City of Louisville
COLORADO • SINCE 1878

Open Space Advisory Board

Agenda

November 8, 2023
Library 1st Floor Meeting Room
951 Spruce Street
7:00 PM

Members of the public are welcome to attend and give comments remotely; however, the in-person meeting may continue even if technology issues prevent remote participation.

- *Call in to: +1 346 248 7799 or +1 408 638 0968 or 877 853 5247 (Toll Free)*
  Webinar ID: 883 3175 6380 or
- *You can log in via your computer. Please visit the City's website here to link to the meeting: www.louisvilleco.gov/osab*

The board will accommodate public comments during the meeting. Anyone may also email comments to the board prior to the meeting at EmberB@LouisvilleCO.gov

1. Call to Order
2. Roll Call
3. Approval of Agenda
4. Approval of Minutes
5. Public Comments on Items Not on the Agenda
6. 7:05 pm Informational Item: Staff Updates, Presented by Ember Brignull, Open Space Superintendent (10 Minutes)
7. 7:15 pm Information Item: Board Updates (10 Minutes)

Persons planning to attend the meeting who need sign language interpretation, translation services, assisted listening systems, Braille, taped material, or special transportation, should contact the City Clerk's Office at 303 335-4536 or MeredythM@LouisvilleCO.gov. A forty-eight-hour notice is requested.

Si requiere una copia en español de esta publicación o necesita un intérprete durante la reunión, por favor llame a la Ciudad al 303.335.4536 o 303.335.4574.

- Board/Council Communication and Refinement to Process
- Update to quasi-judicial Process for OSAB & PPLAB
- Sales Tax Update

8. 7:25 pm Discussion Item: 2023 Open Space Regenerative Cattle Grazing. Presented by Andy Breiter and Emily Gallagher of Grama Grass and Livestock, LLC (20 Minutes)

9. 7:45 pm Discussion Item: 2023 Open Space Goat Grazing. Presented by Donny Benz, Goat Green, LLC. (20 Minutes)

10. 8:05 pm Discussion Item: Overview of 2023 Open Space Fire Mitigation Efforts and Program Refinement for 2024. Presented by Nathaniel Goeckner, Natural Resource Supervisor (20 Minutes)

11. 8:25 pm Discussion Item: Items for December 13, 2023 Meeting
    PROST Master Plan Survey Review
    Discuss Board Officer Positions for 2024
    Finalize Updates for 2023 OSAB Goals
    Draft 2024 OSAB Work Plan For City Council Review

12. Adjourn

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Open Space Advisory Board Meeting Minutes
Wednesday October 11, 2023, 7:00pm
Louisville Public Library, 1st Floor Meeting Room
951 Spruce Street

1. Call to Order

David called the meeting to order at 7:08 pm.

2. Roll Call

OSAB Members Present: David Blankinship, Laura Scott Denton, Susan McEachern, Helen Moshak, Jessamine Fitzpatrick, Jojo Follmar, and Michiko Christiansen

OSAB Board Members Absent: Charles Danforth

Staff Members Present: Ember Brignull

3. Approval of Agenda

Jojo moved to approve the agenda as written. Susan seconded the motion. The motion passed unanimously.

4. Approval of Previous Meeting's Minutes

Susan moved to approve the September 2023, OSAB meeting minutes without edits. Jessamine seconded the motion. The motion passed unanimously with David abstaining.

5. Public Comments on Items Not on the Agenda

-none-

6. Informational Item: Staff Update provided by Ember Brignull, Open Space Superintendent and Adam Blackmore, Director of Parks, Recreation, and Open Space.

Ember pointed out a few highlights from the Staff Updates Memo on pages 8-10 in the October Meeting Packet.

Open Space property perimeter mowing is going on. David asked how the properties selected for mowing had been chosen. Ember replied that the properties were chosen based on old modeling with the addition of properties impacted by the Marshall Fire. She added that the new fire mitigation modeling might change which properties get mowed in the future.

Brian is writing an RFP for the manufacture and installation of wayfinding signs along the Powerline Trail. The plan is for them to be installed this year.

Staff will present the wildfire risk mitigation plan to Council on October 17th as an information item. City staff have done over 400 acres of fire mitigation in 2023. David recalled that the board had some concern about how the consultants' model valued different city-owned properties when they presented to OSAB, and he asked Ember if those valuations had been further considered by Linker (the consultants). Ember replied that the consultants had found that altering property valuations hadn't changed the model significantly so staff requested ratings were used.

The Aquarius Open Space parking lot resurfacing project bids came in over-budget, so staff is re-scoping the project. There are several contractors interested in doing the work.

Staff had a good informational meeting with the public about the city's wildfire mitigation on Davidson Mesa. Susan commented that there had been some high emotion in the audience. She reported that some wildfire survivors would like Davidson Mesa to be completely mowed. Susan commented on what good presenters and educators Catherine Jepson, Nathaniel Goeckner, and Andy, the man who owned the cattle were.

David asked if there had been any complaints or reports about user conflicts with cattle and goats on Open Space this season. Ember said there had not been any, but noted a few people wanted the electric fences to be labeled more clearly.

Staff spoke with a conservation easement specialist from Boulder County. There is currently no program for inspection and enforcement for city-owned easement compliance. She is trying to learn how to implement such a program. Michiko asked if the goal was to follow Boulder County's lead. Ember answered that she feels it is a deficit that needs to be addressed by the City. Susan said that the County uses volunteers to inspect conservation easement properties and write detailed reports. Jessamine thought that could be a role for OSAB members. Michiko would like to hear from the County people at a meeting.

David asked about the Coyote Run trail resurfacing project. Ember replied that the contract is fixed and closed out. The bumpy part of the trail near the bottom of the property has been fixed. Susan asked about the plan for re-seeding, noting that she has heard a lot of concern about this from citizens who were happy about the trail work, but concerned about the vegetation along the margins of the trail. Ember explained that the contractors would reseed, using the city's required re-seeding mix, noting that the city's seed mix is for short-stature native grasses that would not need to be mowed if policy changed in the future.

The Highway 42 Public Works improvement project is being planned. There may be an ask for some Open Space land to build an underpass at Short Street. The underpass would connect to trails. If this request were to happen, Public Works staff would come to OSAB to talk about it.

7. Board Updates

Susan said that the Bee City USA group had a booth at Ecotoberfest. She reported that homeowners who are re-building from the Marshall Fire were asking for help installing fire-resistant, xeric, and pollinator-friendly landscaping. She mentioned that a few citizens said they

might like a neighborhood-level presentation on the topic. Ember said that the new city fire mitigation employees might be good resources for this ask.

David said that the dark sky lighting ordinance was defeated by a 3-3 vote on Council. Jessamine asked what the arguments against it had been. David reported that the Council members who voted against it mostly didn't want it to be overly-restrictive and weren't sure this particular ordinance was the right way to achieve the goals.

David announced that the City hasn't heard back from Boulder County about the 2023 land and trail request document that OSAB reviewed in December of 2022. Ember observed that the County has been trying to reassess their process, and that we typically don't receive a response until they send out the new year's request.

The City is hosting a Boards and Commissions Open House at City Hall on October 26 to drum up interest in service.

David announced that he is now serving on a DRCOG board that is having a discussion about multimodal connections between the City of Boulder and Eastern Boulder County. They are starting by looking at South Boulder Rd. They are focusing on safety and accessibility.

Jojo said that last night the City Council adopted the City Decarbonization Plan. It is a plan and timeline to decarbonize city vehicles and facilities.

8. Discussion Item: Review and Finalize the Results of the 2023 OSAB Opens Space Candidate Recommendations to City Council. Presented by Laura Scott Denton and Michiko Christiansen, Acquisition OSAB Tiger Team.

Laura reported that she and Michiko had written a short list of questions for City Council members to ask them for their feedback about the OSAB Candidate Recommendation process and documents. The hope was to get feedback to help craft the document into a format that would be optimally useful and used by Council. The survey questions are in the October meeting packet. The City Manager recommended that they should not email the City Council their questions.

Ember said there will be a joint meeting at the beginning of the year between OSAB and City Council and OSAB, and as an alternative to the survey, could ask for feedback about the document from Council at that time. Laura commented that OSAB might have higher priorities to cover in these rare face-to-face meetings with Council, rather than feedback on a document's format.

Helen said there should be a lot of confidence in this document and it is based on years of feedback. She wants a cover letter added to the packet, noting that some of the survey questions to Council could be incorporated into the memo, such as "if you would like to see a different process or a different format for this document, please let OSAB know."

Jessamine agreed that the meeting with Council should not be bogged down with a discussion about format and process, but some of the questions about how the City handles acquisitions at a high level might be worth discussing. Laura agreed that a high-level discussion about acquisition and how to be more proactive about it would be useful.

David reported that Chris Leh said that he had been very impressed by how thoughtful the board was on the property tour in August, and particularly noted the value of long-term members.

David said he'd like to see the property list linked from the OSAB website, saying that the public would like to see it. Helen noted that previous Council members specifically argued against that, thinking it might put pressure on the landowners or undermine the City's negotiation power.

David noted that Council is going to be discussing board procedures soon. He wondered if they would say anything about how to receive memos from boards.

David would like to see property AAA (the small parcel at South Boulder Rd and Heritage) on the spreadsheet, even though the board decided not to evaluate it in August. Michiko said it could have an asterisk on it in the spreadsheet since it wasn't evaluated. Jessamine suggested including the memo about the property that the board wrote in August along with the document. Michiko said that the questions could be part of the memo, saying "if we don't hear from the Council, we won't change the document." Laura rephrased it as "we welcome Council's feedback on this document."

