City of Louisville
COLORADO • SINCE 1878

Open Space Advisory Board

Agenda

Wednesday, October 9, 2019
Library 1st Floor Meeting Room
951 Spruce Street
7:00 PM

1. Call to Order
2. Roll Call
3. Approval of Agenda
4. Approval of Minutes
5. 7:05 pm Staff Updates (5 Minutes)
    a. Community Park Dog Park Pond Update
6. 7:10 pm City Council Liaison Updates (10 Minutes)
7. 7:20 pm Board Updates (10 Minutes)
    a. Dark Skies
    b. Joint Meeting with PPLAB and/or Dog Park Siting Hand Off
8. 7:30 pm Public Comments on Items Not on the Agenda (5 Minutes, more time as needed)
9. 7:35 pm Discussion Item: Extending the Duration of Annual and Biennial Weed Control on City of Louisville Open Space Properties with Esplanade Tank Mixes. Presented by Shannon Clark, