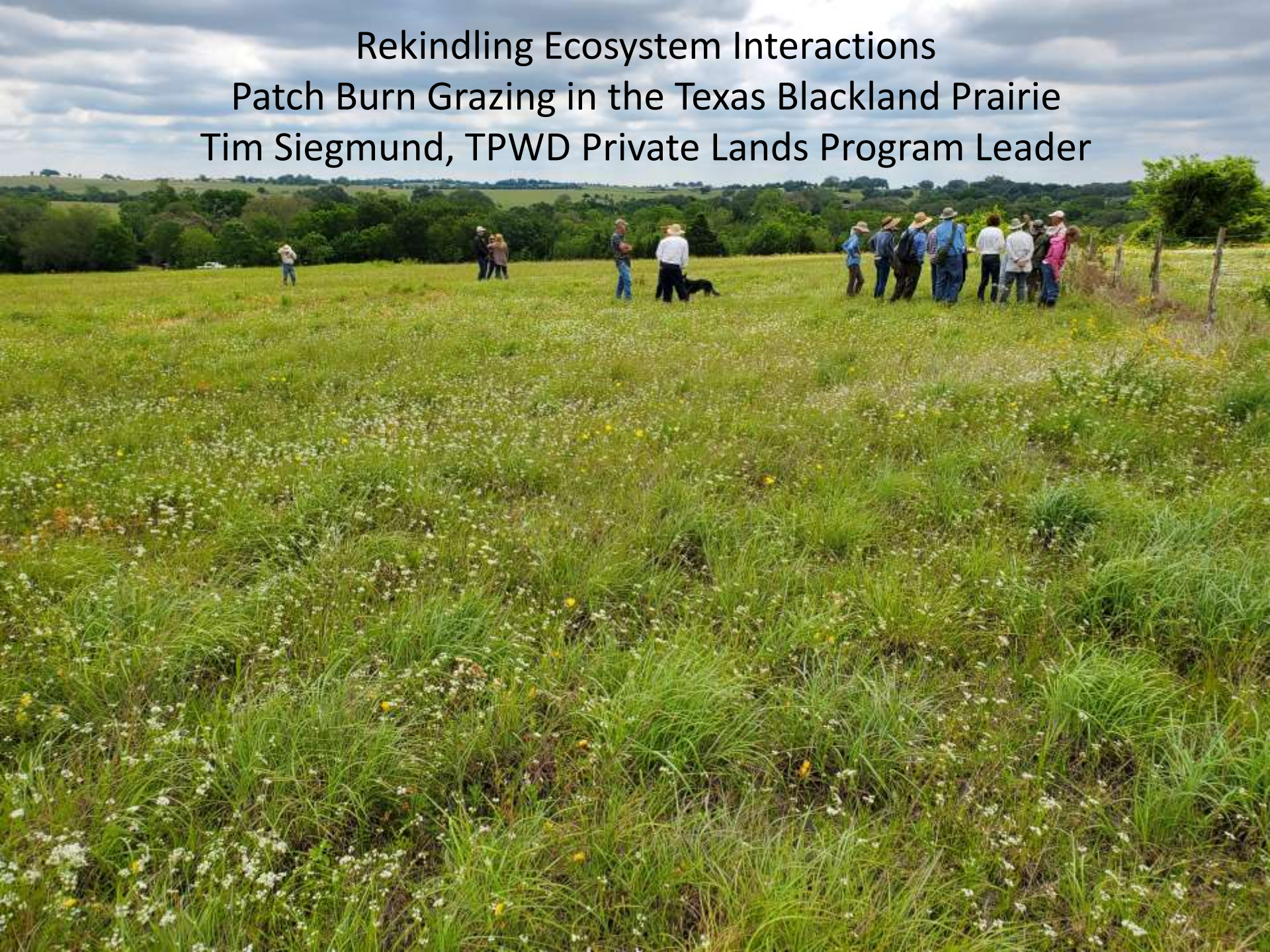
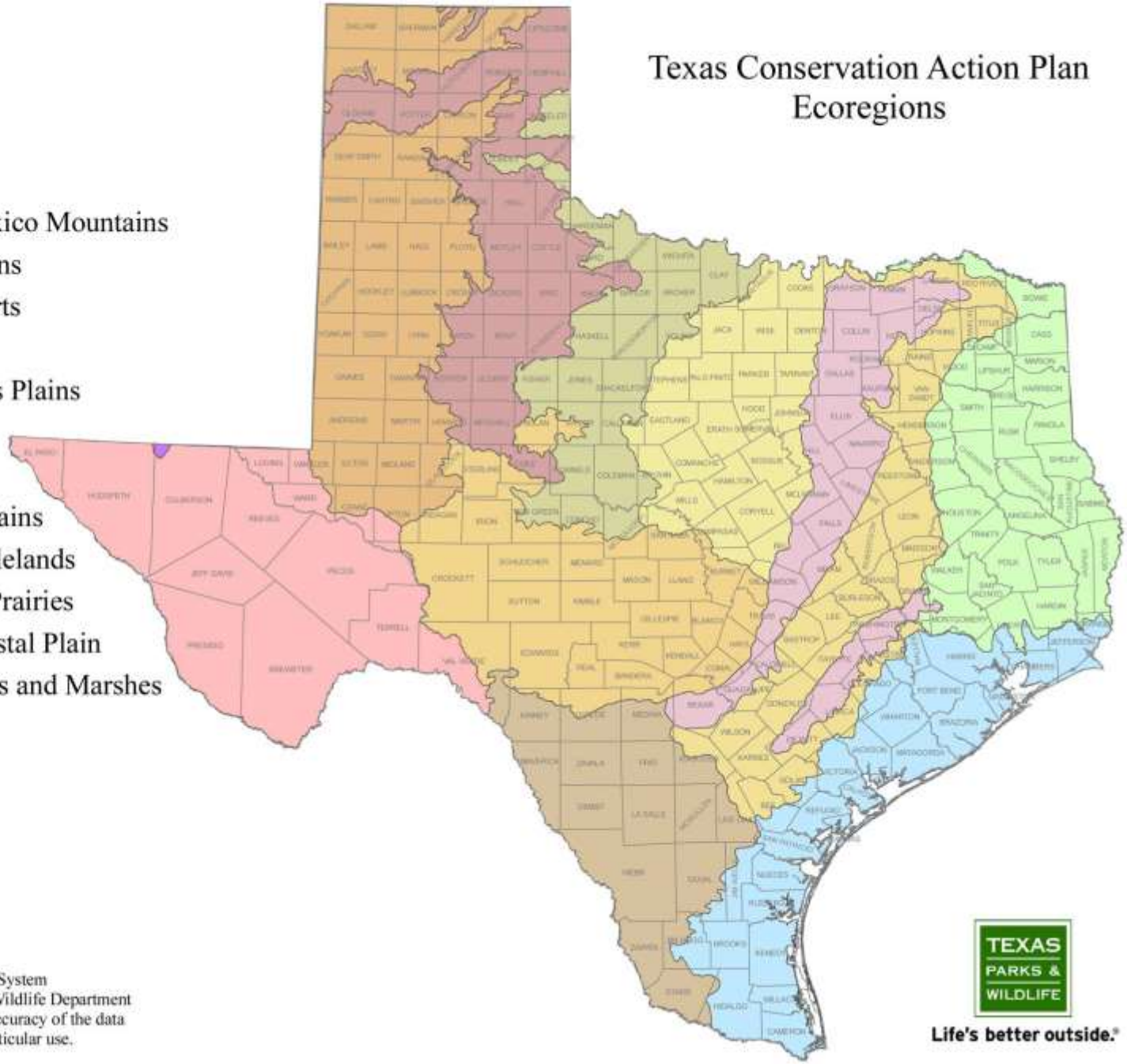
Rekindling Ecosystem Interactions
Patch Burn Grazing in the Texas Blackland Prairie

Tim Siegmund, TPWD Private Lands Program Leader



Texas Conservation Action Plan Ecoregions

- Arizona/New Mexico Mountains
- Central Great Plains
- Chihuahuan Deserts
- Cross Timbers
- East Central Texas Plains
- Edwards Plateau
- High Plains
- Southern Texas Plains
- Southwestern Tablelands
- Texas Blackland Prairies
- Western Gulf Coastal Plain
- Gulf Coast Prairies and Marshes



20 May 2011
Projection: Texas Statewide Mapping System
Map compiled by the Texas Parks & Wildlife Department
GIS Lab. No claims are made to the accuracy of the data
or to the suitability of the data to a particular use.

TEXAS PARKS & WILDLIFE

Life's better outside.®

John Brooke, English Immigrant

- 1848: Grayson County near the northern edge of the Blackland Prairie, he wrote: "I can sit on my porch before my door and see miles of the most beautiful Prairie interwoven with groves of timber, surpassing, in my idea, the beauties of the sea. Think of seeing a tract of land on a slight incline covered with flowers and rich meadow grass for 12 to 20 miles."

Fredrick Law Olmsted

Later the Father of Landscape Architecture and Designer of Central Park, NY

- Jan 3rd, 1856: East of Centreville, Leon County
- "During the first part of the day we went over small, level, wet prairies, irregularly skirted by heavy timber, with occasional isolated clumps and scattered bushes. Most of the prairies have been burned over. Both yesterday and today we have been surrounded by the glare of fires at night. The grass is coarse and reedy, and exceedingly dry…….We shot a few quails, which are very common, and saw, several times, turkeys and wild geese."
- Mid-January 1856, Across the Brazos, near modern-day Brazos/Robertson County Line
- "Near the Navasoto (Navasota) we rejoined the regular San Antonio road, and came out upon large open prairies with long and heavy skirts of timber, and this description applies to the whole region as far as the Coloardo, the prairies, as you proceed westward, growing more and more extensive, and the proportion of wooded land smaller."

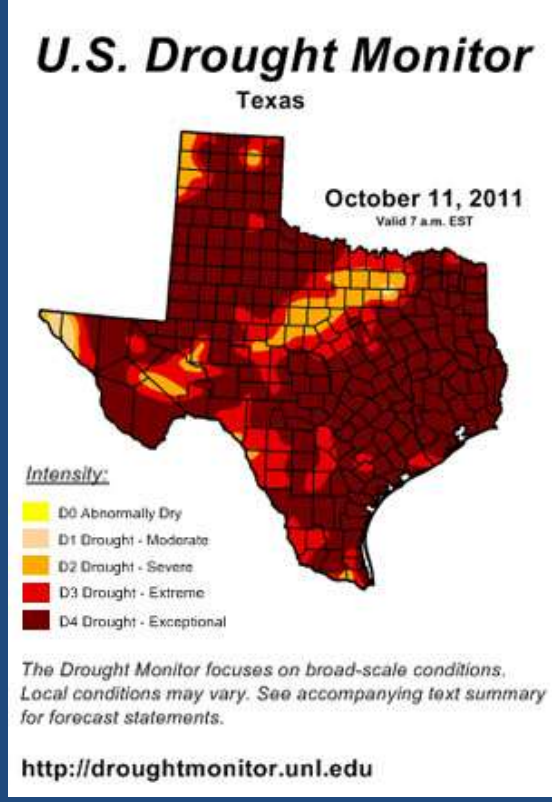
Early February 1856 traveling from Seguin to Gonzales:

Today, the genial sun warmed the fresh moistened soil, and three or four more species opened into bloom. After this hardly a day passed without some addition, and very soon it was impossible to welcome each new-comer; the whole prairies became radiant and delicious. **The beauty of the spring-prairies has never been and never will be expressed. It is inexpressible.**

A quick flush spread over all; the bosom of old Mother Earth seemed to swell with life. In another day the elm buds were green and bursting, and the wild plum in fragrant blossom; **the dreary, burnt prairies, from repulsive black, changed at once to a vivid green**, like that of a young wheat. The cheering effect I leave to be imagined**. The herds all left the dry sedge, and flocked to the new pastures. The unburnt districts, covered with the thick mat of last year's growth, were a month behind.**

Historic Drivers

- Drought
- Grazing
- Fire




02/19/2015 16:08


Jay Whiteside

Patch Burn Grazing

What is the Goal?


Copyright Chris Helzer/The Nature Conservancy

Patch Burn Grazing

- What is it?
  - Using fire at different times and scales to shift grazing pressure
- What does it accomplish?
  - Allows for production of quality livestock forage
  - Controls Woody Encroachment
  - Creates Structural Diversity in Vegetation
    - Meets needs of multiple wildlife species

Cornell Lab of Ornithology

- "Grassland ecosystems are dependent on periodic disturbance for habitat maintenance."
- "As a result, management of grassland areas is best directed toward the creation of a mosaic of grassland habitat types. This habitat mosaic is probably best maintained through some type of rotational management system in which sections of large grassland areas receive management on a regular schedule. Such a rotational system would provide a variety of habitat types in every year, would ensure the availability of suitable habitat for birds at either end of the grassland management spectrum, and also would provide habitat for birds whose preferences lie between these extremes."

By: Brian E. Small

Provide Usable Space

- Nesting, Brood Rearing, Screening Cover
  - Quail and other birds need these in close proximity
- Habitat Patches
  - Multiple Habitat Types in a Single Location/Patch
  - Allows for use by Multiple Species
- Foraging Locations
  - Bare Ground = Granivorous Birds-mourning doves, etc
  - Invertebrates = sunny and shady; tall and short vegetation
  - Pollinators = annual, perennial, short, and long blooming species
- Germination Opportunities
  - Opens Up Root and Light Space
  - Less Competition for Moisture and Nutrients

