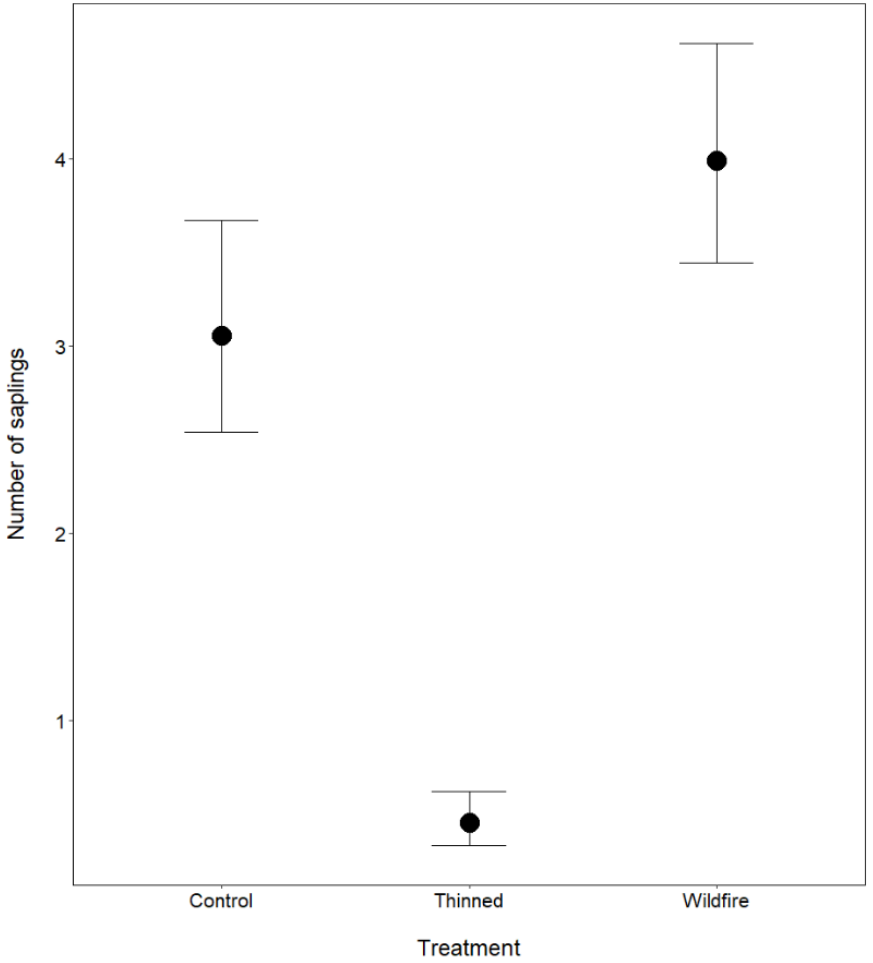
Fewer oak seedlings on mechanically thinned plots



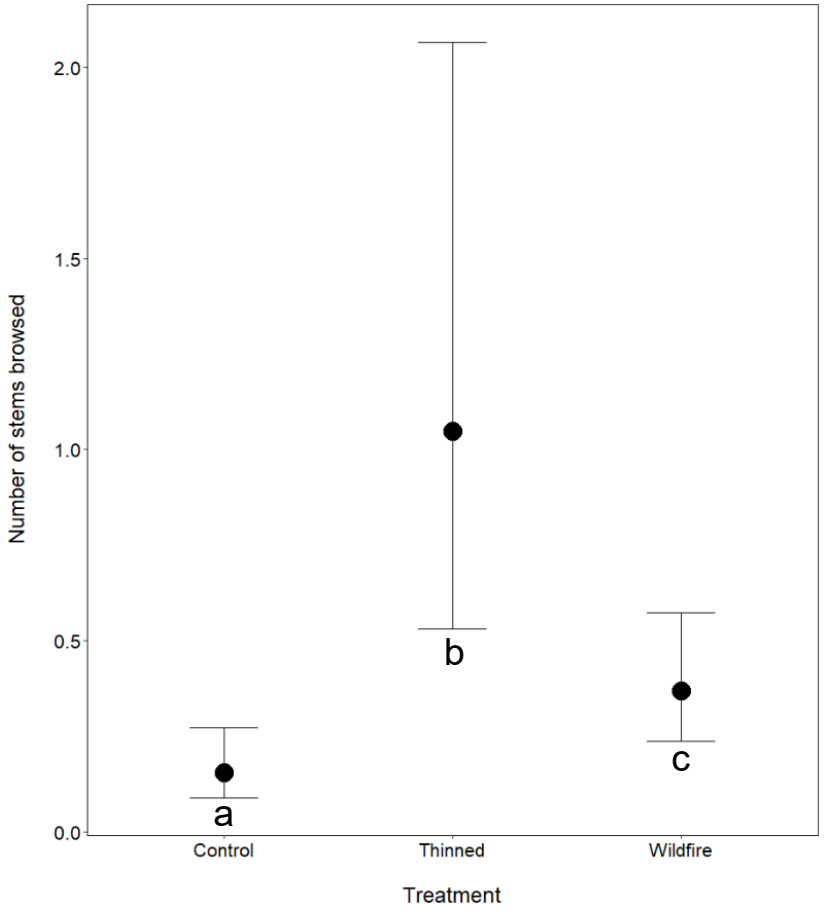
Fewer shrubs and saplings in thinned plots