David questioned the property categories the board had decided upon at the September meeting. He was particularly concerned about the difference between the "Low Priority" category and the "Considered, but not Priority" category. The board discussed the categories.

Jessamine recommended that the board spend time next year looking at each of the high-priority properties and see if OSAB could specifically recommend their purchase. Laura agreed with this idea.

Helen moved:
- To change the blue category to "not a priority at this time."
- To add a cover memo that incorporates a few of the survey questions and invites feedback from Council.
- To include the numbers: 1-high, 2-medium, etc. on the map.
- To include OSAB's memo from August about property AAA.
- To add property AAA into the high-priority category with an asterisk to indicate it had not been evaluated on the August property tour

Michiko seconded the motion. The motion passed unanimously.

9. Discussion Item for the November Meeting:

1. Presentations by the Grazing Contractors
2. Introduction of Nathaniel Goeckner, Supervisor of Natural Resources
3. Board/Council Communication and Refinement to Process Discussion
4. Sales Tax Update

10. Adjourn

The meeting adjourned at 8:43pm.

City of Louisville
PARKS & RECREATION

MEMORANDUM

To: Open Space Advisory Board
From: Open Space Division
Date: November 8, 2023
Re: Information Item 6, Staff Updates

Marshall Fire Updates Pertaining to Open Space:

1. Property perimeter mowing is in the process and will be completed by November 1st pending weather. Staff met with the contractor on October 24th, 2023 to clarify and confirm proper completion of all areas including the added area mow zones. Information and locations can be found here: https://www.louisvilleco.gov/local-government/government/departments/parks-recreation-and-open-space/mowing-practices-for-parks-and-open-space
2. The Wildfire Hazard and Risk Assessment for Public Lands Final Report was presented to City Council on October 17, 2023 for review. Council was supportive of the report and mitigation efforts completed by Open Space division in 2023. Mitigation work will be added to City council's annual work plan.
    i. Council Packet: https://www.louisvilleco.gov/local-government/government/city-council/city-council-meeting-agendas-packets-minutes
3. Wildfire Hazard and Risk Assessment and Louisville 2023 Fire Mitigation efforts were presented to the Grassland Group on November 3, 2023.
    a. The Grassland working group is an offshoot from the Boulder County Fire shed, with an emphasis on grassland wildfire mitigation and management and is composed largely of Front Range land managers.
4. Goats – Fuels reduction
    a. Goat Grazing for the fall season is complete. The goats grazed approximately 18.17 acres with an additional day of grazing at North Open Space.
    b. Staff has been working collaboratively with the National Resource Conservation Service (NRCS) and Bird Conservancy of the Rockies to create a grazing management plan as well as objectives and goals for continued grazing.

General:

1. City Council is tentatively scheduled to meet with OSAB on February 13, 2023. The goal of the meeting will be for City Council to review OSAB's work plan and provide direction on OSAB's proposed areas of focus.
2. The Warembourg fishing pond was refilled in mid-October.

Trails & Maintenance:

1. Staff has been working on completing a baseline sign inventory for all Open Space properties with plans to complete this task by December. Staff is in the first phase of the project which entails site assessing all properties of current sign status, collecting data, updating ArcGIS maps and spreadsheets. Future steps will include a needs assessment to the current sign inventory.
2. The Aquarius parking lot resurfacing project is in the planning stages. Staff is working with a contractor to receive an accurate quote.
3. Staff is in the process of reseeding areas of bare ground along trail corridors with a drill seeder/aerator that Mac Equipment is allowing staff to test/demo. Staff has re-seeded trail corridors on Davidson Mesa Open Space, Hecla Lake Open Space, and Dutch Creek.
4. The reseeding at Coyote Run Open Space should be completed by the contractors by November 3rd, 2023. Staff will confirm with the contractors and provide updates when available.

Natural Resources:

1. Staff is planning an herbicide application on Davidson Mesa to control Japanese brome and cheat grass in November which is in alignment with recommendations made in the Wildfire Hazard and Risk Assessment Report.
2. The Prairie Dog Management contractor will be finishing up flushing and relocation work on Davidson Mesa at the end of October. So far over 160 prairie dogs have been relocated to Pueblo. Staff contacted the Pueblo receiving site and Pueblo staff will not know if they are accepting prairie dogs in 2024 until April of next year.

Resource Protection:

1. Rangers partnered with the Library and the Planning Department to staff a booth at Community Park to watch the annular solar eclipse. Approximately 265 people looked through the Open Space telescope and its special solar filter to view the eclipse!

Education/Volunteer:

1. Volunteers from Fresca Foods participated in a trash pick-up on Aquarius Open Space on October 12.
2. All City education and volunteer events, including Open Space programming, will now be posted on a joint EventBrite account. This https://www.eventbrite.com/o/open-space-72687162223

Education Events Upcoming:

1. Sunday, 12/10/2023, from 4:30 to 7:00 PM, Open Space Stargazers: Jupiter, Saturn, and the Geminids. Aquarius Open Space.

Education Events Past:

2. Saturday, 10/7/2023, from 9:00 to 11:00 AM, Louisville Grasslands Field Tour. Davidson Mesa Open Space. 37 attendees.
3. Saturday, 10/14/2023 from 9:00 to 11:00 AM, Annular Eclipse Watch Party. 265 attendees.
4. Sunday, 10/15/2023, from 3:30 to 5:30 PM, The Old Windmill on Canvas (Open Space Plein Air Series). Jointly-owned Warembourg Open Space. 5 attendees.
5. Wednesday, 10/25/2023, 2 session times 6:00 to 6:45 PM and 6:45 to 7:30 PM, Spooktacular Critters. Louisville Recreation Center. 85 attendees.
6. Sunday, 10/29/2023, from 6:00 to 8:00 PM. Open Space Stargazers: Halloween Moongazing. Aquarius Open Space.

Properties Owned by City of Louisville

OPEN SPACE REGENERATIVE GRAZING 2023

Created and Implemented by Grama Grass & Livestock

Photo curtosy of KCM Photography

Introduction

Project vision

Davidson Mesa Open Space

Monitoring

Spring Targeted Grazing

Fall Targeted Grazing

Public Event

North Open Space

Fall Targeted Grazing

Grazing Reflection

Photo curtosy of KCM Photography

Introduction

The City of Louisville contracted Grama Grass & Livestock to graze approximately 88 acres in 2023. 75 acres consist of two grazes on Davidson Mesa Open Space and 13 acres of North Open Space. These two grazes aim to build ecological resiliency and reduce fuel load for potential fires using Best Management Practices (BMP). The Davidson Mesa portion of the contract consists of grazing in the Spring and Fall, creating and implementing photo points from the grazed areas, extracting biological soil samples, participating in a public education event, compiling an end-of-year report to reflect on the impact created by the Grama Grass herd, and presenting that information to the Open Space Advisory Board at the City of Louisville. The North Open Space portion of the contract consists of grazing an additional parcel for the City in the fall.

Grama
GRASS & LIVESTOCK

City of Louisville
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After the 2021 Marshall Fire, the City of Louisville began putting more efforts towards fire mitigation on open space properties. As a part of these efforts, the City chose to **integrate targeted livestock grazing** for it's **holistic approach to ecosystem resilience.**

Rather than utilizing a mower that requires diesel fuel or chemical sprays to reduce forage, the **targeted livestock grazing uses livestock to reduce forage, deposit nutrients on the land, support heterogeneity, and kick-start the natural cycles** to create a healthier ecosystem long term.

One of the main objectives of regenerative land management is to keep animals moving. Land stewards move a high-density herd daily. **This practice mimics the way buffalo roamed across the plains.** Large herds could create a high impact in a short amount of time, eating grasses, trampling the earth, and depositing nutrients. Then, the acres were **left to rest** before the buffalo returned. The process of **high impact followed by long stretches of rest** created a system where the ruminants and grasses evolved together creating a healthy grassland ecosystem. [1]