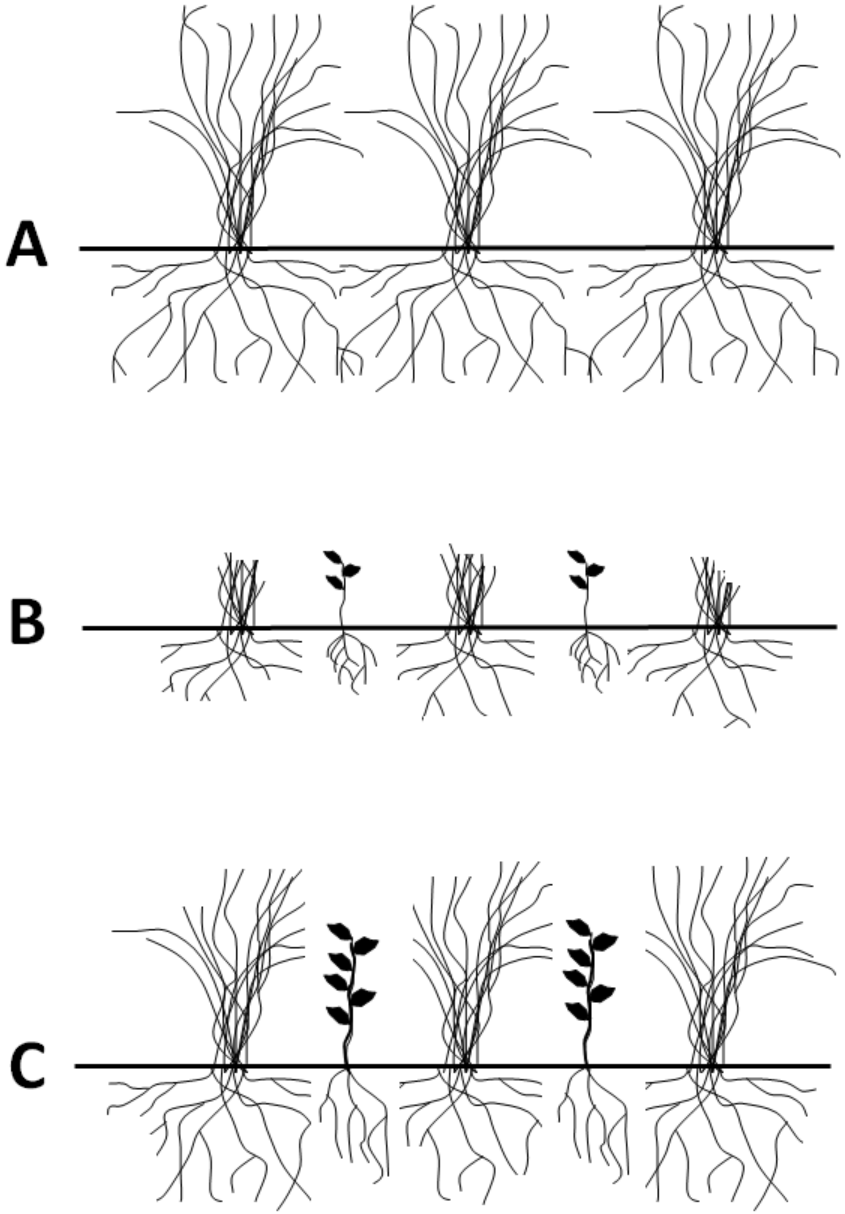

A
B
C

Figure 2. From Franklin Crider 1955- As grazing pressure increases, root mass decreases. Notice the second plant from the left has about 50% of its top growth removed, and root development is relatively unaffected, but a small increase in grazing pressure leads to a dramatic loss of root development for the 2 plants on the right..

Usefulness of PBG as a Tool

- Whereas the traditional model of range management (even distribution of moderate animal impact) might optimize sustainable livestock production objectives, it might not be sufficient for the maintenance of plants and animals that require habitat conditions different from those created by moderate grazing animal impact, i.e., species whose habitat needs are best provided by heavily- or lightly-impacted rangelands. -OSU Winter, Fuhlendorf, and Goes

- Additionally, some rangeland wildlife species require markedly different habitats at different times during their life cycle. If entire landscapes are managed with similarly moderate levels of grazing animal impact, evenly distributed across all management units within the landscape, such landscapes might not provide sufficient habitat for all portions of those species' requirements. The ability of rangelands to provide habitat for wildlife and enhance biodiversity values will often depend on the ability of land managers to simultaneously optimize objectives associated with those values and objectives associated with livestock production.

Patch-Burn Grazing Effects on Cattle Performance: Research Conducted in a Working Landscape
By Stephen L. Winter, Samuel D. Fuhlendorf, and Mark Goes

Cattle Performance?