Result of thinning prescription



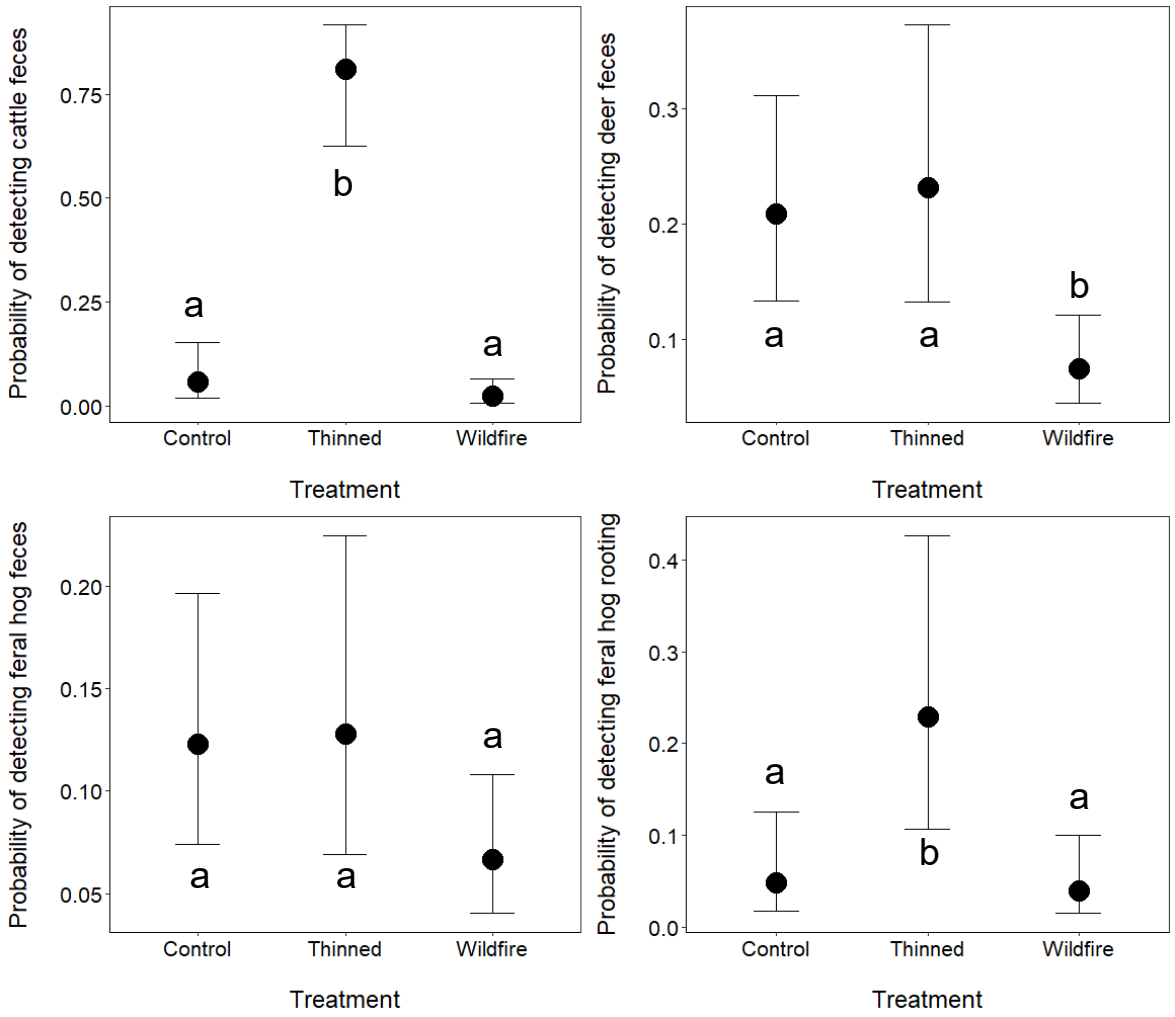


More browsed stems on mechanically thinned plots

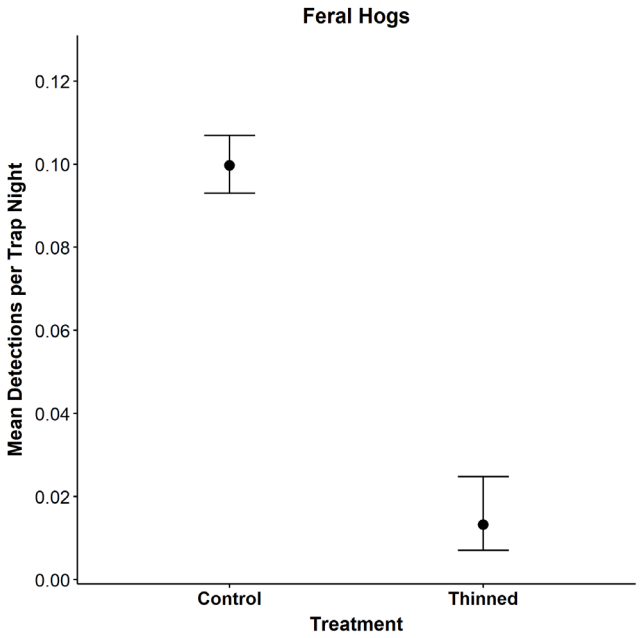


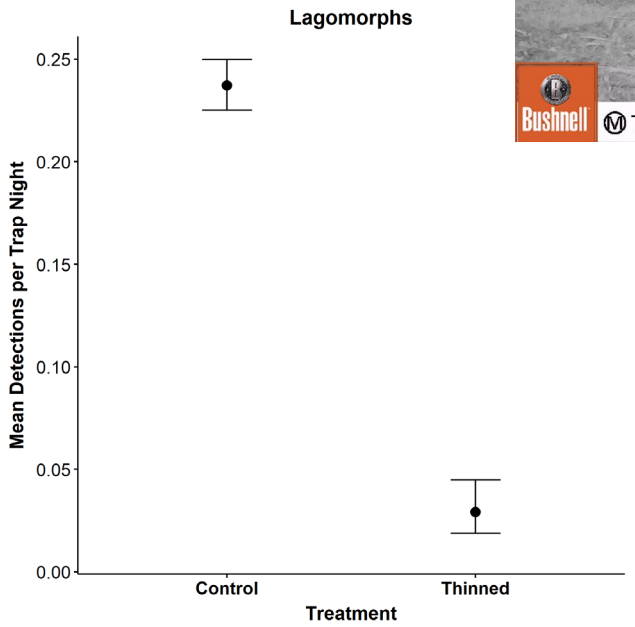
Who are the culprits?