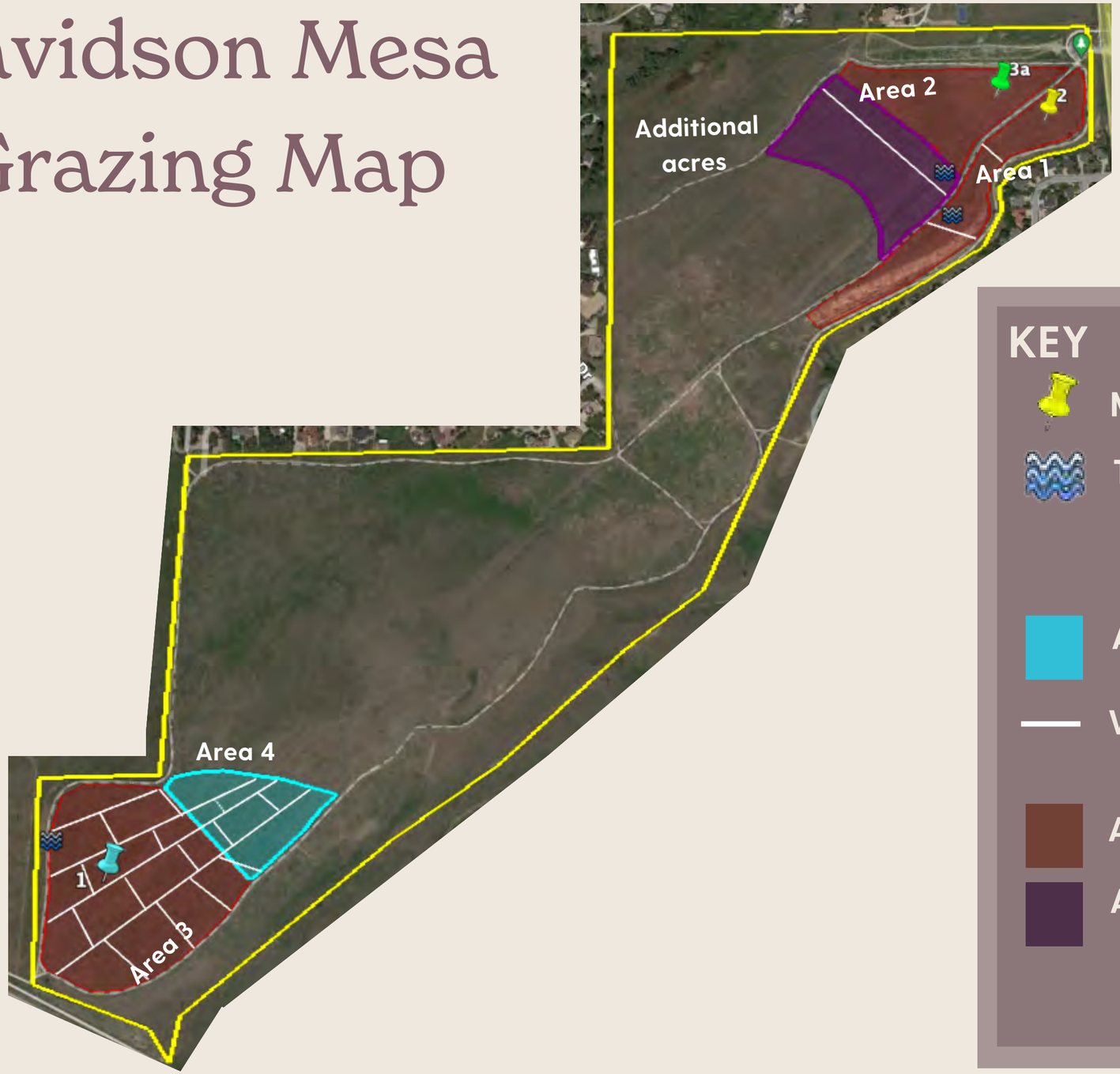
Grama Grass & Livestock **works to achieve this mimicry** by increasing the herd's stocking density on a small portion of the grazable acres and **moving the cows daily** to **allow for as much rest as possible.**

[1] Holistic management concept pulled from Allen Savory's Ted Talk "How to green the world's desserts and reverse climate change.

Davidson Mesa Open Space

Photo curtosy of KCM Photography

Davidson Mesa Grazing Map



KEY

Monitoring locations

Trough Locations

In area 3, troughs moved along the west perimeter fence.
In area 2, troughs moved West to East
In area 1, troughs stayed in the same place

Area 4

Only grazed in the fall

White Lines

Indicate an example of daily moves throughout areas

Areas grazed in the spring and fall

Additional Acres

Additional acres needed in the spring due to the rain also grazed in the fall.

Rain Event's Impact

Between May 8th and May 15th, Davidson Mesa received over 3.5 inches of rainwater.[2] This heavy amount of rain in a short period increased the amount of impact on the grazed areas. Since the cows were moving through softer ground, their cloven hooves tramped a significant amount of forage. The mix of the heavy rain, grazing, and trampling resulted in heavily impacted areas. Grama Grass & Livestock photographed these areas and will monitor them throughout the year.

Pugging in Area 1

Photo of the depth one hoof print pressed into the soil

Pugging in Area 2

[2] Rain fall fall pulled from the Colorado Collaborative Rain, Hail and Snow Network, using sites in close proximity to Davidson Mesa

Pugging: a word used to describe the indentation from the cows on the land due to heavy rain conditions.

Photo Point Monitoring

Grama Grass & Livestock established **3 monitoring sites** on Davidson Mesa, one for each area grazed.

Each site uses a transect (shown below) to **create consistency** for year-to-year monitoring.

The code used for Davidson Mesa is "**DM**."

Each photo point evaluated **% bare ground**, **% plant litter**, **% live plant**, **plant height,** and **number and type of plant species*** and took 2 photos.

*The objective for tracking the number and type of plant species is to show the diversity in the observation square. If the monitors recognized a different plant but could not identify it, it's labeled as grass #1, forb #2, etc.

Photo Point Monitoring

location one

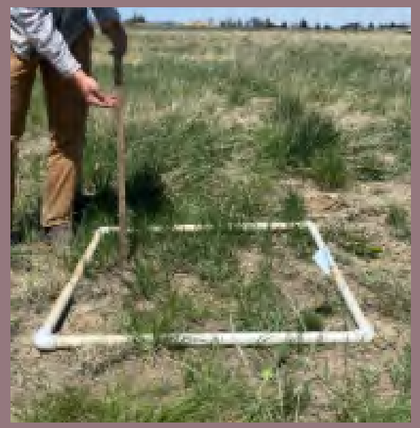
DM - 1 - 5.3.23

N 39° 58'.036"
W 105° 11'0.46"

Biological soil samples extracted from a 10ft radius around location 1

DM - 1a - 5.3.23

N 39° 58.0133'
W 105° 11.0060'



Bare ground:
60-70%
Live plant:
20-30%
Litter:
0-10%
Avg. plant height:
5 inches

Species identified:
Perennial ryegrass
Crested wheatgrass
Grass #1
Grass #2

DM - 1b - 5.3.23

N 39° 58.0234'
W 105° 11.0035'

Bare ground:
50-60%
Live plant:
30-40%
Litter:
10-20%
Avg. plant height:
8 inches

Species identified:
Perennial ryegrass
Blue grama grass
Forb #1

Photo Point Monitoring
location two

DM - 2 - 5.10.23

N 39° 58.6253'
W 105° 10.0327'

Biological soil samples extracted from a 10ft radius around location 2

DM - 2a - 5.10.23

N 39° 58.6309'
W 105° 10.0232'

Bare ground:
40-50%
Live plant:
30-40%
Litter:
10-20%
Avg. plant height:
2.5 inches

Species identified:
Sweet clover
Milkweed
Forb #3
KY bluegrass
Broadleaf plant #1

Monitoring took place between rain events on a cloudy day

DM - 2b - 5.10.23

N 39° 58.6376'
W 105° 10.0162'

Bare ground:
20-30%
Live plant:
30-40%
Litter:
30-40%
Avg. plant height:
9 inches

Species identified:
Brome grass
Forb #3

Monitoring took place between rain events on a cloudy day

Photo Point Monitoring

location three

DM - 3 - 5.10.23

N 39° 58' 38.47"
W 105° 10' 5.49"

Biological soil samples extracted from a 10ft radius around location 3

DM - 3a - 5.10.23

N 39° 58.6309'
W 105° 10.0232'

Bare ground:
60-70%
Live plant:
20-30%
Litter:
0-10%
Avg. plant height:
5 inches

Species identified:
Bunchgrass #1
KY bluegrass
Desert malwart
Brome grass
Grass #3
Yellow salsify

Monitoring took place between rain events on a cloudy day

DM - 3b - 5.10.23

N 39° 58.6376'
W 105° 10.0162'

Bare ground:
20-30%
Live plant:
40-50%
Litter:
30-40%
Avg. plant height:
5 inches

Species identified:
Brome grass
Broadleaf #1
Desert malwart
KY bluegrass
Forb #4

Monitoring took place between rain events on a cloudy day

Soil Samples

Grama Grass and Livestock took soil samples on the 3 monitoring sites at Davidson Mesa. These samples will **track the unseen data on how the cattle impact the land over time.** This quantitative information is essential as it shows potential deficiencies in soil biology.

Soil is part of a living food web comprising **bacteria, fungi, protozoa, amoeba, and nematodes**. The **relationship between these organisms directly correlates to the health of the soil and the plants**. If the soil and grasses are not communicating effectively, it most likely means there is an imbalance within the biological world of the soil.

This living food web also assists in the turnover of organic matter. Through a **life, death, and decay cycle**, the residing food web slowly increases soil organic matter. **Within every .01% organic matter increase comes an increased ability for the soil to retain water**. Water retention allows for more hydrated plants and an overall cooler and moister soil surface.