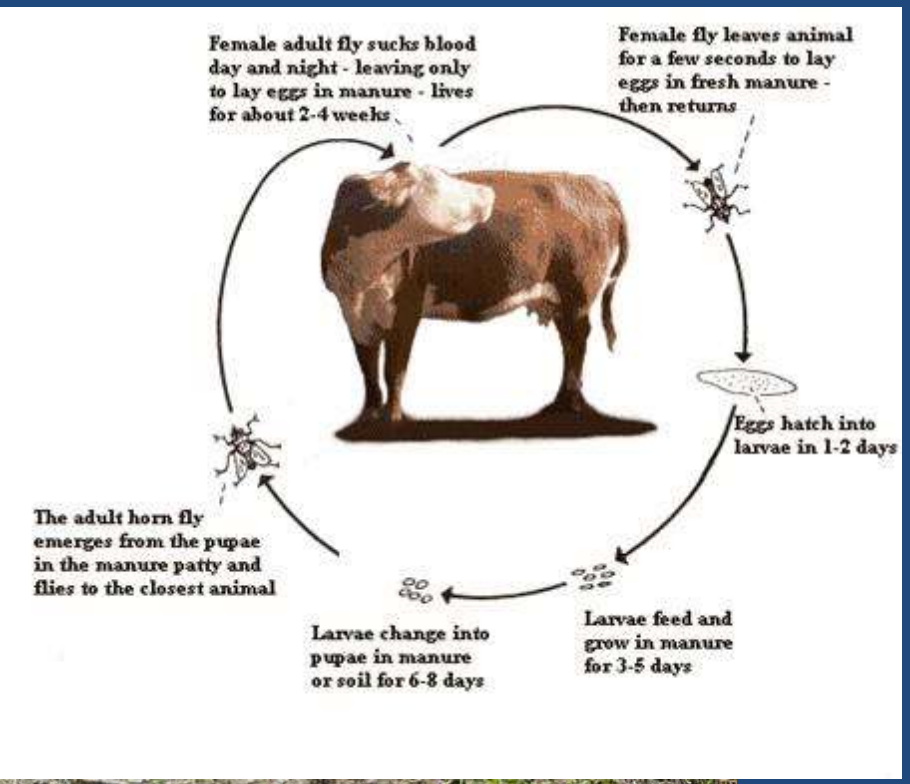
- "We found that cattle performance in pastures managed with patch-burn grazing did not differ from that found in pastures managed with a traditional range management strategy. This suggests that land managers who adopt patch-burn grazing in our study region might be able to maintain levels of cattle performance they are accustomed to. Simultaneously, they might also be able to achieve wildlife habitat objectives that might not have been possible with the application of traditional range management strategies."

- Results affirmed other results from studies in Oklahoma and Colorado
  - Fuhlendorf, S. D., and D. M. Engle. 2004. Application of the fire-grazing interaction to restore a shifting mosaic on tallgrass prairie. *Journal of Applied Ecology* 41:604–614.
  - Limb, R. F., S. D. Fuhlendorf, D. M. Engle, J. R. Weir, R.D. Elmore, and T. G. Bidwell. 2011. Pyric-herbivory and cattle performance in grassland ecosystems. *Rangeland Ecology& Management* 64:659–663.
  - Augustine, D. J., and J. D. Derner. 2013. Controls over the strength and timing of fire–grazer interactions in a semi-arid rangeland. *Journal of Applied Ecology* 51:242–250.

- Estimated Cost
- $3-7/foot
  - 5 strand barbed wire fence
  - ¼ mile = $3,960-$9,240

Brush Control

Parasite Reduction



Important Considerations

- Stocking Rates
  - Need for Income
  - Impacts on Vegetation/Resources
- Flexibility
  - Burn Size/Timing/Frequency
  - Ability to Move Cattle
  - Ability to Respond to Drought
  - Ability to Respond to Abundant Rainfall
- Scale
  - Single Pasture or Entire Property
- Rest
  - How long? How often?

Stocking Rate

- Greatest Impact on Results
  - Will Vary by Soil, Rainfall, Year and Vegetation
  - Maximize Impact in Burn Zone
  - Minimize Impact Outside of Burn Zone
  - THERE IS NO MAGIC NUMBER!

Rest

- Important
  - Allows Perennial Grasses to Recover
- Impacted by Climate
  - Longer in Dry Cycles
  - Shorter in Wet Cycles
- Impacted by Stocking Rate
  - Heavier Grazing Pressure = Longer Rest