More cattle and hog sign on mechanically thinned plots



Higher detections of hogs and rabbits on unmanaged sites





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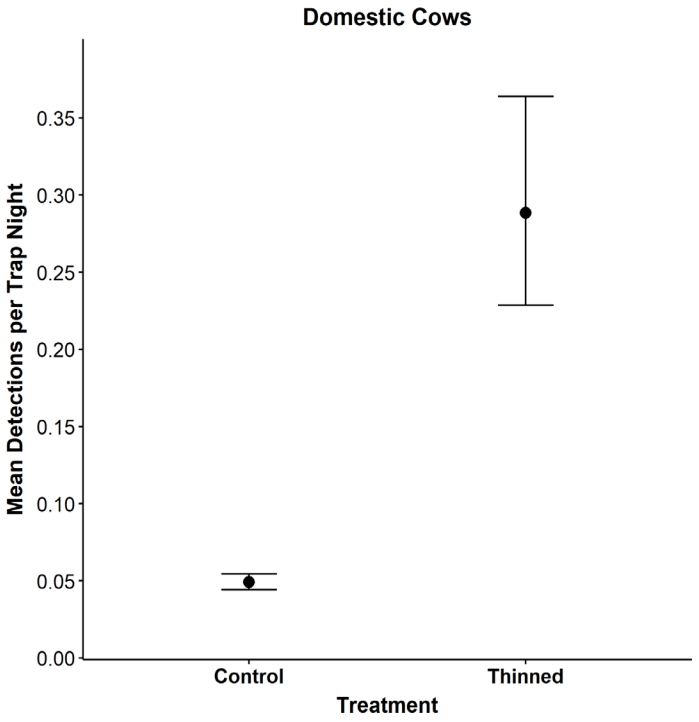
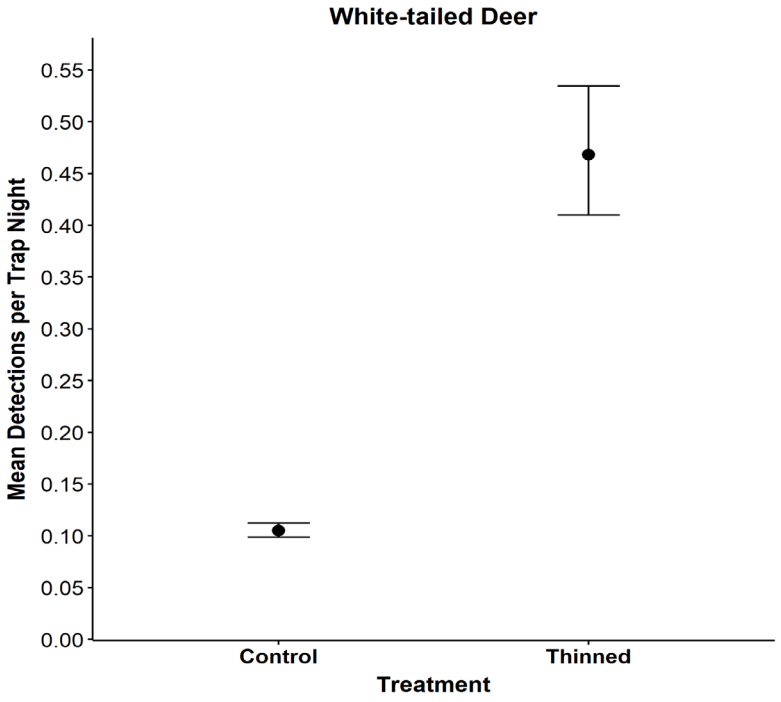
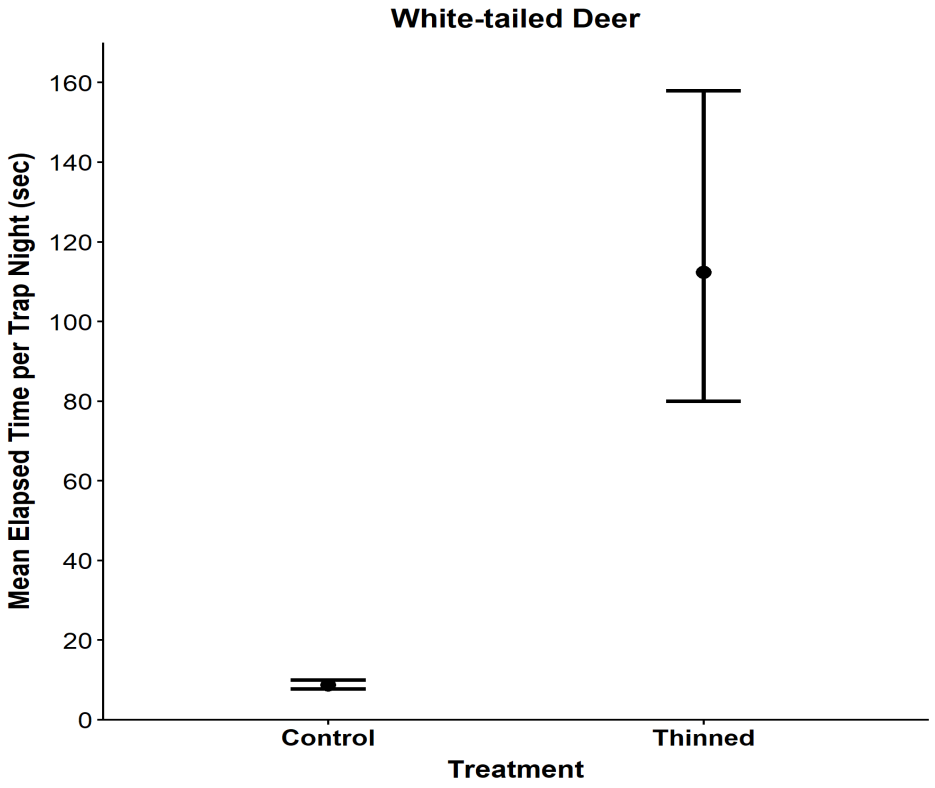
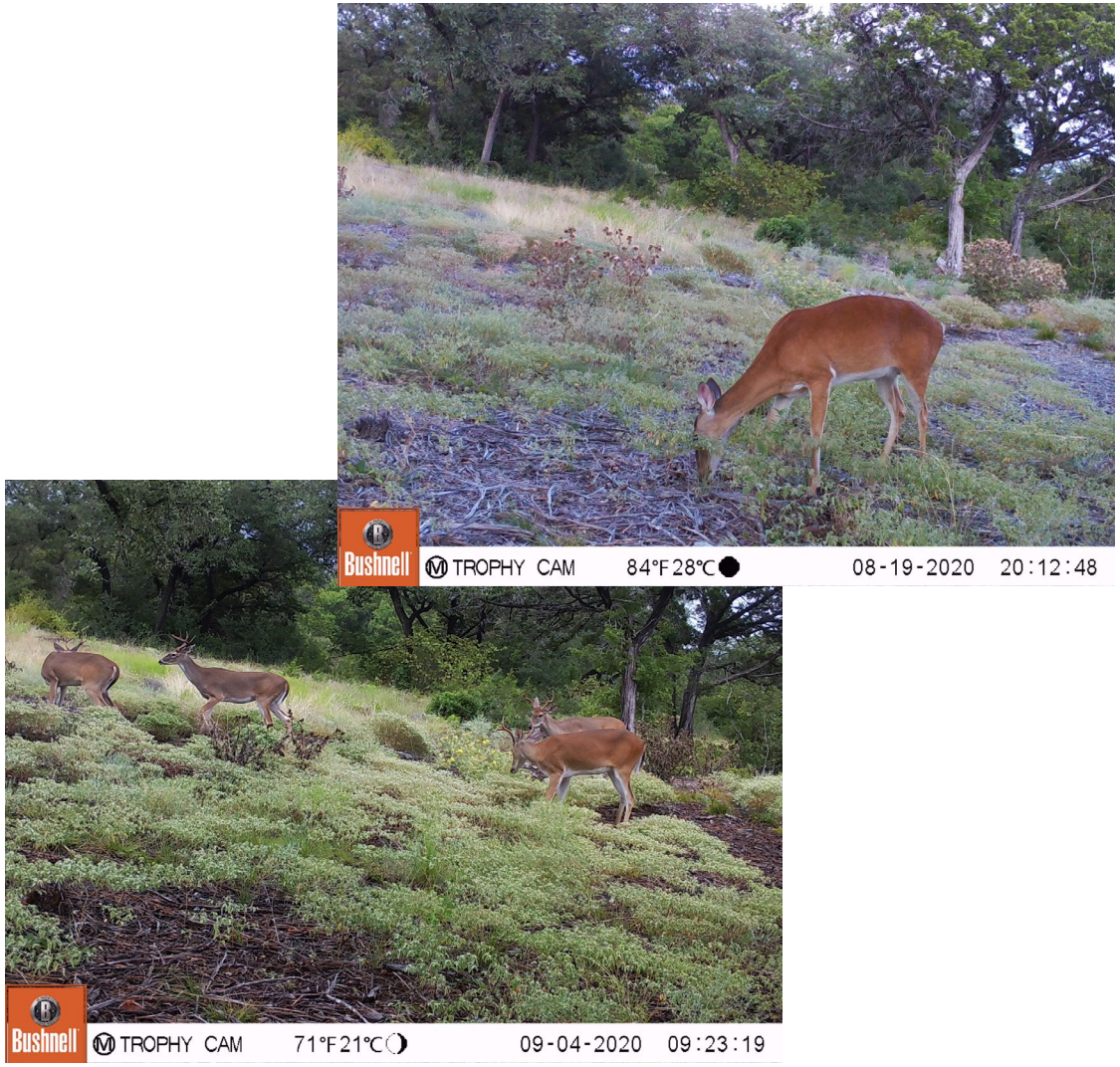
Heavy use of thinned plots by cattle and deer