Sample Location 1 + 2

Sample ID 1 : DAVIDSON MESA
Sample ID 2 : DM-1-5-3-23

PLFA Soil Microbial Community Analysis

Functional Group Biomass & Diversity

Total Living Microbial Biomass, Phospholipid Fatty Acid (PLFA) ng/g	**2158.75**
Functional Group Diversity Index	**1.49**

Total Biomass	Diversity	Rating
< 500	< 1.0	Very Poor
500+ - 1000	1.0+ - 1.1	Poor
1000+ - 1500	1.1+ - 1.2	Slightly Below Average
1500+ - 2500	1.2+ - 1.3	Average
2500+ - 3000	1.3+ - 1.4	Slightly Above Average
3000+ - 3500	1.4+ - 1.5	Good
3500+ - 4000	1.5+ - 1.6	Very Good
> 4000	> 1.6	Excellent

Functional Group	Biomass, PLFA ng/g	% of Total Biomass
Total Bacteria	**938.60**	**43.48**
Gram (+)	**440.12**	**20.39**
Actinomycetes	178.27	8.26
Gram (-)	**498.48**	**23.09**
Rhizobia	0.00	0.00
Total Fungi	**393.61**	**18.23**
Arbuscular Mycorrhizal	**107.66**	**4.99**
Saprophytes	**285.95**	**13.25**
Protozoa	**0.00**	**0.00**
Undifferentiated	**826.54**	**38.29**

Sample ID 1 : DAVIDSON MESA
Sample ID 2 : DM-2-5-10-23

PLFA Soil Microbial Community Analysis

Functional Group Biomass & Diversity

Total Living Microbial Biomass, Phospholipid Fatty Acid (PLFA) ng/g	**1742.14**
Functional Group Diversity Index	**1.527**

Total Biomass	Diversity	Rating
< 500	< 1.0	Very Poor
500+ - 1000	1.0+ - 1.1	Poor
1000+ - 1500	1.1+ - 1.2	Slightly Below Average
1500+ - 2500	1.2+ - 1.3	Average
2500+ - 3000	1.3+ - 1.4	Slightly Above Average
3000+ - 3500	1.4+ - 1.5	Good
3500+ - 4000	1.5+ - 1.6	Very Good
> 4000	> 1.6	Excellent

Functional Group	Biomass, PLFA ng/g	% of Total Biomass
Total Bacteria	**709.35**	**40.72**
Gram (+)	**336.70**	**19.33**
Actinomycetes	127.83	7.34
Gram (-)	**372.65**	**21.39**
Rhizobia	0.00	0.00
Total Fungi	**348.95**	**20.03**
Arbuscular Mycorrhizal	**95.47**	**5.48**
Saprophytes	**253.48**	**14.55**
Protozoa	**5.52**	**0.32**
Undifferentiated	**678.32**	**38.94**

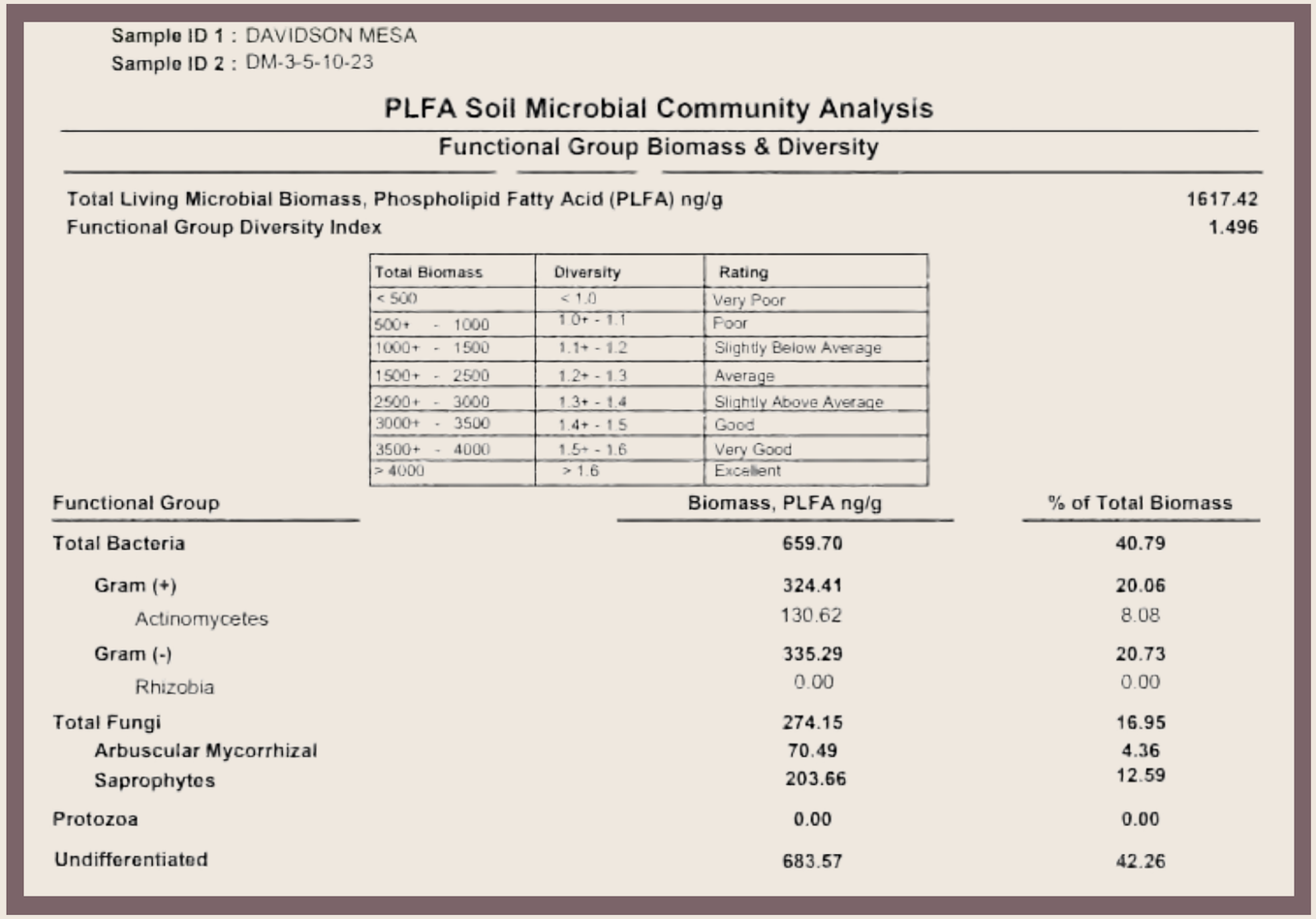
A healthy fungal-to-bacteria ratio is 35:100, Area 1's is **43:100,** and Area 2's is **49:100.**

The predator-to-prey ratio is below average for Areas 1 + 2 (all prey + 9:1000). Protozoa feed on bacteria, which helps release nutrients. A healthy Predator: Prey ratio would **provide 1 predator (protozoa) for every 50 prey (bacteria).**

Brome was the **main forage** in both locations.

Soils are heavier in clay than area 3, which led to the pugging issue in the spring.

Sample Location 3



Sample ID 1 : DAVIDSON MESA
Sample ID 2 : DM-3-5-10-23

PLFA Soil Microbial Community Analysis

Functional Group Biomass & Diversity

Total Living Microbial Biomass, Phospholipid Fatty Acid (PLFA) ng/g	1617.42
Functional Group Diversity Index	1.496

Total Biomass	Diversity	Rating
< 500	< 1.0	Very Poor
500+ - 1000	1.0+ - 1.1	Poor
1000+ - 1500	1.1+ - 1.2	Slightly Below Average
1500+ - 2500	1.2+ - 1.3	Average
2500+ - 3000	1.3+ - 1.4	Slightly Above Average
3000+ - 3500	1.4+ - 1.5	Good
3500+ - 4000	1.5+ - 1.6	Very Good
> 4000	> 1.6	Excellent

Functional Group	Biomass, PLFA ng/g	% of Total Biomass
Total Bacteria	**659.70**	**40.79**
Gram (+)	**324.41**	**20.06**
Actinomycetes	130.62	8.08
Gram (-)	**335.29**	**20.73**
Rhizobia	0.00	0.00
Total Fungi	**274.15**	**16.95**
Arbuscular Mycorrhizal	**70.49**	**4.36**
Saprophytes	**203.66**	**12.59**
Protozoa	**0.00**	**0.00**
Undifferentiated	**683.57**	**42.26**

Area 3 offered **greater plant diversity.**

The soil in Area 3 is more **sandy**.

Both warm and cool season grasses are present.

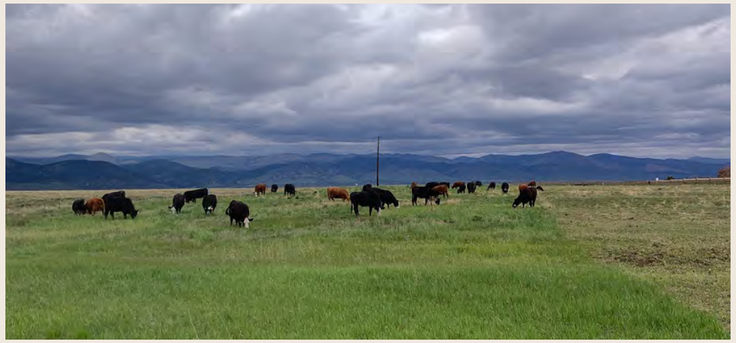
A significant amount of **tall oat grass** in the fall

The fungal-to-bacteria ratio for area 3 is similar to areas 1 and 2. at **42:100.**

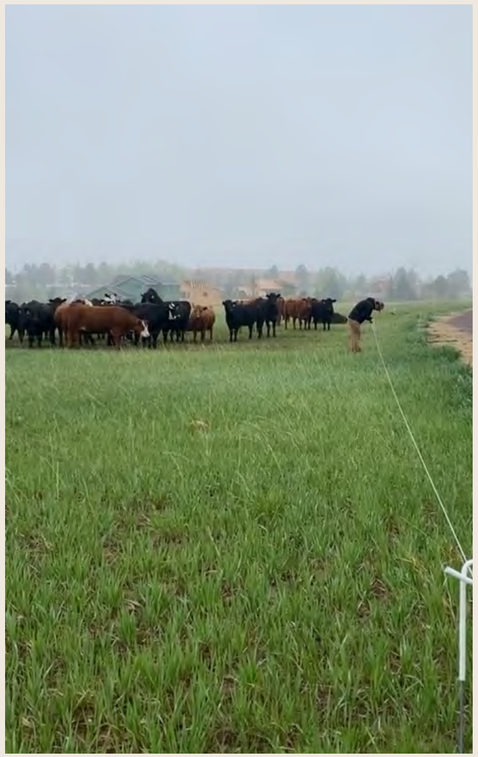
The predator-to-prey ratio is 0:100 - **all prey.**

Spring Graze

Herd grazing in Area 3

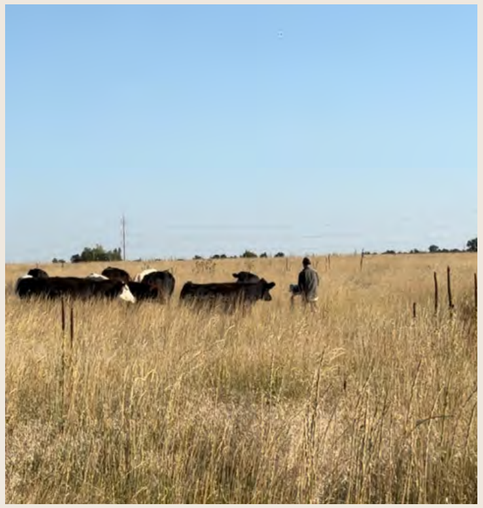


Herd Grazing in Area 1. Fence line on the right side of the photo shows grazing impact



Herd prepared to move in Area 2.

