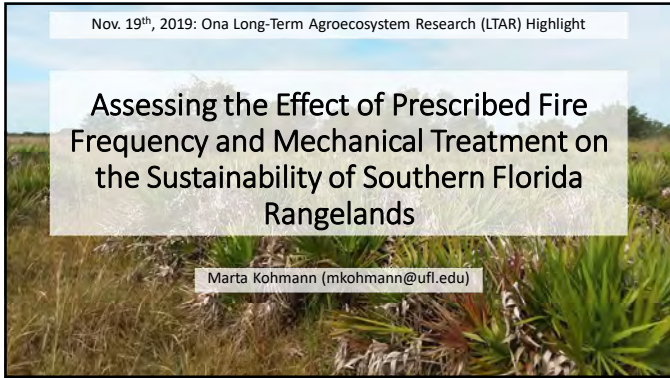



Nov. 19th, 2019: Ona Long-Term Agroecosystem Research (LTAR) Highlight

Assessing the Effect of Prescribed Fire Frequency and Mechanical Treatment on the Sustainability of Southern Florida Rangelands

Marta Kohmann (mkohmann@ufl.edu)



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Outline

- RCREC- Long-Term Agroecosystem Research (LTAR) team
- Overview of LTAR
- Archbold Biological Station – Range Cattle Research and Education Center
- Native flatwood rangeland
 - Why is this ecosystem important?
 - Why fire and mechanical control?
- The RCREC-LTAR experiment
 - Treatments
- Measurements
 - Temperature during fire
 - Ashes and ash-derived nutrient deposition
 - Effect of treatments on vegetation
 - Effect of treatments on soil C, N, P, and K
- Ongoing research efforts


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RCREC LTAR team

- Marta Kohmann
- Maria Silveira
- Raoul Boughton
- Brent Sellers
- João Vendramini
- Philippe Moriel
- Students:
 - Shanna Stingu (M.Sc.)
 - Dipti Rai (Ph.D.)
 - Vinicius Gomes (Visiting Scholar)
- Former research assistants:
 - Carolina Braga Brandani
 - Britt Smith
 - Kacey Aukema
 - Lucas Zanini
 - Igor Machado




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Native Pine Flatwood Rangeland

- Used for dry pregnant beef cows during winter
- High biomass production
- High incidence of lightning
- Fire occurs naturally every 3 - 4 years
- Land managers use prescribed burning every 4 years
 - ↓ saw-palmetto plants, ↑ forage production
 - ↓ occurrence of uncontrolled fire
- Chopping also used to reduce presence of palmetto



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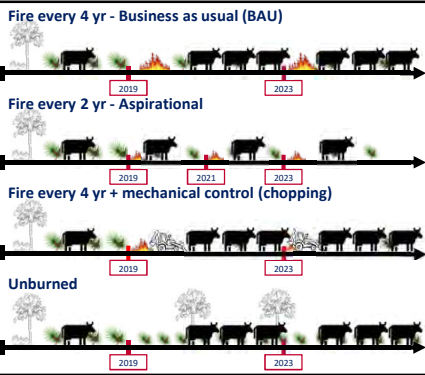


Fire every 4 yr - Business as usual (BAU)

Fire every 2 yr - Aspirational


Fire every 4 yr + mechanical control (chopping)

Unburned



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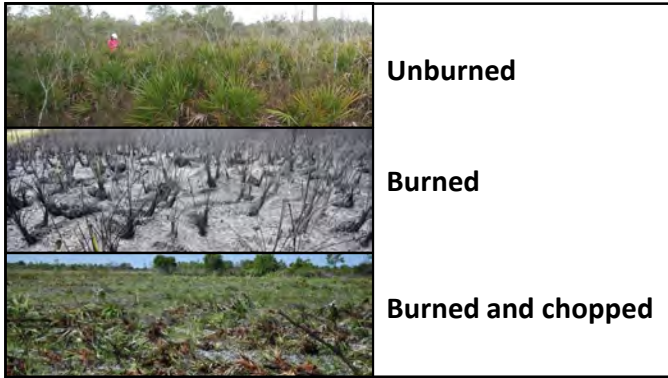
Range Cattle Research and Education Center (UF)



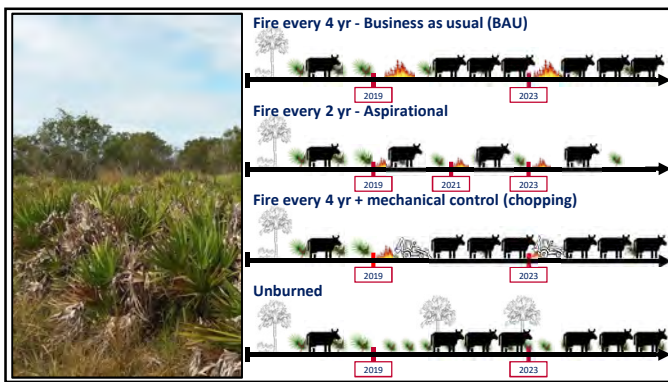
Experimental area:

- 16 plots
- 40 to 60 acres per experimental unit
- Total of 980 acres
- In each plot, 5 transects (150 ft) where sampling is concentrated

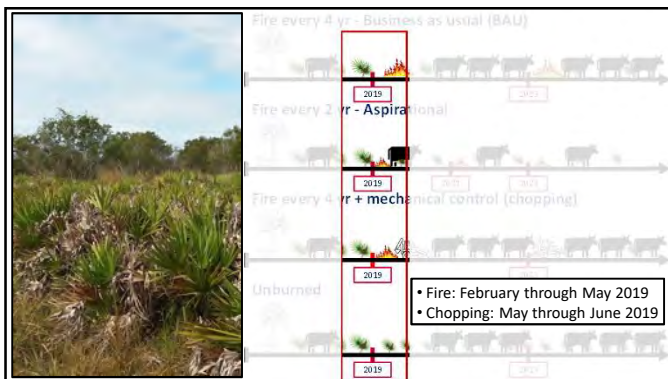
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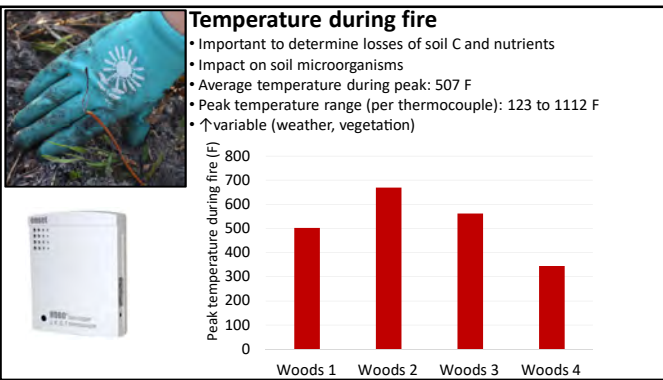


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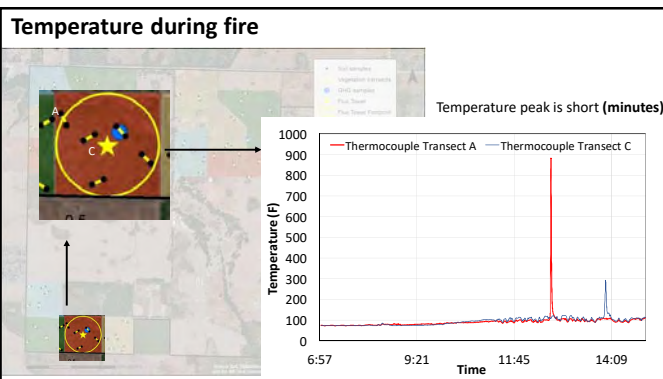
Temperature during fire



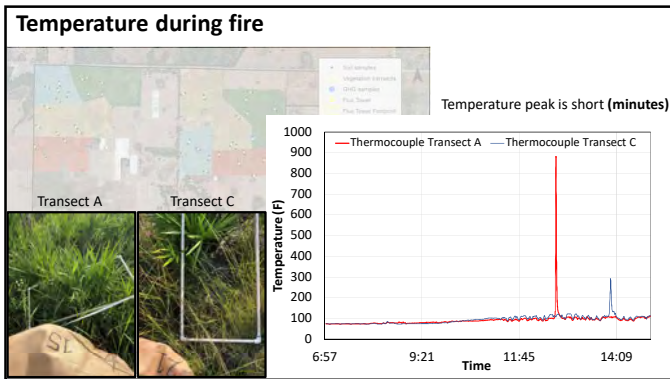
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Ashes

- Ashes – material on the ground
- Source of C and of nutrients to the ecosystem
- Two measurements:
 - Wet collection: ashes deposited during fire at soil surface
 - Dry collection: remaining ashes at soil surface after fire
- Wet collection: 430 lb/acre → 13 lb N/acre, 2.7 lb P/acre, and 3.3 lb K/acre
- Dry collection: 1720 lb/acres → 510 lb C/acre

Wet collection

Dry collection

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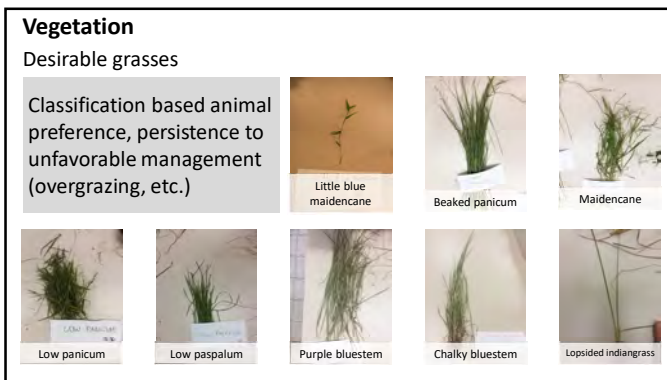
Vegetation