Deer spend more time on thinned plots





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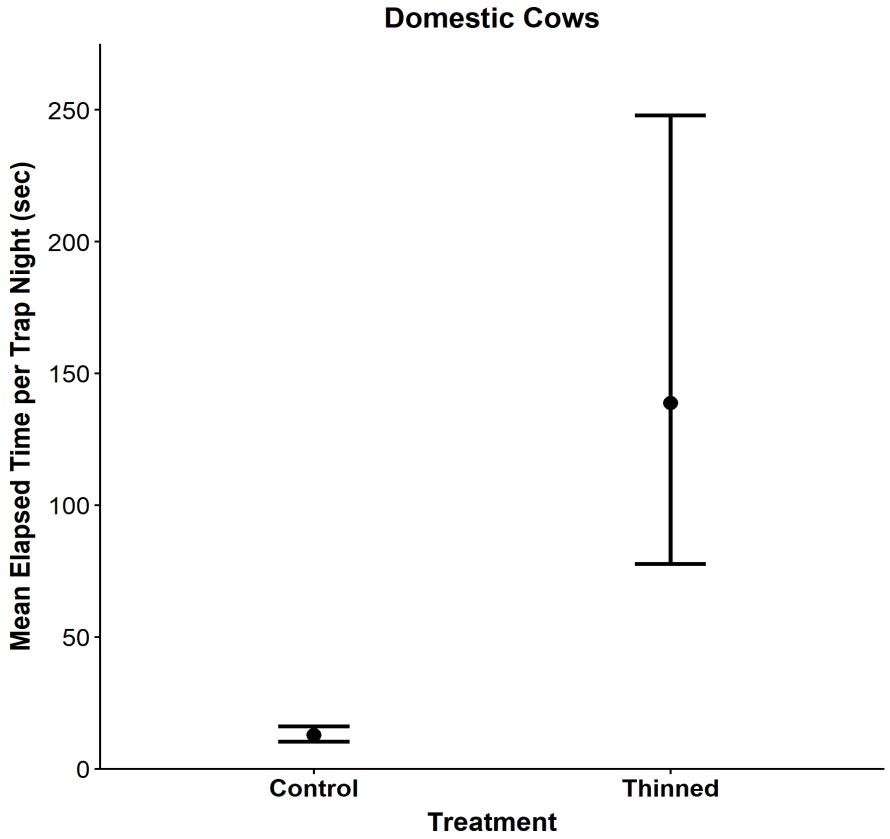
Domestic cattle use of thinned plots