Fall Graze



Lincoln offering alfalfa pellets to the herd due to the tall oat grass.

Single cow in Area 3.

Herd in Area 3. Some of the forage options were shoulder height.

Targeted Livestock Grazing

Grama Grass & Livestock delivered cows to Davidson Mesa on May 1st, 2023. The herd spent 15 days on the Mesa, targeting zones 1, 2, and 3, represented on the map below. The goals for this graze included grazing the plants to encourage more green growth through the season, exposing the public to a grazing operation on an open space property, and reducing oxidized plants for fire mitigation.

Grama Grass returned on September 5th, 2023, for a fall graze of zones 1, 2, and 3. The herd left on October 5th. The objective of the fall graze included reducing fuel for a potential fire.

Best Management Practices used to complete these goals included: moving the cows daily to create a stocking density that would positively impact the soil and plants, creating a double fence and posting high-vis signs to prevent citizen interaction with the herd, and supplementing the cows in the fall to encourage consumption of the more lignified plants.

Timeline

SPRING GRAZE

May 1, 2023
Grama Grass delivers 29 cows to Davidson Mesa, Area 3

May 4, 2023
Grama Grass delivers 8 additional cows to Davidson Mesa, Area 3

May 8, 2023
37 cows moved from Area 3 to Area 2 during an educational event for the public

May 11, 2023
Herd moved from Area 2 to Area 1

May 15, 2023
Herd removed from Davidson Mesa

FALL GRAZE

September 5, 2023
Grama Grass delivers 20 cows to Davidson Mesa, Area 3 + 4

September 22, 2023
Grama Grass delivers 8 additional cows and 4 calves to Davidson Mesa, Area 3

September 27, 2023
Herd moved from Area 4 to Area 2

September 29, 2023
Calf born!

October 3, 2023
Herd moved from Area 2 to Area 1

October 5, 2023
Herd removed from Davidson Mesa

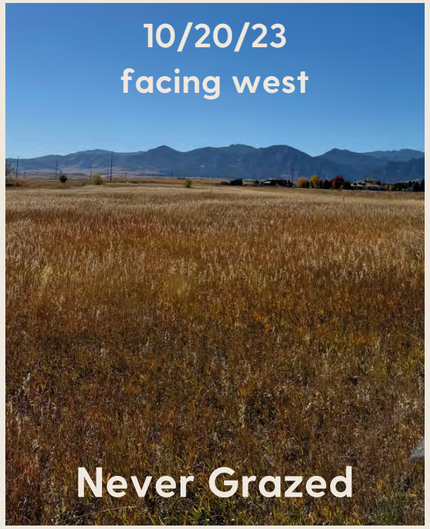
Grazing Comparison

	SPRING GRAZE	FALL GRAZE
STOCKING DENSITY	24,000 lbs. per acre	24,800 lbs. per acre
WATER HAULED	6,750 gallons	9,425 gallons
FORAGE CONSUMED	22,680 lbs. of forage	37,000 lbs. of forage
AUDS* PER ACRE	13 Animal Unit Days	25 Animal Unit Days
CHALLENGES	Significant rain fall Soil pugging	Calves Uneven ground Tall Oat Grass Consumption Clover consumption
CELEBRATIONS	Community appreciation Positive regrowth	Salt consumption in A2 Alfalfa pellet supplementation Plant diversity of A3

*Animal Unit Days, or AUDs refers to the number of days a single cow could spend on a property with the available forage. AUDs per acre is the AUD number divided by the amount of acres grazed.

Fuel Reduction

Cattle grazing does not result in 100% fuel reduction. This method offers a heterogeneous graze that varies in plant height, reduces plant connectivity, and offers bare ground spots that can reduce a fire's severity while still supporting the long-term health of the ecosystem.



Photos captured after the fall graze on Davidson Mesa.

Education Event

On May 8th, 2023, Grama Grass & Livestock collaborated with Ember Brignull, Catherine Jepson, and Ginger Cross to host a 2-hour education event at Davidson Mesa. The event involved the Grama Grass team moving the herd from Area 3 to Area 2 by creating an alley with poly wire fencing between the two sections.