Legend
By: Jay Whiteside

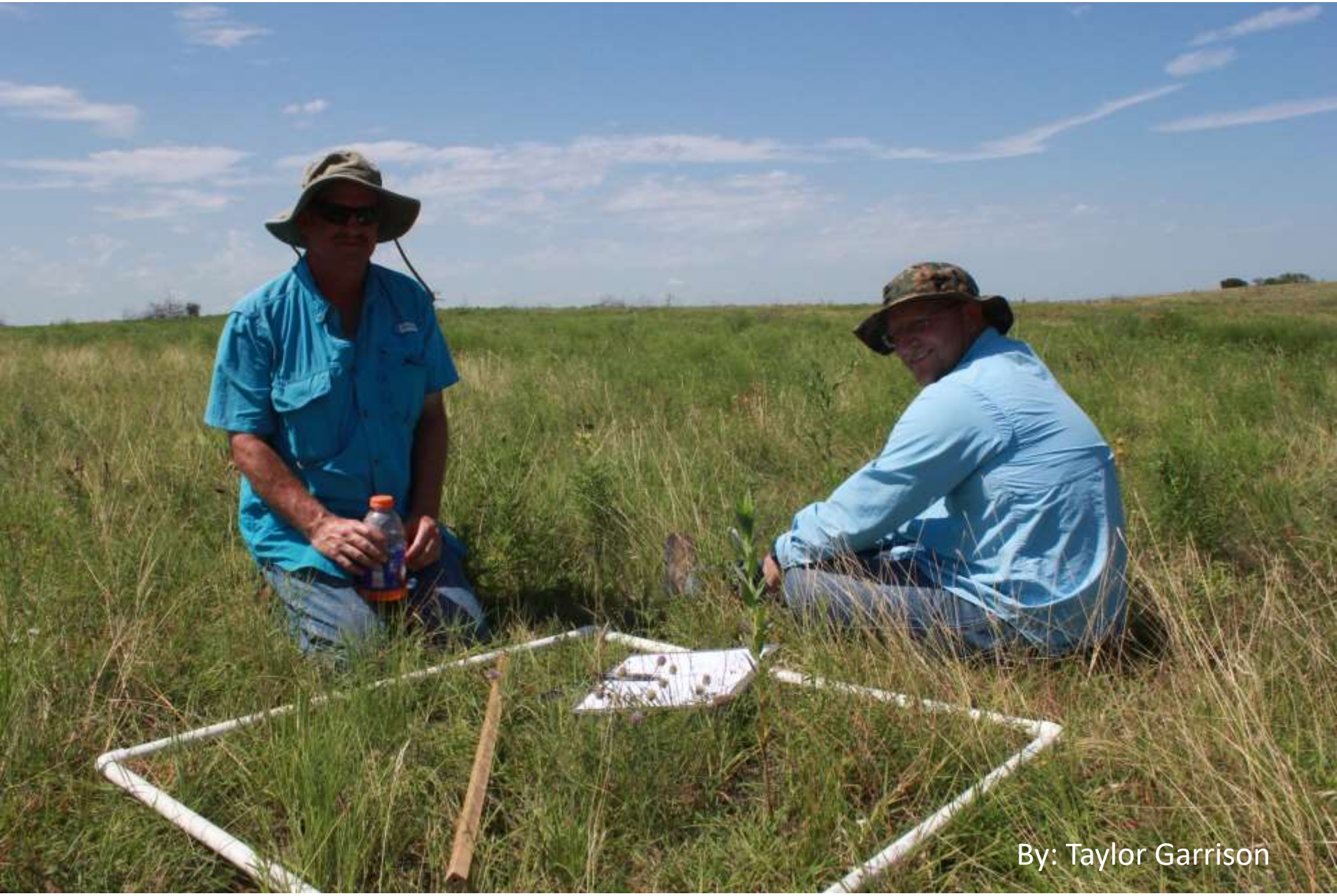

02/19/2015 16:08


By: Taylor Garrison


By: Taylor Garrison


By: Taylor Garrison


By: Taylor Garrison


By: Taylor Garrison


By: Taylor Garrison


STIHL


02/10/2015 16:36


04/08/2015 14:28


TEXAS PRAIRIES

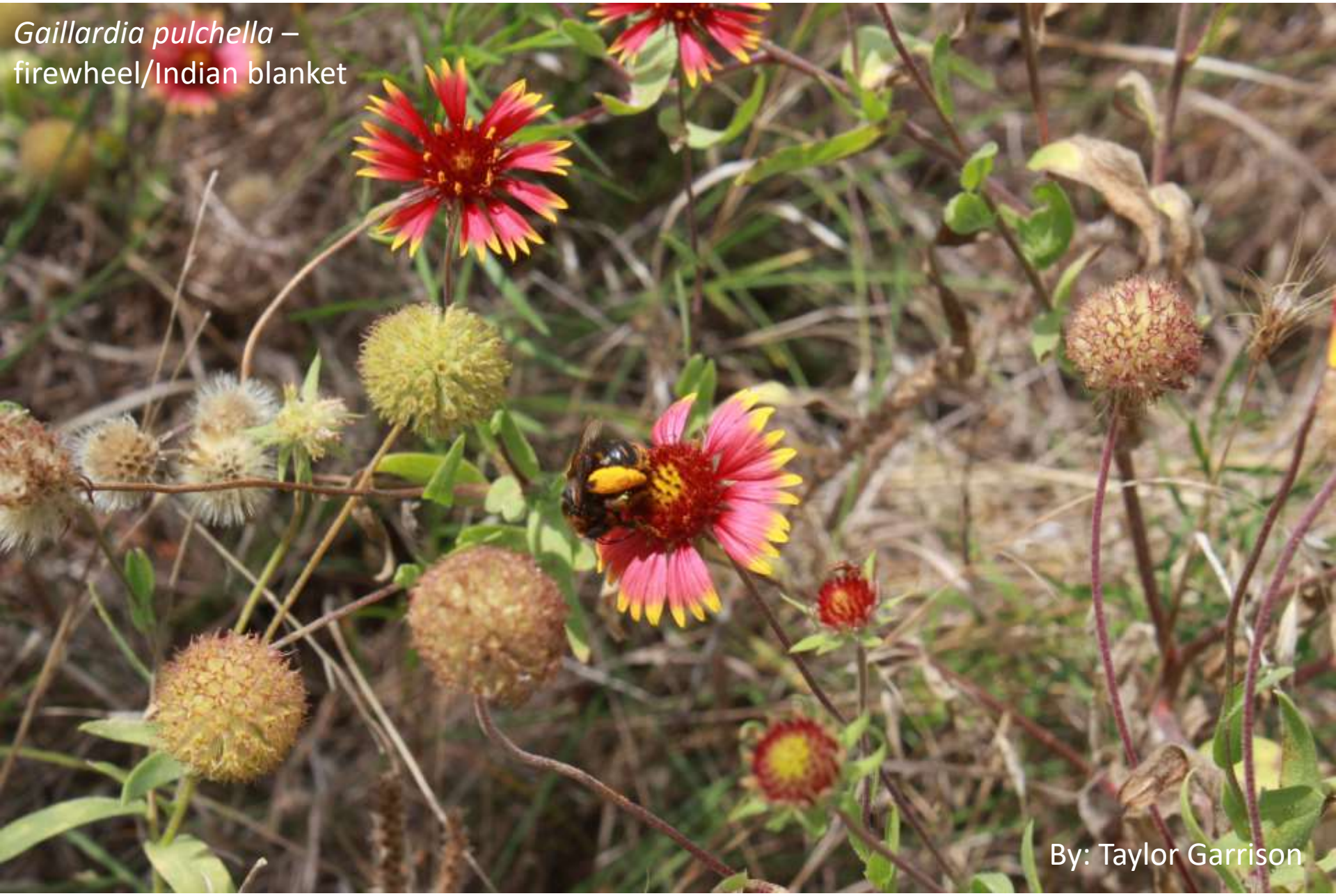
Plotwise Floristic Quality Analysis

- https://theprairieecologist.files.wordpress.com/2011/10/plotwise-fqi-description-short.pdf
- Meter squared plots
  - List all species
  - Compare over time
  - Use Nature Conservancy Derived Conservatism Values for North-Central Texas
  - Long term comparison Burned-Unburned and Frequency Data

Frequency Chart for Plants in East and West Pasture 1 m² Sampling Plots

EAST PASTURE					WEST PASTURE				
SPECIES	OCCURRENCE	N = 25 BURNED	N=75 UNBURNED	CC SCORE	SPECIES	OCCURRENCE	N=19 BURNED	N=82 UNBURNED	CC SCORE
Desmanthus leptolobus	93	22	71	6	Desmanthus leptolobus	100	19	81	6
Bromus catharticus*	87	21	66	0	Bromus catharticus*	93	18	75	0
Croton monanthogynus	81	20	61	1	Amphiachyris dracunculoides	87	16	71	1
Amphiachyris dracunculoides	73	19	54	1	Croton monanthogynus	80	18	62	1
Euphorbia bicolor	64	13	51	1	Sporobolus compositus	73	17	56	3
Gaillardia pulchella	64	20	44	2	Euphorbia bicolor	67	12	55	1
Nassella leucotricha	55	10	45	2	Gaillardia pulchella	59	13	46	2