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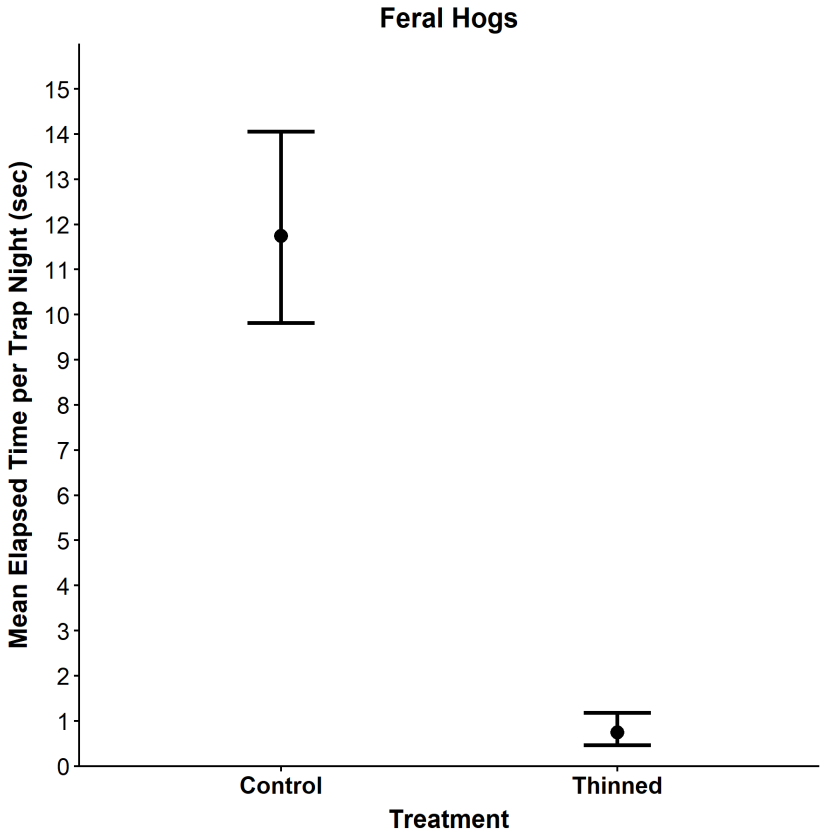
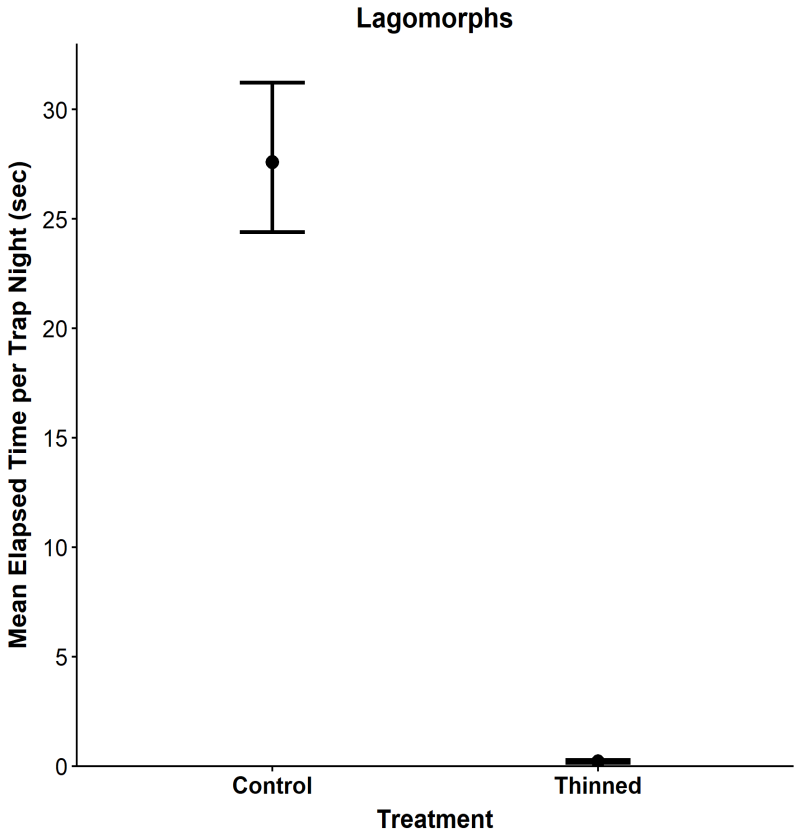
Feral Hogs and rabbits spend little time in thinned plots