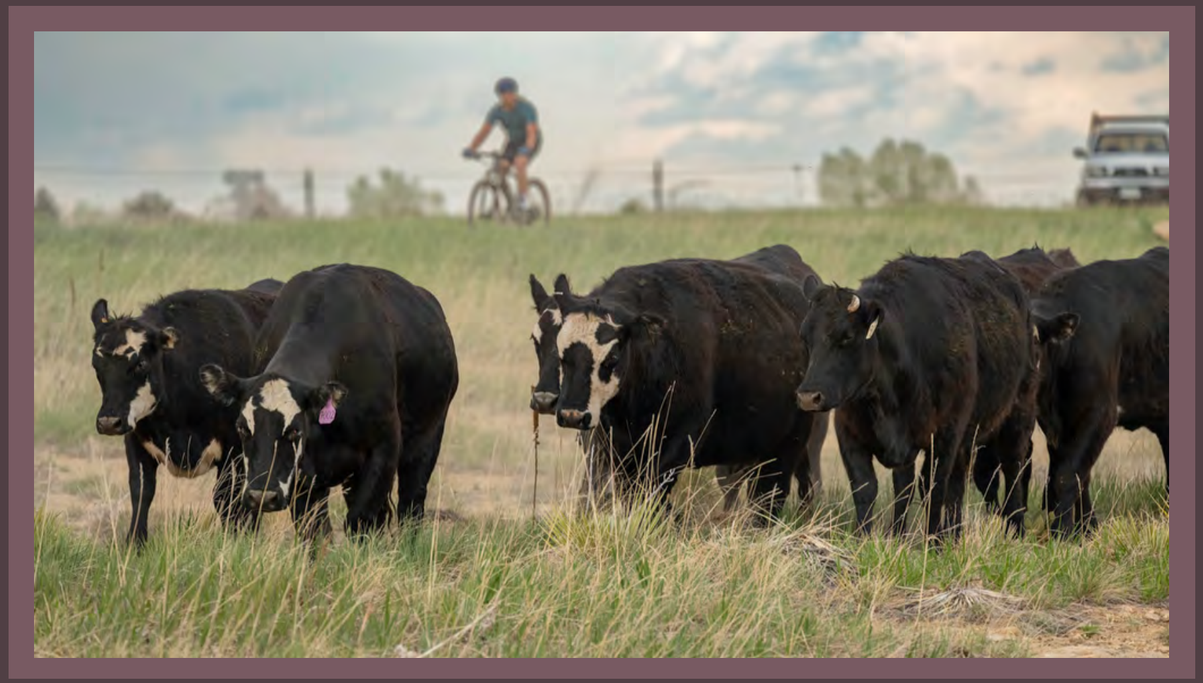


Photo curtosy of KCM Photography

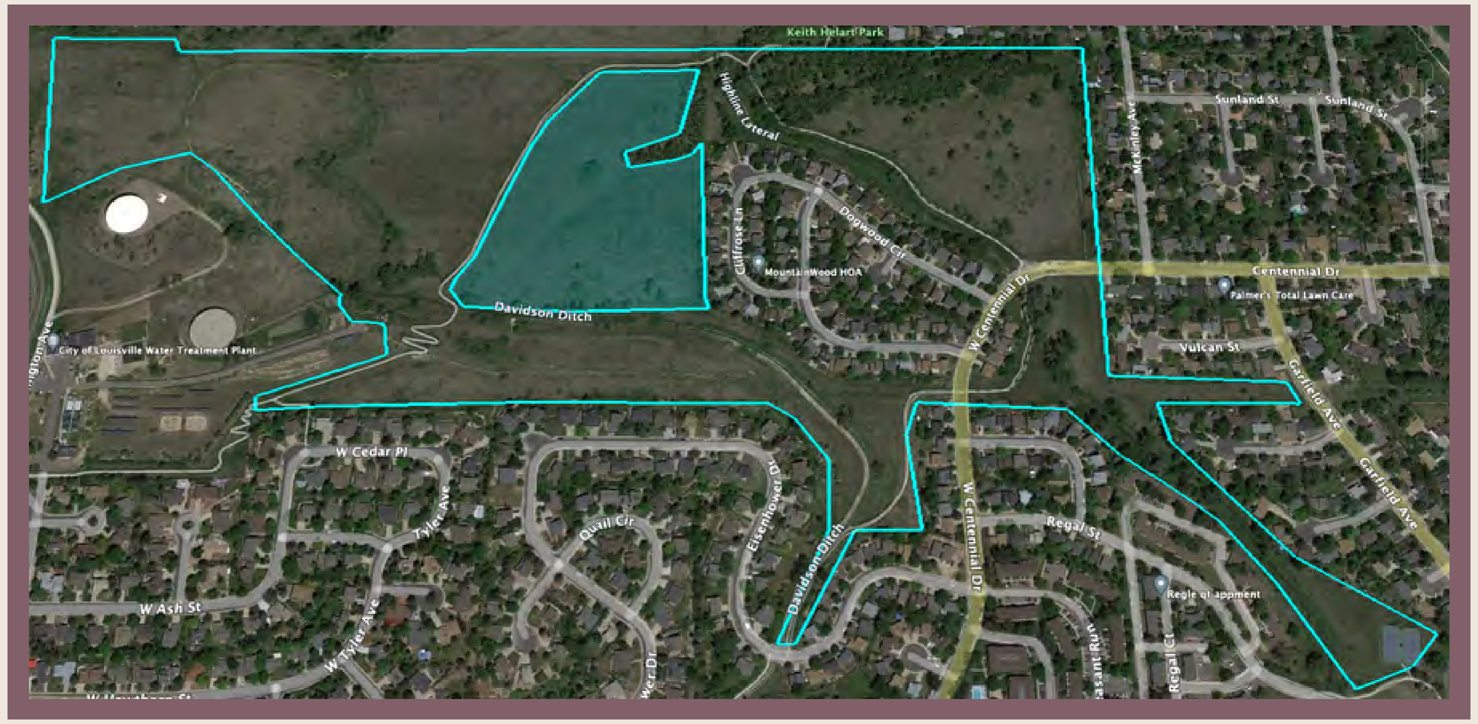
Louisville community members were encouraged to attend the event to see the cows move, learn about targeted grazing, and ask questions. Overall, the event was a success!

North Open Space

Targeted Livestock Grazing

On September 12, 2023, Grama Grass & Livestock delivered 25 cows to North Open Space. The City established a designated area for grazing, represented by the shaded blue polygon on the map below. This graze had the duel objectives of fuel reduction for fire mitigation and showcasing targeted grazing to citizens on their public land.

Grama Grass worked towards these goals using targeted grazing techniques, such as moving the cows daily through the ~13 acres. Grama Grass also stopped and talked to curious citizens as they roamed the trail to answer any questions about the project. The herd left North Open Space on September 22, 2023.



STOCKING DENSITY	24,000 lbs. per acre
WATER HAULED	4,000 gallons
FORAGE CONSUMED	13,500 lbs. of forage
AUDS* PER ACRE	24 Animal Unit Days
CHALLENGES	Access, calves
CELEBRATIONS	Community response

*Animal Unit Days, or AUDs refers to the number of days a single cow could spend on a property with the available forage. AUDs per acre is the AUD number divided by the amount of acres grazed.

Grazing Impact

2023 Reflection

- To continue the regenerative grazing process, the plants on both Davidson Mesa Open Space and North Open Space require rest to keep the plants healthy and foster natural cycles.

- The change in AUDs per acre between the spring (13 AUDs) and fall (25 AUDs) graze at Davidson Mesa shows us that in the spring, Grama Grass intentionally used a lower stock density to encourage regrowth. To positively influence warm season, perennial grasses we suggest using a higher stock density in the spring in future years.

- The rain events that occurred in the Spring resulted in a high impact on the fields from cattle walking and pressing their hooves into the soil - referred to as pugging. As that land dried, it created uneven ground that can benefit water retention but creates a problematic surface for our cattle to navigate - resulting in livestock injuries that occurred in the fall. We appreciate City of Louisville staff were flexible in the spring, offering us more acres to keep the cows moving.

- On Davidson Mesa Area 3 offered a variety of native warm and cool season plants for the cows to graze. In order to encourage consumption of these seeded out plants in the fall, especially the tall oat grass, Grama Grass & Livestock offered alfalfa pellets to the herd to change the microbiome of their rumens.

- On Davidson Mesa Area 1 + 2 is more of an established brome monoculture than Area 3 with a few natives mixed into the forage profile. Specifically, in Area 2, the cows consumed lush clover, resulting in difficult digestion for the herd. The fluctuation in more fibrous plants to more lush, sugar dominant plants impacts the composition of the microbiome in the rumen.

- On North Open Space, the dominant forage is brome grass. To improve plant diversity, we suggest targeted the plants at a specific time of year and increasing the stock density.

Conclusion

Ecosystem resilience is more than increased organic matter or stronger plant production. A resilient ecosystem fosters healthy natural cycles, including the **carbon, nitrogen, water, and mineral cycles**. It encourages birds to return to the area, enhances heterogeneity, improves water sequestration and retention, reduces fuel density, and welcomes citizens to enjoy and learn from the land. A resilient ecosystem will not prevent adverse impacts from occurring but will **mitigate those impacts and recover at a greater rate than a degraded and dependent ecosystem.**

The thriving ecosystem described above, which evolved with the bison, did not occur in one day or one year. The **mutually beneficial relationship between the ruminants and the plants that create a resilient ecosystem evolved centuries and millenia.**

The goals that targeted grazing are working to tackle will take funds, effort, and, most importantly, time to see results. We can look at fence line photos and soil samples to notice hints of change, but **significant ecosystem change will occur on a 5-10+ year scale and beyond.**

Photo curtosy of KCM Photography

GOAT GREEN, LLC

www.goatseatweeds.com

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Lani Malmberg ewe4icbenz@aol.com
Kaiti Singley kaitisingley@gmail.com

Mission statement

To provide land managers an alternative to chemical and mechanical methods *(chasing symptoms)* for land stewardship; using managed goat grazing to build a **living, functioning ecosystem** where desired plants sustain each other with balanced, recycling microbes in the nutrient rich soil and water is held *in situ (goal oriented)*

Since 1996
15 Western States

WORK:
- Weed Management
- Brush Control
- Fire Fuel Load Reduction
- Erosion Mitigation
- Flood Control
- Oilfield Reclamation
- Re-seeding
- Land restoration

Contracts:
- Federal
- State
- County
- City
- Private
- Local
- Home Owners
- Corporations

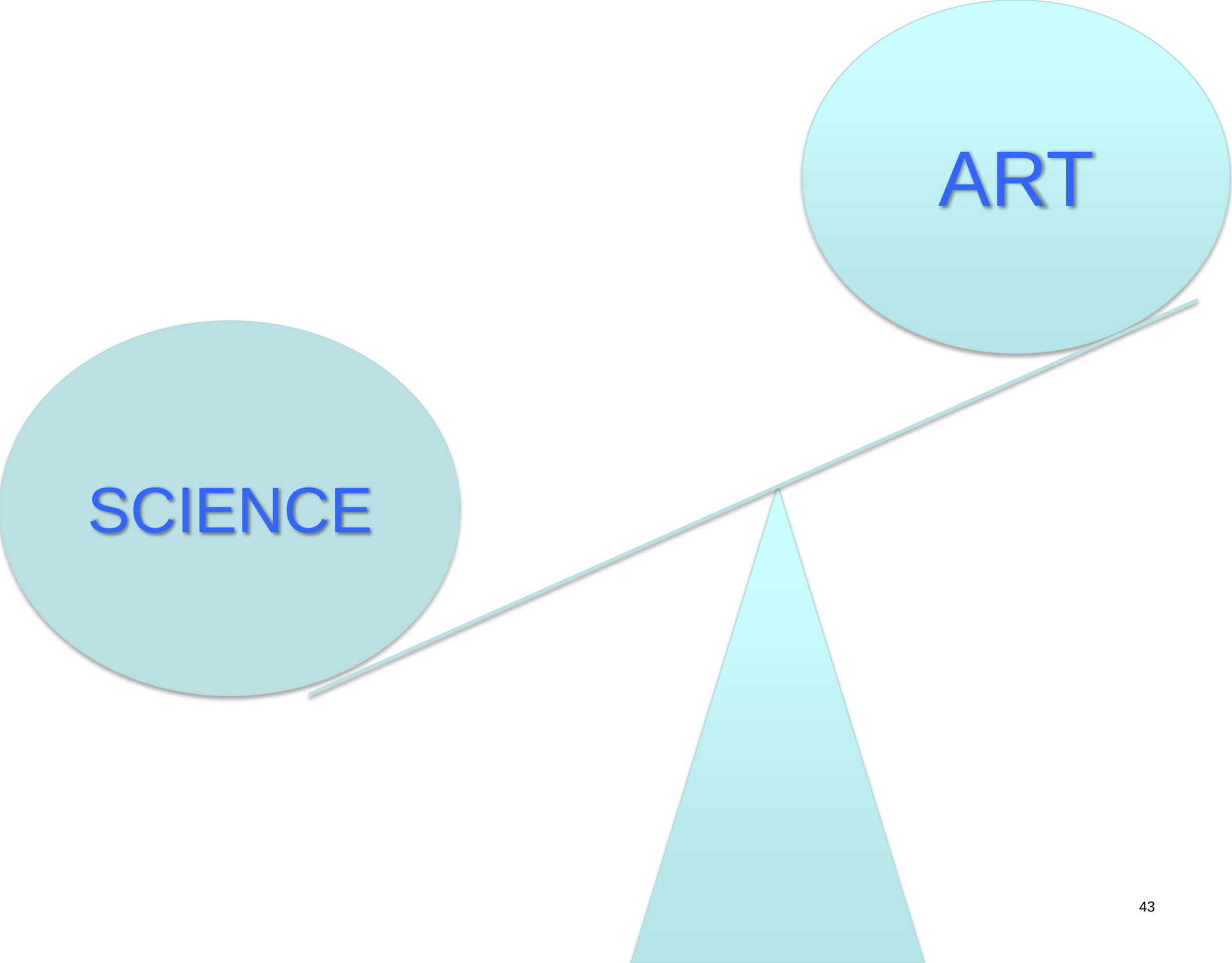
07/26/2010


10/23/2012


303-471-1522
KENWORTH
07/22/2010


150,000 lbs living energy workforce
06/11/2012


06/25/2009


ART
SCIENCE

Self-Propelled 120,000 machine

Goats are doing about 12 steps at the same time (as opposed to mowing which is only 1)