Sporobolus compositus	53	6	47	3	Plantago rhodosperma	59	12	47	1
Plantago rhodosperma	42	16	26	1	Bothriochloa ischaemum*	42	7	35	0
Asclepias viridis	41	9	32	2	Nassella leucotricha	37	6	31	2
Oenothera speciosa	41	8	33	1	Monarda citriodora	36	4	32	5
Eriochloa sericea	28	5	23	3	Asclepias viridis	31	5	26	2
Monarda citriodora	26	7	19	5	Oenothera speciosa	25	7	18	1
Bouteloua curtipendula	25	13	12	4	Bothriochloa laguroides	24	4	20	2
Ambrosia psilostachya	23	7	16	2	Centaurium tenuiflorum*	22	3	19	0


By: Taylor Garrison


Gaillardia pulchella –
firewheel/Indian blanket
By: Taylor Garrison


Lesquerella gracilis –
spreading bladderpod
By: Taylor Garrison


New species for project! (Found in West pasture)
Helianthus maximiliani – Maximillian Sunflower
By: Taylor Garrison

Dalea purpurea –
Purple prairie clover

By: Taylor Garrison

By: Taylor Garrison

Dalea enneandra – bigtop dalea

By: Taylor Garrison

Centaurea americana –
American basket flower


By: Taylor Garrison


By: Taylor Garrison

Andropogon gerardii –
big bluestem

By: Taylor Garrison


Bouteloua curtipendula –
sideoats grama
Schizachyrium scoparium –
little bluestem
By: Taylor Garrison


Bouteloua curtipendula –
sideoats grama
By: Taylor Garrison


Panicum virgatum - switchgrass
By: Taylor Garrison

Prosopis glandulosa –
honey mesquite
(fire effects on mesquite)