- Land managers use prescribed burning every 4 years
 - ↓ saw-palmetto plants, ↑ forage production
- How will burning and burning + chopping affect vegetation composition?
- Samples: 21 ft² per transect (September 2019)
 - Total biomass
 - Functional groups:
 - Saw-palmetto
 - Desirable grasses
 - Undesirable grasses
 - Forbs
 - Shrubs

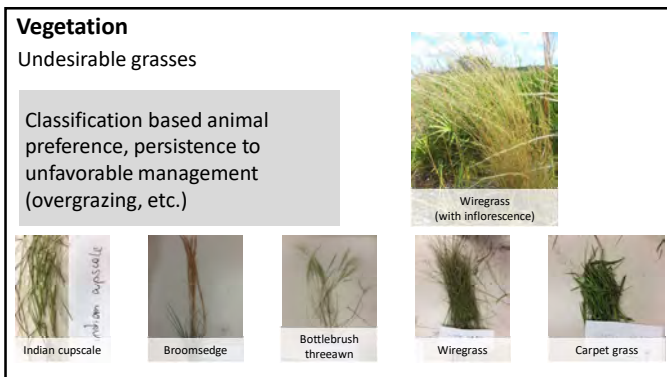
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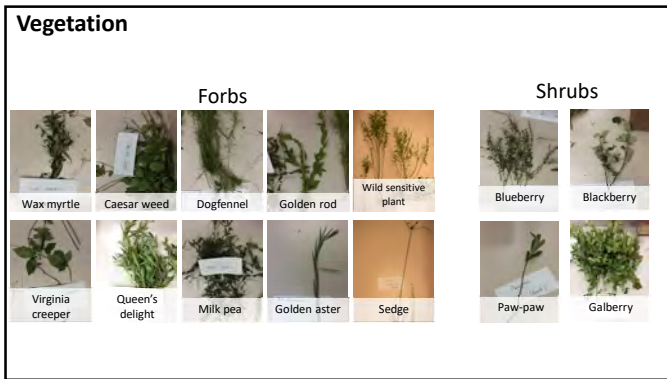
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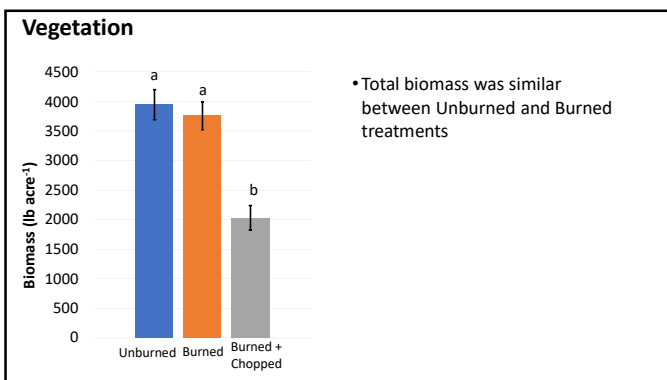
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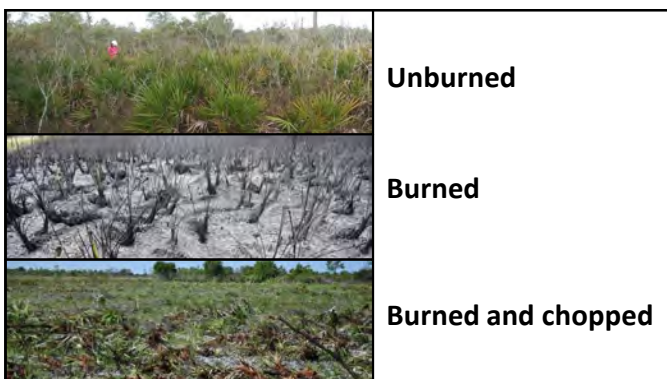
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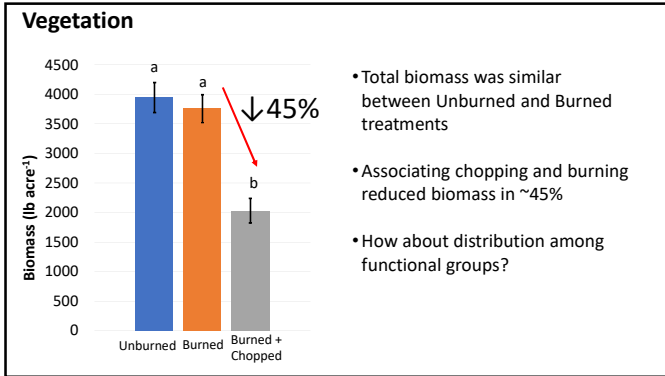
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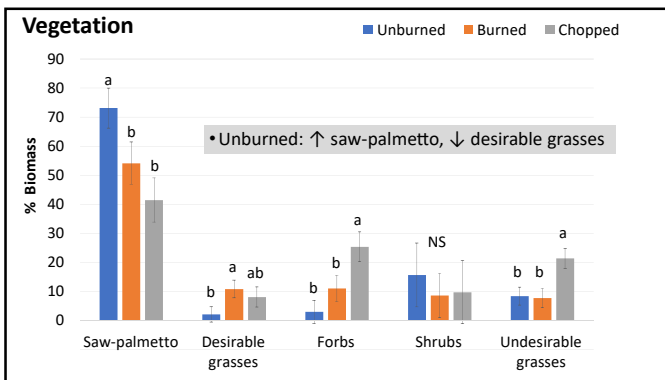
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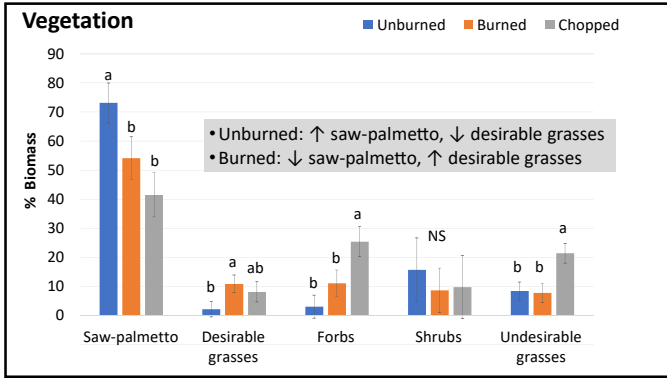
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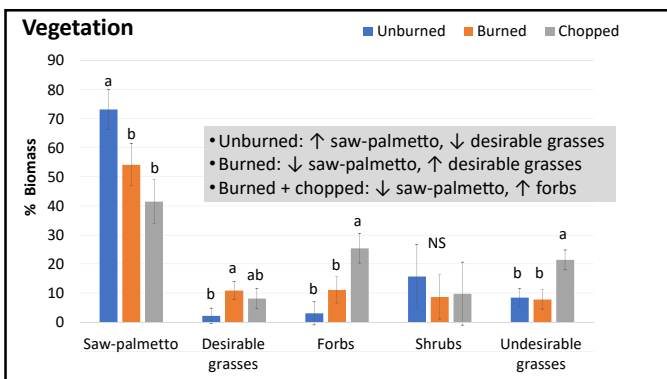
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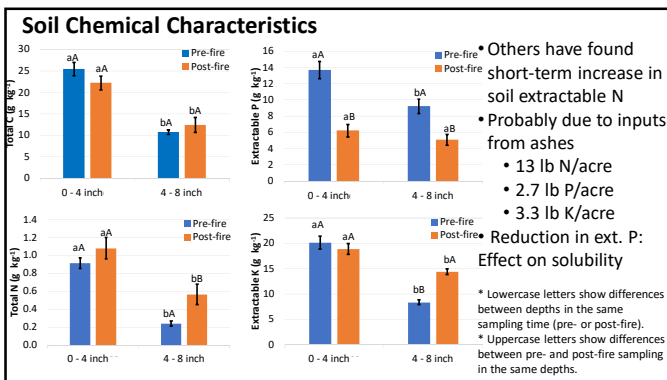
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Ongoing studies

- Above-ground litter decomposition
 - Evaluating Unburned and Burned x botanical composition x N application
- Soil responses
 - Soil C stocks and stability
- Natural abundance of ¹³C isotope
- Impacts of pyrogenic C on soil C stocks and long-term stability – Shanna Stingu (M.Sc.)
- Soil microbial community responses to fire (diversity and activity), soil enzymes, and RNA– Dipti Rai (Ph.D.)
- GHG emissions
 - Evaluating Unburned, BAU, and Burned + Chopping treatments

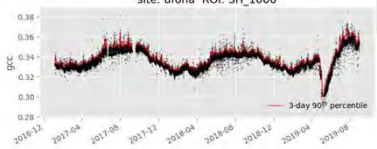
Pasture x native rangeland comparisons

- Above- and below-ground litter decomposition
- GHG emissions

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site: ufona ROI: SH_1000



Ongoing studies

- Eddy covariance tower:
 - CO₂ fluxes
 - Temperature
 - Wind speed and direction
 - Precipitation
 - PAR
 - Solar radiation
 - Atmospheric pressure
 - ...
- PhenoCam
 - Measurement of canopy greenness every 30 min in several locations across the globe

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Thank you!

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