- 1. **recycling** nutrients (dried vegetation is a combo of carbon, nitrogen, sulfur, calcium, magnesium, boron, phosphorus, manganese, etc...)
- 2. **fertilizing**
- 3. **irrigating** (1000 goats get a drink and drop it a pint at a time on the steep hillside with a dab of nitrogen in it)
- 4. **aerating** the soil - 4,000 hooves
- 5. **trampling** into soil the fertilizer and irrigation - 4,000 hooves
- 6. **mulching** soil with 4,000 hooves - trampling dried vegetation that is not eaten to protect soil surface
- 7. **mitigate erosion** - building organic matter in soil with poop and hoof action that holds water; hoof action smoothes surface, mitigating erosion trails
- 8. **preparing seedbed** for dormant seeds in system
- 9. **packing seedbed**
- 10. bringing **living energy** (120,000 bs moving, running, playing, eating, pooping, peeing, sleeping) to a stagnant system
- 11. **packing roadbed**, smoothing edges, preventing erosion and run-off on road cuts
- 12. **Fire mitigation** - goats eat fire tinder and recycle it all in place,

Fuel for goat herd is all undesired plants

Risk Management

I. Animals
II. Plants
III. Camper Living
IV. Public Relations/Education - expectations
V. Contracts
VI. Weather; Season of work
VII. Business
VIII. Safety
IX. Employees
X. Plan B - emergency

Animals

1. Goats
    A. Herd Management
    B. Health Management
    C. Breeding/Kidding
    D. Herd Behavior
    E. Trucking
    F. Rapport with the Herd
    G. Mutual Respect - goats/dogs/land/people

2. Dogs (Yours and everyone else's)
    A. Herding
    B. Guardian

3. Wildlife

4. Predators

5. Livestock


06/20/2010


06/23/2013

PLANTS

I. Undesirable plants
   A. Weeds – nuisance, noxious, poisonous
   B. Brush – infestation, fire
   C. In target areas – flood control, irrigation ditches

II. Desired plants
   A. Species information for desired results
   B. Future Landscape Goals
   C. Endangered species

III. Previous Management
   A. Chemical use, Pesticide Residues
   B. Overgrazing/Over rest
   C. Stress - natural or man-made

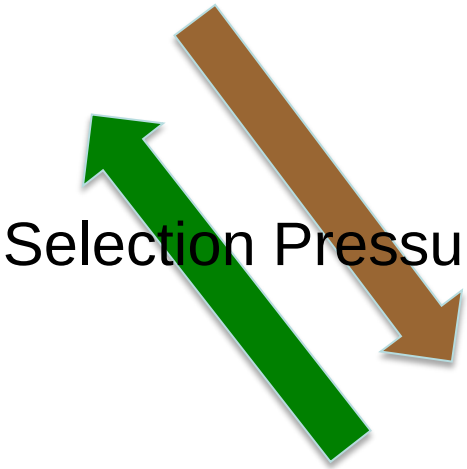
IV. Genus and species information on all plants
   A. Growth Habit – annual, biennial, perennial, woody
   B. Plant family characteristics

V. Site Soil Information
   A. Physical data: pH, EC, compaction, %OM, texture, H_20 Holding, FE, Ca, Zn, N
   B. Living biota: bacteria, fungi, ratios, mycorrhizae, protozoa, nematodes,

Natural Succession of Plants

- Push it FORWARD

- **FORward**
- BareGround
- **Annuals**
- Biennials
- Perennials
- Brush
- Trees



- **BACKward**
- **Trees**
- **Brush**
- **Perennials**
- **Biennials**
- **Annuals**
- **Bare ground**


07/25/2010

Public Relations-Education

I. Be able to explain goal setting for the site

II. Be able to articulate scientific soil and plant species information

III. Be able to compare and contrast goat grazing vs chemical vs mechanical methods $$$, response of the land, what happens next

IV. Friendly, courteous, respectful, professional

V. Have good, reliable working equipment, dogs

VI. You are ALWAYS in someone else's neighborhood (Predators too)


09/20/2009


06/14/2010


ZIPPY for MAYOR
09/02/2007


SCAPE
GOAT
06/13/2012

POSITIVE CHANGES EXPECTED DIVERSITY

Ecological Diversity

Soil, Water, Plant Species Diversity

$ Financial Diversity

Lower outside inputs– supplement feed, chemicals
Increase ranch revenue-recycle weed problem to cash
Real Estate value appreciation – more productive

Cultural/Social Diversity

Educational opportunities
Rural development

Animal Behavior Diversity

Wildlife, Livestock, Predators

FEED the SYSTEM

- Build nutrition at all levels
- Pushing Succession FORWARD

= diversity and stability

Land Restoration

ADD what is missing

PARADIGM SHIFT

- Add new energy, life, ideas, creativity, excitement
- Feed the system - Feed the soil, plants, animals, people
- Add vitality, vigor and joy
- Recycle natural resource to organic matter, energy flow
- Recycle weed problem to cash; solar energy is free
- Recycle Knowledge

- There is enough

Managed Goats

(living)

as alternative to

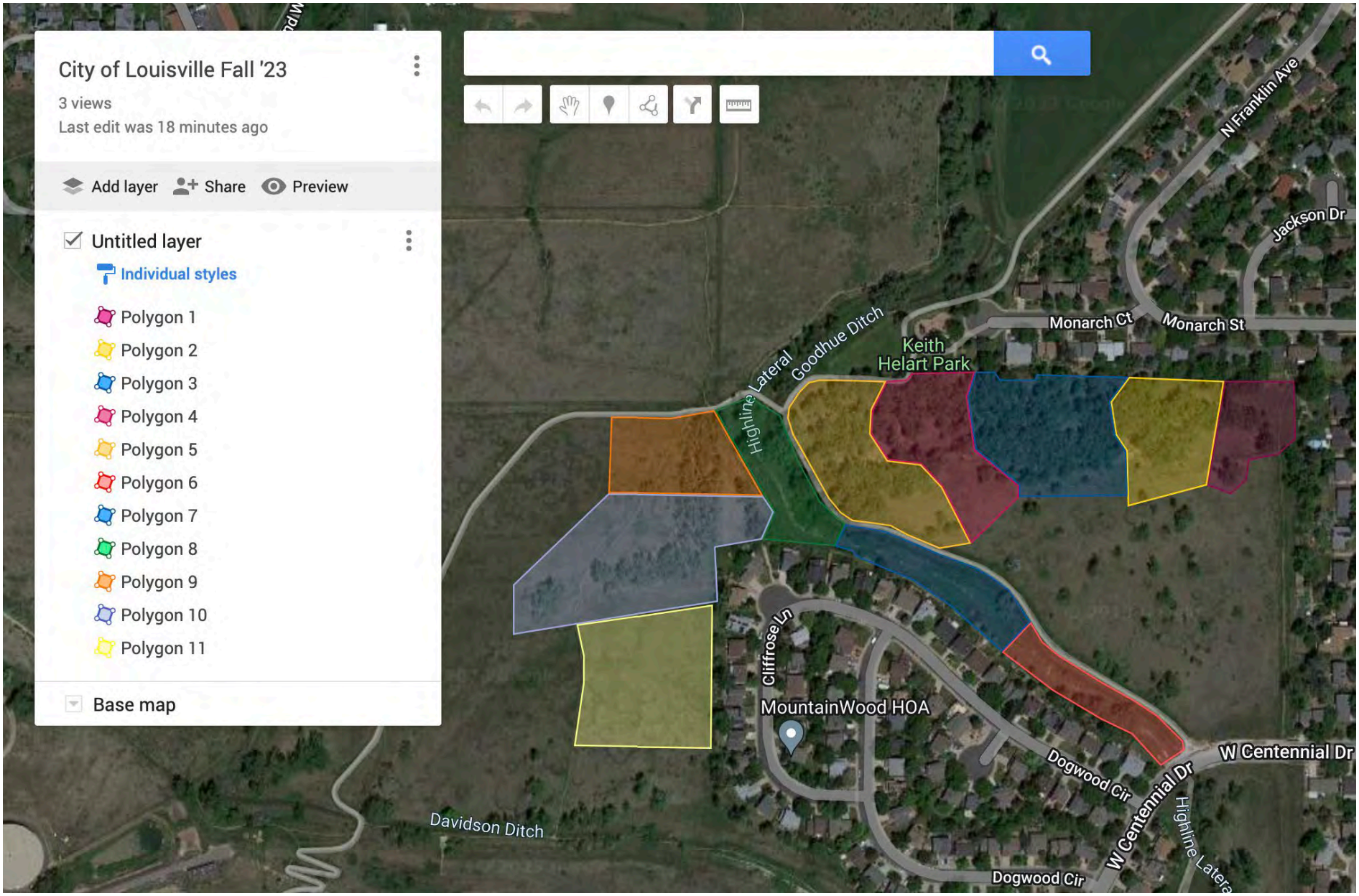
Chemicals and Machinery

(non-living)

Employee of the month

148 months in a row – since May 2001


CAUTION
GOAT GRAZING
MAY 21-24
Dogs must be on a leash at all times.
Do not touch or climb the fence.
Do not feed or pet the goats.
THANK YOU!