By: Taylor Garrison


04/08/2015 14:28


09/06/2016 15:55

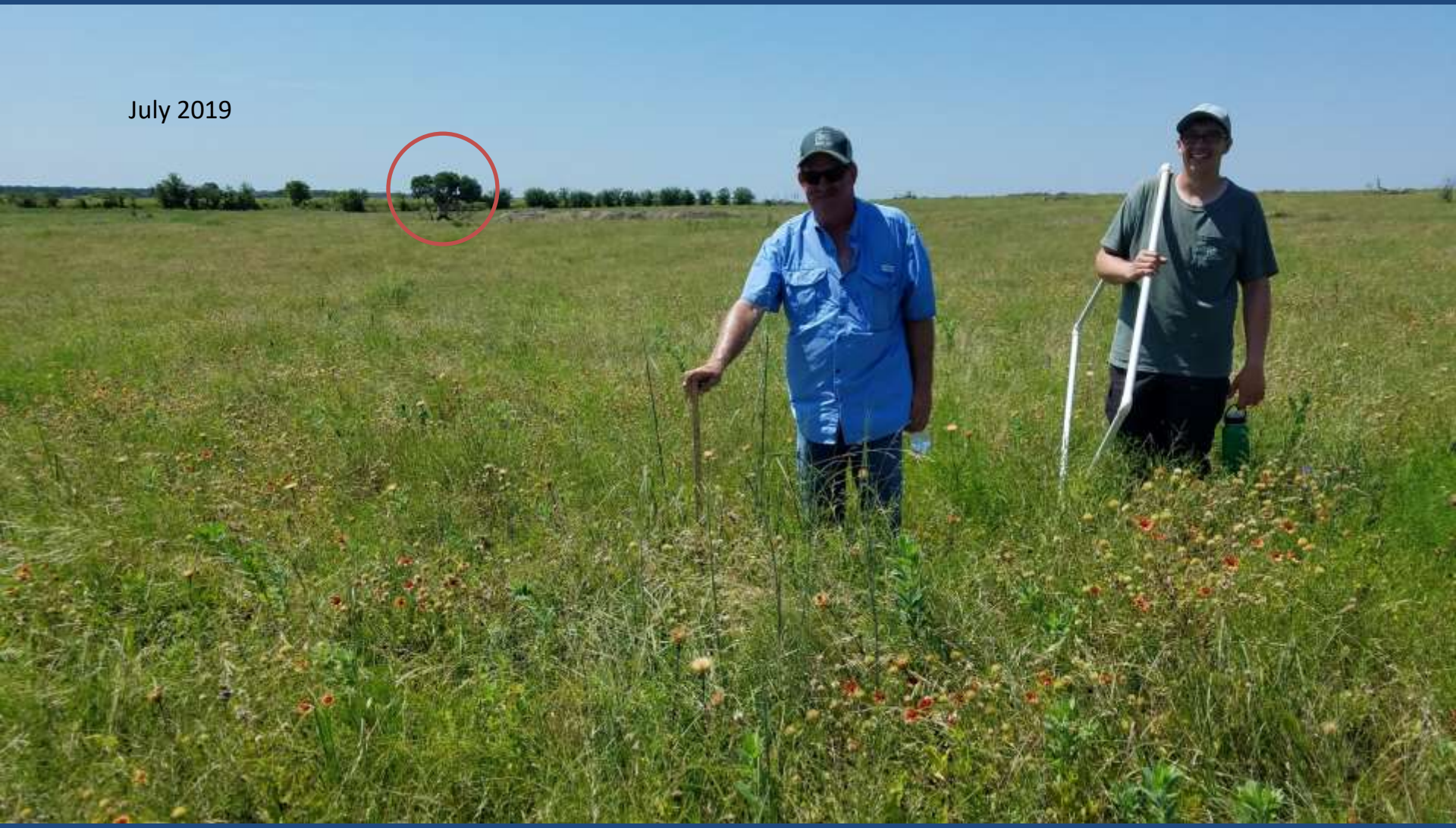
2007: 3rd Year of Grazing

2010: 1 Fire, and 2 Years of Rest


July 2017


July 2017


July 2017


July 2019


July 2019


July 2019


04/10/2018 14:03


July 2020

Continued Research

- We continue to evaluate data sheets and hope to release additional evaluation data over the next few years about results
- Plan on continuing research for 2 years to finish 3 burn cycles and sampling cycles for all treatments pastures to analyze results.

Observational Conclusions

- PBG: Another Tool In the Toolbox
  - Achieve Effects Fire and Grazing Can't Alone
  - Achieve Secondary Goals
    - Brush Control
    - Parasite Control
    - Minimize Wildfire Risk
    - Promote Biodiversity
    - Increase Usable Space
    - Cattle Production

End Result

- More Wildlife in the Field

Questions?

Special thanks to Mr. Beasom and samplers Jay Whiteside, Taylor Garrison, Heidi Kryger, Bobby Allcorn, Matt Machacek, Dan Jones, Charlie Booher, Obed Rodrequez, Jason Singhurst, WNBRI landowners + volunteers, and me!