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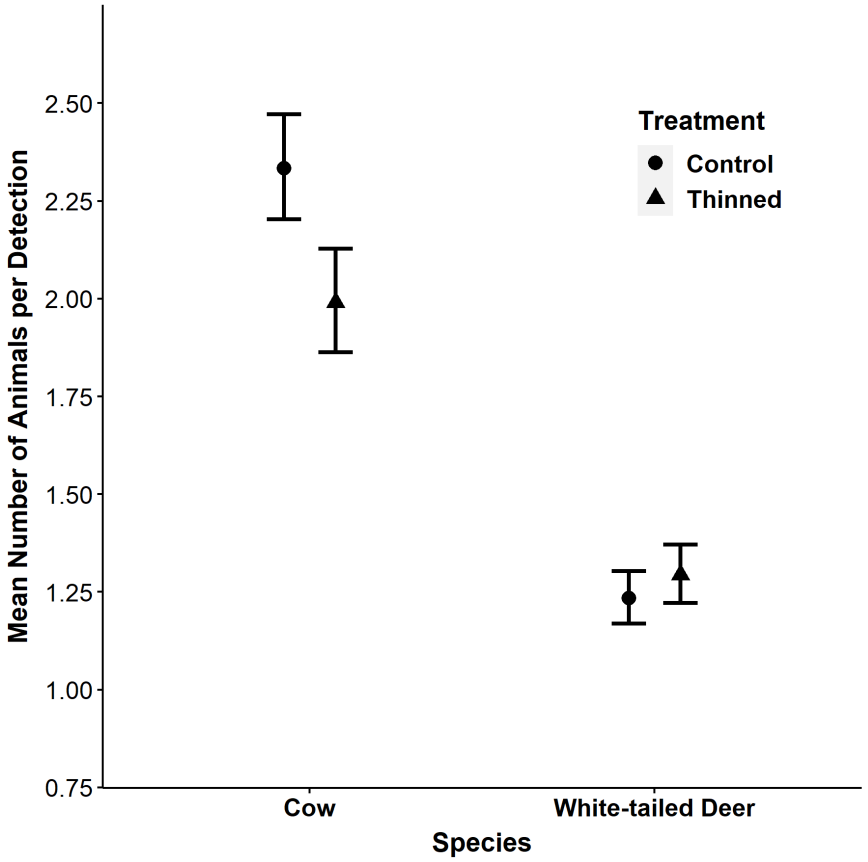
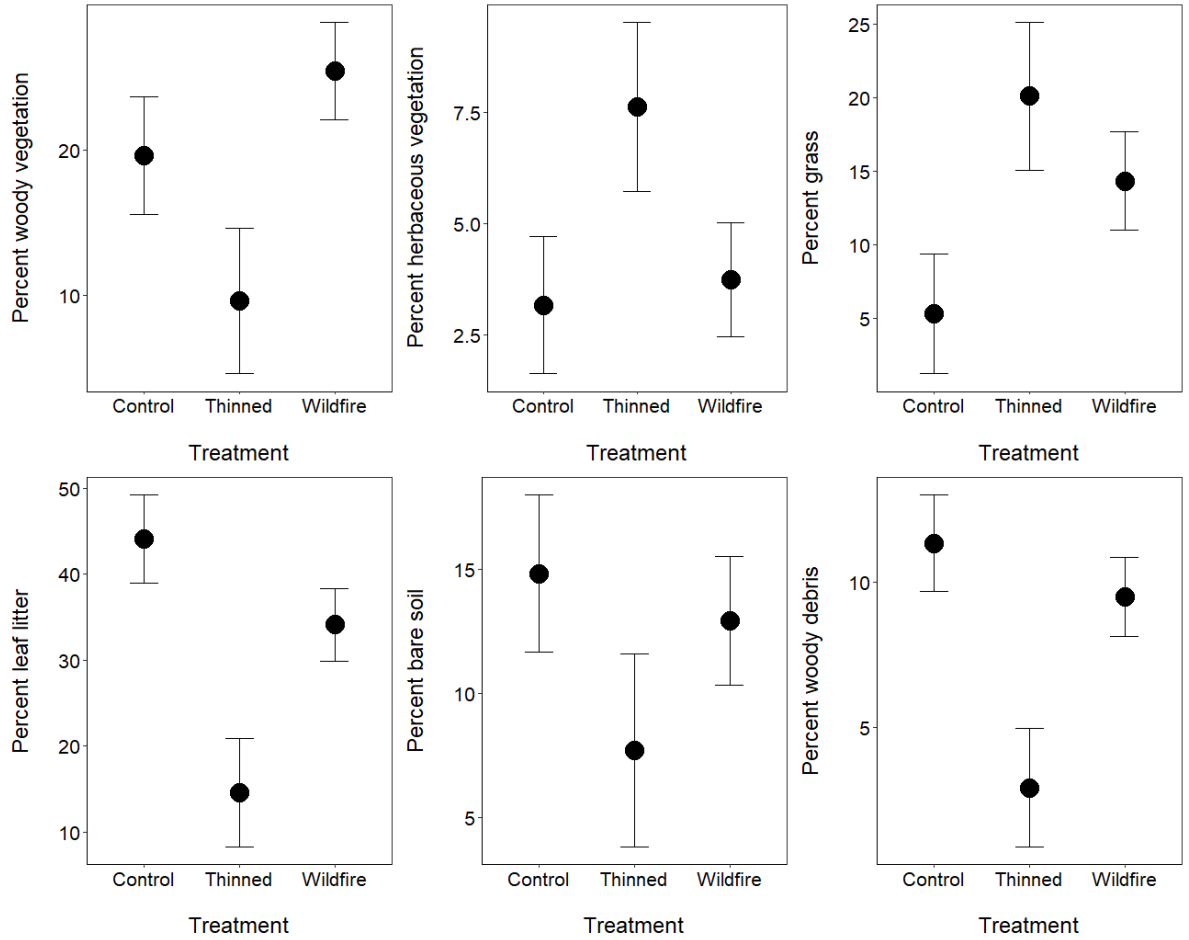
Cows more likely to use thinned plots in groups