City of Louisville Fall '23
3 views
Last edit was 18 minutes ago
Add layer
Share
Preview
Untitled layer
Individual styles
Polygon 1
Polygon 2
Polygon 3
Polygon 4
Polygon 5
Polygon 6
Polygon 7
Polygon 8
Polygon 9
Polygon 10
Polygon 11
Base map
N Franklin Ave
Jackson Dr
Monarch Ct
Monarch St
Keith
Helart Park
Goodhue Ditch
Highline Lateral
Cliffrose Ln
MountainWood HOA
Dogwood Cir
W Centennial Dr
Davidson Ditch

Spring Before

Spring After

Fall Before

Goal


Goat

City of Louisville
PARKS, RECREATION & OPEN SPACE

MEMORANDUM

To: Open Space Advisory Board
From: Open Space Division
Date: November 8, 2023
Re: 2023 Open Space Wildfire Mitigation Efforts

Following is a summary of 2023 Open Space wildfire mitigation efforts. This content can also be viewed on the Open Space Mitigation Story Map: https://arcg.is/0nf4K5

Trail Corridor, Mowing and Haying Fuel Reduction

Trail corridor fuel reduction consists of removing fine fuels like grass and woody material like tree limbs and shrubs to reduce the fuel load on-site, reducing the intensity and spread of wildfire while creating tactical areas for fire suppression.

The City of Louisville has a pre-existing trail system that is advantageous for creating fire suppression control lines and entry for accessing open space properties. Trail materials consist of concrete and crushed gravel. Trail materials and width, when combined with mowed fuels to a minimum height of 4 -6 inches, can act as a targeted mechanical mowing to create fuel breaks on open space property. (4.2.7 page 45)

The city of Louisville currently implements broadcast area mowing from trail corridors to fence lines in select areas neighboring wildland-urban interface and other at-risk values. Damyanovich Open Space is agriculturally hayed, a process that mitigates herbaceous fuel height and continuity, addressing wildfire rate of spread and flame length. City of Louisville Wildfire Risk Assessment (4.2.6 page 43)

Natural Resources – Cattle Grazing

The city of Louisville manages several properties with large expanses of grassland and shortgrass prairies with fine herbaceous fuels. Fine grass-like fuels can present a wildfire risk due to their ability to dry out faster than larger woody materials, as well as their connectivity and fuel height. Fine grassland fuels can be mitigated with seasonal grazing, which targets the most effective time to graze cool and warm season grasses. Ungulates grazing on grasslands is a natural process that can increase rangeland health, biodiversity of native grasses, while reducing fuel loads and fire rate of spread. City of Louisville Wildfire Risk Assessment (4.2.3 page 39)

Natural Resources – Goat Grazing

The city of Louisville manages properties with dense forest understories and many sapling species (Prunus spp., Populus spp., Fraxinus spp.) and connective stands of Willow (Salix spp.) along ditch way corridors, trails, and open space boundaries. Goat ruminants can be used to browse woody material like

shrubs, tree branches, and other leaved plants. Browsing woody understory plants can reduce fuel loads, ladder fuels, and keep wildfires from progressing vertically into tree canopies, reducing fire behavior and severity. City of Louisville Wildfire Risk Assessment (4.2.3 page 39)

Natural Resources – Noxious Weed Management

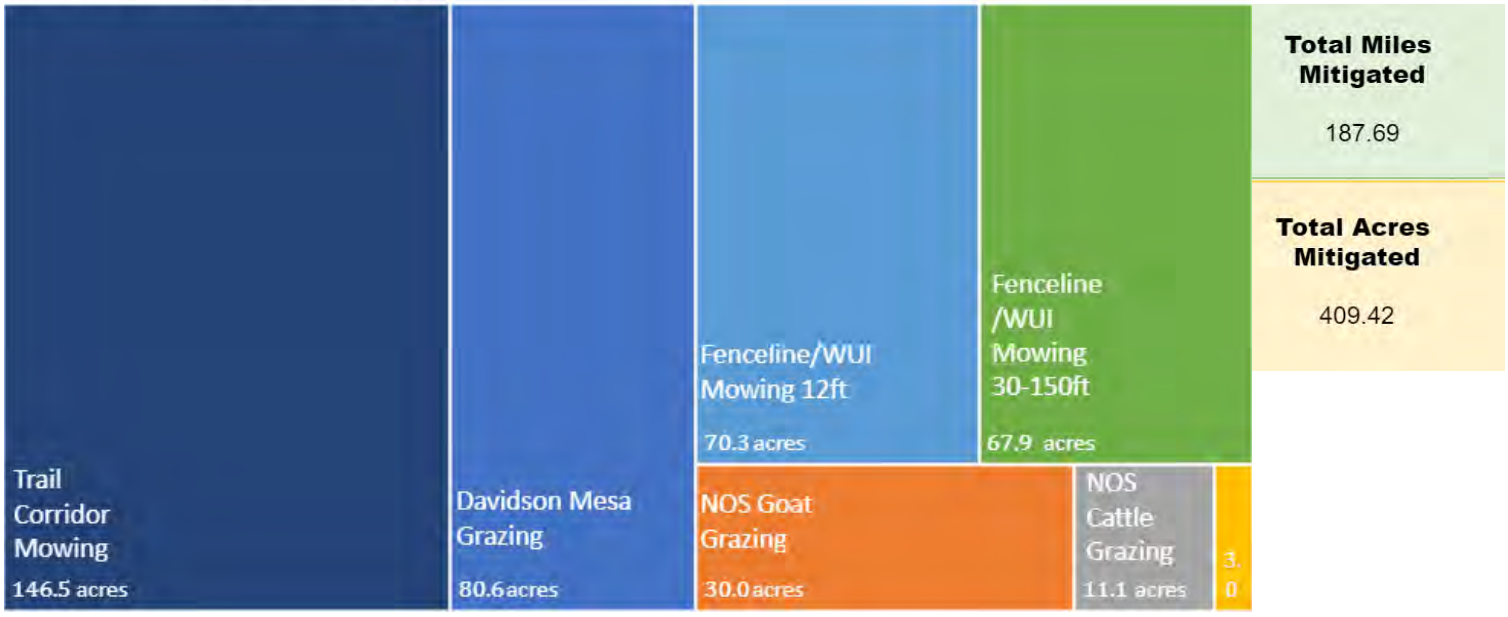
Non-native weeds and grasses can adversely affect ecosystem health, increase wildfire behavior, and alter fire regimes for native ecosystems on Colorado's Front Range. Non-native grasses can increase wildland fire behavior by curing early in late spring/summer, providing connective fuels, and out-competing native plants. Invasive and non-native weeds and grasses are managed across all properties and are outlined in the City of Louisville's integrated pest management plan. City of Louisville Wildfire Risk Assessment (4.2.2 page 37)

See the Map Below for Mitigation Locations

Mitigation Totals Table

Property	Treatment Type	Fuel Type	Area/Acres	Distance/Miles	Mowing Count	Widths	Year
Davidson Mesa OS (Moderate Risk)	Grazing - Cattle	Grasses and Forbs	80.62	N/A	N/A	N/A	2023
North Open Space (Moderate Risk)	Grazing - Goats	Grass,Forbs & Woody	30	N/A	N/A	N/A	2023
North Open Space (Moderate Risk)	Grazing - Cattle	Grasses and Forbs	11.1	N/A	N/A	N/A	2023
North Open Space (Moderate Risk)	Woody Vegetation	Woody Vegetation	3	N/A	N/A	N/A	2023
Fenceline/WUI Mowing 12ft (Low - Mod. Risk)	Mowing	Grasses and Forbs	70.3	48.38	2	12 feet	2023
Fenceline/WUI Mowing 30-150ft (Low - Mod. Risk)	Mowing	Grasses and Forbs	67.9	6.71	1	30-150 feet	2023
Trail Corridor Mowing (Low - Mod. Risk)	Mowing	Grasses and Forbs	146.5	120.9	3	10 feet	2023
Trail Corridor Veg. Reduc.	Woody Vegetation	Woody Vegetation	N/A	11.7	N/A	5 feet	2023
			Total Acres	Total Miles			
			409.42	187.69			

Visual Representation of Mitigation Acres



*(measurements do not include trail widths)

Mitigation Collaborations

- Internal City of Louisville
  - Recovery and Resilience Office, Parks and Recreation, City Manager's Office, Public Works, Planning Department, Police Department
- Louisville Fire Protection District
- Boulder County Fireshed – Grasslands working group
- Gramma Grass & Livestock (Cattle Contractor)
  - Boulder County-based regenerative grazing LLC. https://www.gramagrasslivestock.com/
- Goat Green (Goat Contractor)
  - Colorado-based wildfire mitigation and weed management grazing LLC https://goatseatweeds.com/
- Boulder Valley and Longmont Conversation District & National Resource Conservation Service
- Rocky Mountain Bird Conservancy

Mitigation Map