Effects of prescribed fire on cattle use and foraging behavior in subtropical grasslands

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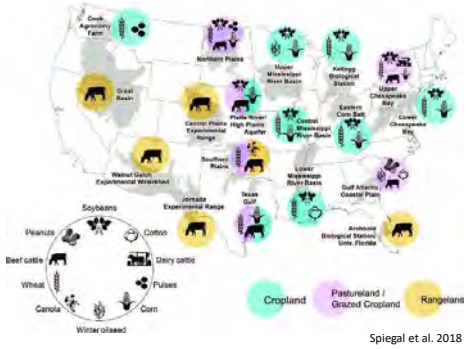
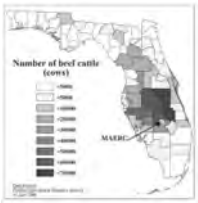


Spiegal et al. 2018

Florida's Subtropical Humid Grazinglands

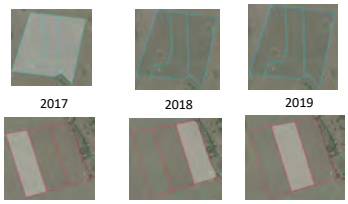
Florida – 5 million ha grazinglands (1/3 land area)
High productivity (5–10 Mg/ha) (4-9K lbs/acre)
Prescribed fire
Grazing distribution and utilization



Management Approaches

'Business as usual'

- Full pasture burn with cattle grazing



'Aspirational'

- Patch pasture burn with cattle grazing

Hypotheses

Patch scale (within pasture)

1: Cattle use greater in recently burned patches

2: Greater evenness in recently burned patches

Study Site

Buck Island Ranch – Archbold Biological Station

4,000 ha

Precipitation 1300mm/yr (51in)

Cow/calf ~3000

Improved pastures

- Bahia grass

Semi-native

- Broomsedge bluestem
- Panic grass
- Carpet grass

Study Design

RxFire – Jan 2017

Feb – Dec 2017

Full and patch burn treatments

16 ha pastures (n=16)

Stocking rate

- Improved pastures – 32 cows
- Semi-native – 15 cows

4 GPS collared cows / pasture

GPS Loggers

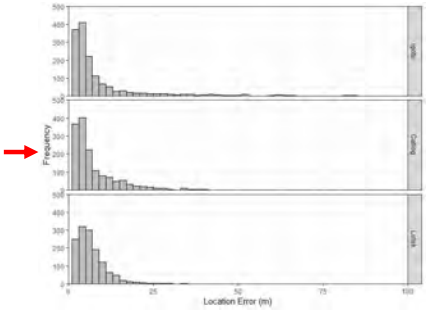
Li Battery life: +6 months

GPS fix interval: 5 minutes

Storage: ~70,000 points/unit

32 total cows with collars

GPS Loggers



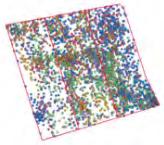
Data Summary

3.1 million GPS points

Points truncated to pasture boundaries

Behavioral categories

- Resting < 2 m/min
- Grazing 2 < x < 20 m/min
- Traveling > 20 m/min



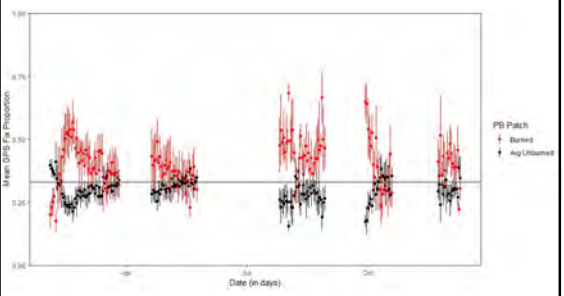
Grazing Intensity – Patch Scale

Analysis:

- Proportional use comparison – each grazing period
  - GLM: Proportion ~ patch * date, random: pasture