More herbs and grass on mechanically thinned – less woody debris and litter



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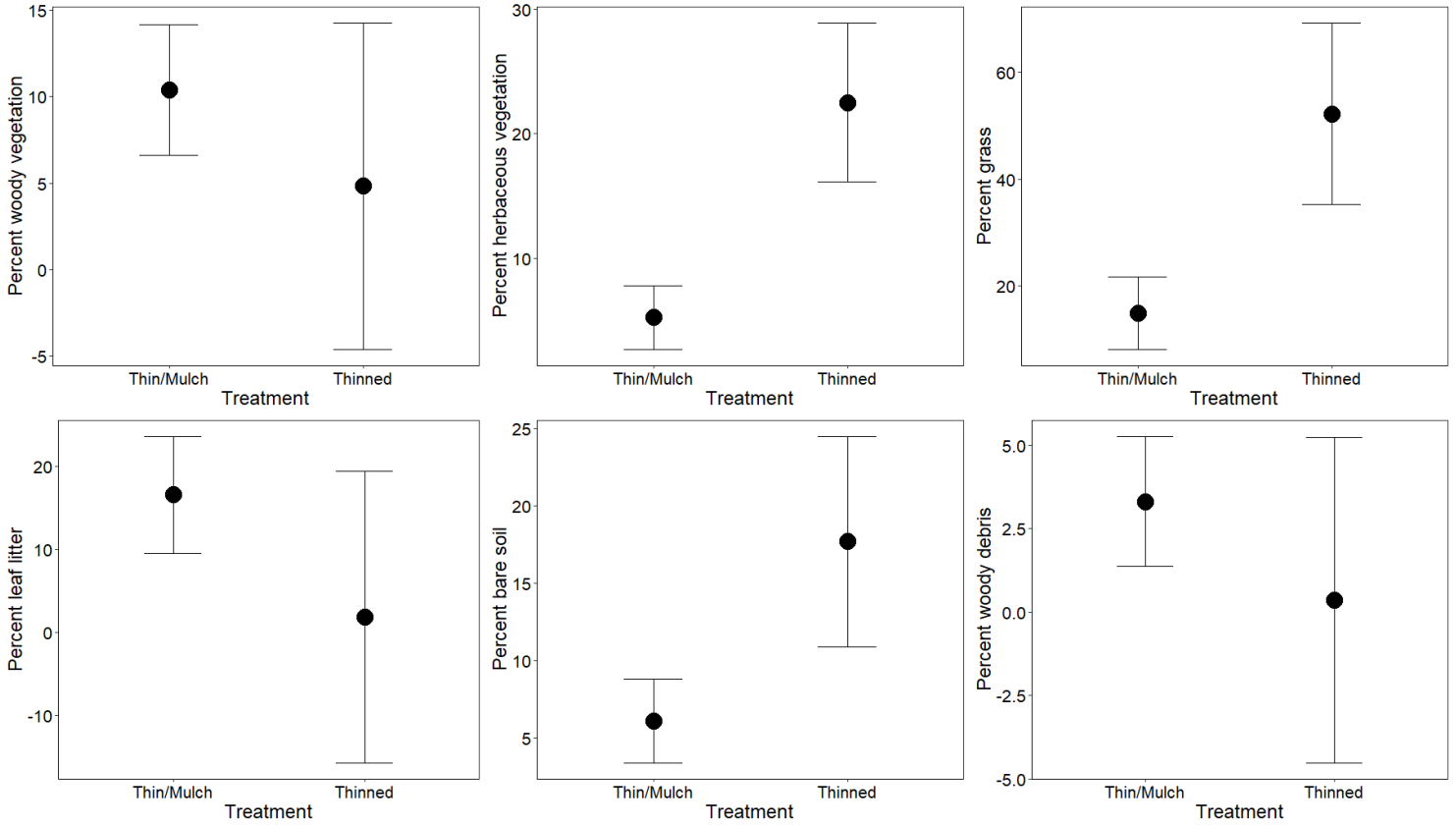
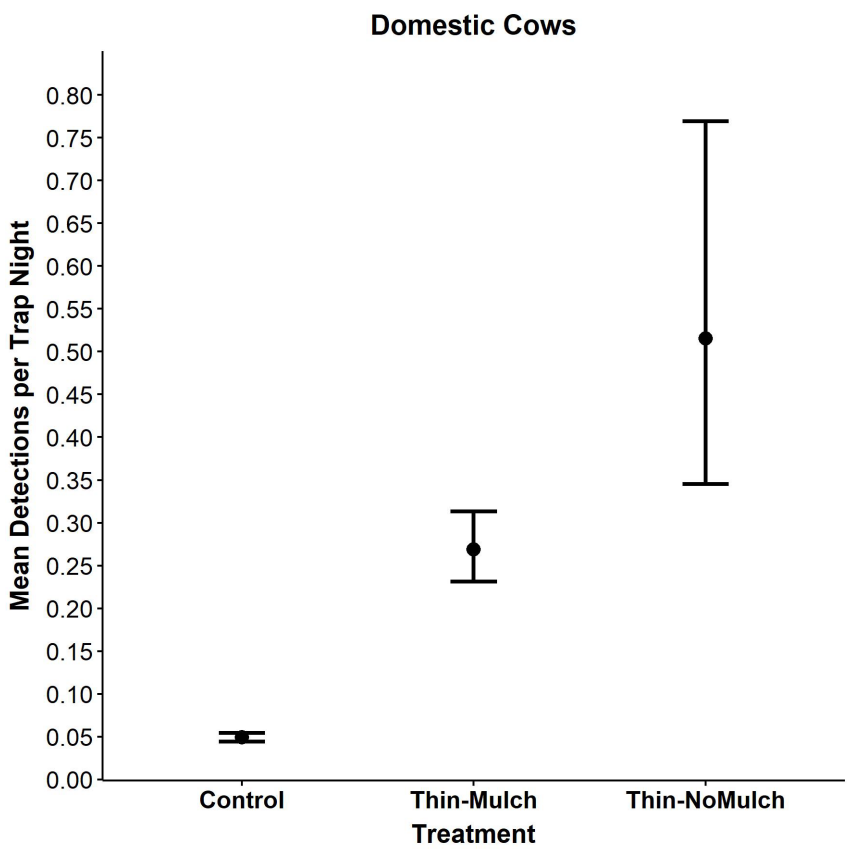
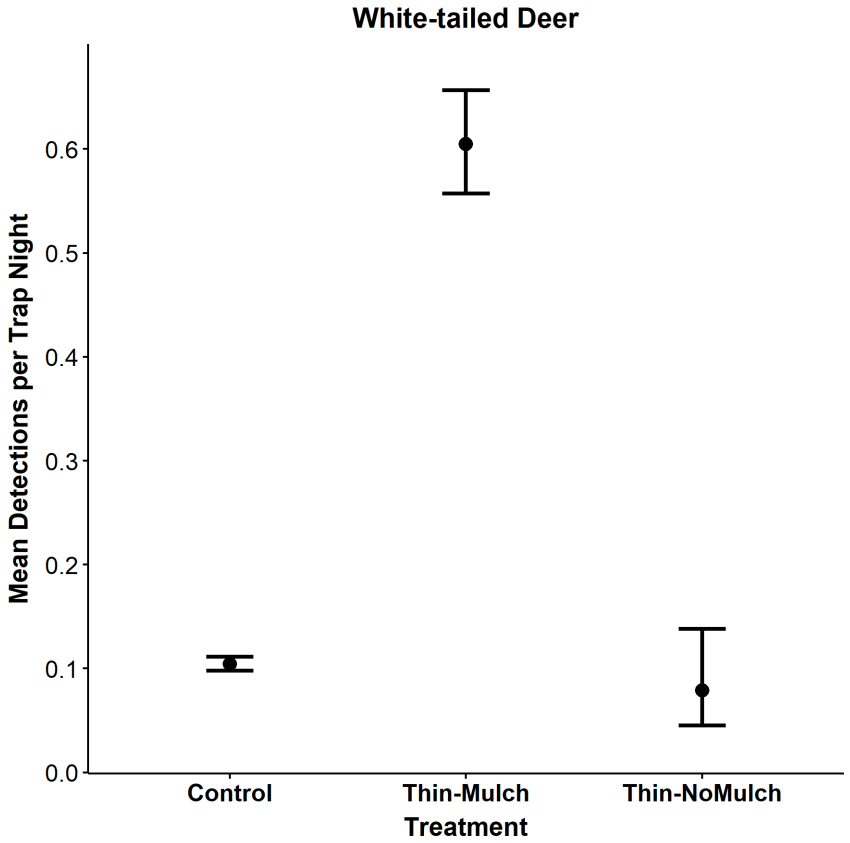
Reduced herbaceous and grass cover on mulched plots



Cattle detections higher on sites without mulch, deer on sites with mulch





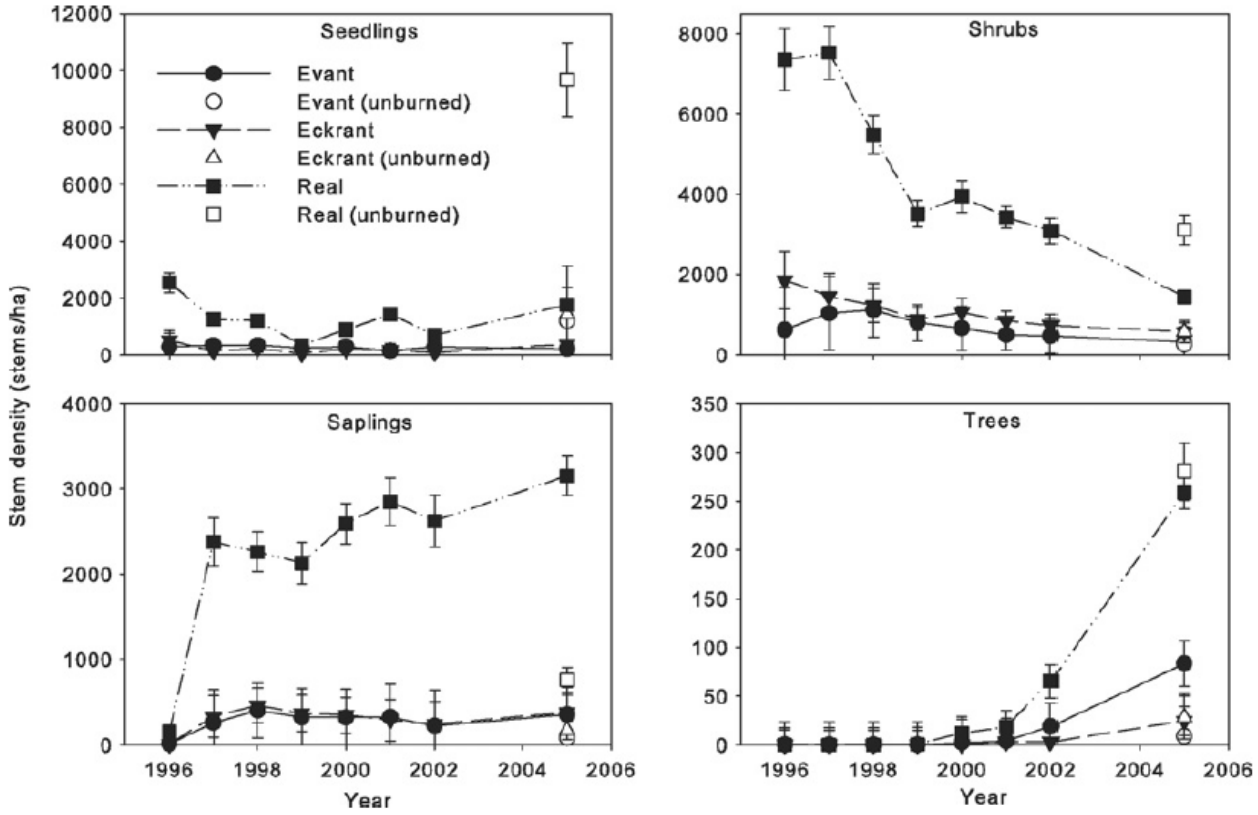
Oak recruitment on military lands: Conclusions

- Low levels of oak recruitment on mechanically thinned plots
  - Particularly for thinned sites without mulch
  - Heavy browse pressure
- Extensive use of thinned plots by cattle and deer
  - Open understory and thick herbaceous layer
    - Particularly on thinned sites without mulch
  - Extended use by cattle
- Suggests very long timeframe for oak forest regeneration
  - Implications for oak dependent wildlife

Photo Credit: Gil Eckrich

Oak recruitment on military lands: Conclusions

- High levels of recruitment on wildfire plots
  - 20+ years since fire
    - Oak documented soon after fire (Reemts and Hansen 2008)
- Suggests wildfire may encourage oak
  - Unknown browse pressure following fire



Oak recruitment on military lands: Recommendations

- Likely requires multiple strategies
- Wildfire alone seems to be effective for oak recruitment
  - More work is needed
- Mechanical thinning
  - Light prescription (Schweitzer et al. 2019)
  - Secondary management actions
    - ▸ Prescribed fire (Dey 2014)
    - ▸ Ungulate control
    - ▸ Shrub/woody debris management (Perea et al. 2020, Smit et al. 2012)
    - ▸ Mulch application

Photo Credit: nps.gov

Acknowledgements

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Questions?

Photo Credit: Chris Taylor