Grazing Intensity

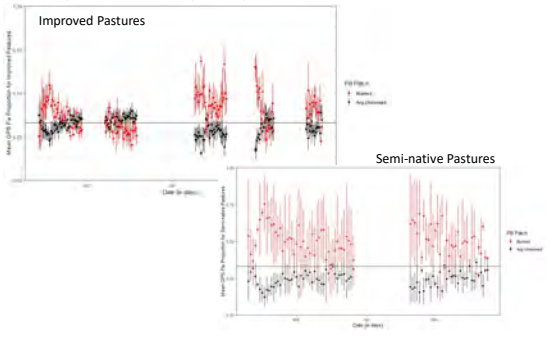
Proportional analysis – patch burn



Proportion ~ patch * date, random: pasture

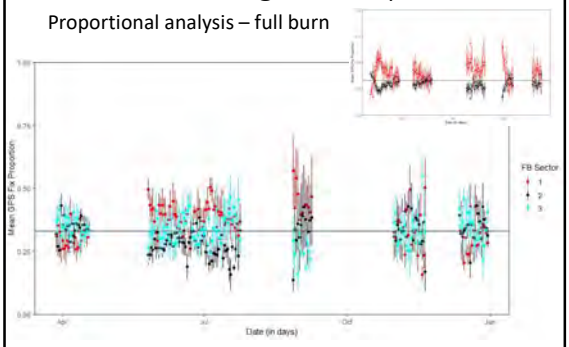
Grazing Intensity

Proportional analysis – patch burn



Grazing Intensity

Proportional analysis – full burn



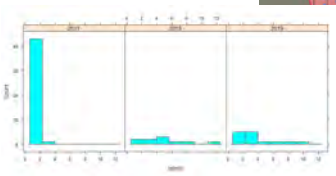
Grazing Evenness – Patch Scale

Analyses:

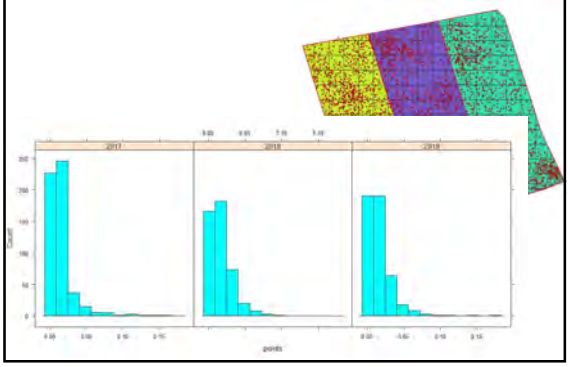
- Quadrat Analysis
  - Distribution of grazing intensity using 30x30 cells
- Ripley's K
  - Permutation test between patches with 1000 permutations
  - (Baddeley et al. 2015, Hahn 2012)

Grazing Intensity across Cells

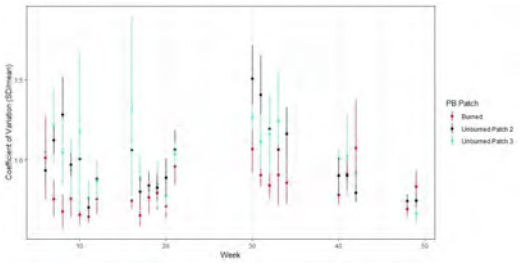
Hypothetical example



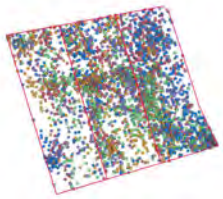
Grazing Intensity across Cells

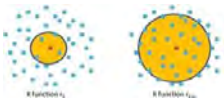


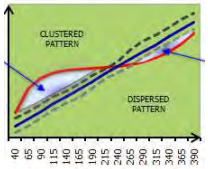
Grazing Intensity across Cells



Ripley's K-function

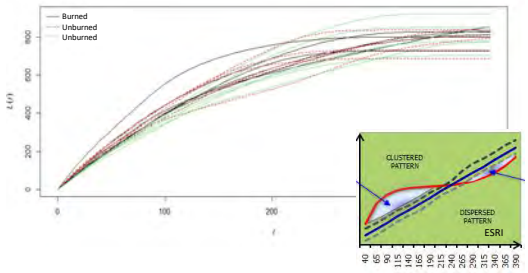




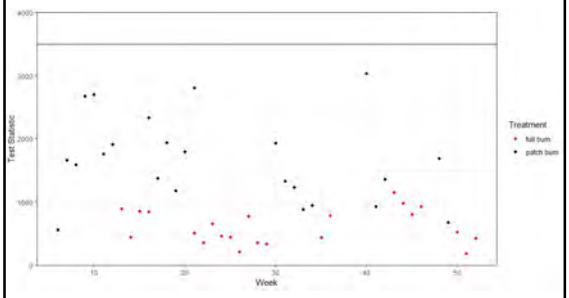


Ripley's K

Distance between points at all distances within patch



Ripley's K



Conclusions

Patch scale

- Cattle use higher in burned areas across the year
- Evenness not significantly different between PB patches

Implications

- Cattle attracted to burned areas throughout year
- Fire may influence grazing evenness (weak evidence)
- In humid subtropical rangelands, patch burns can increase heterogeneity

Questions?

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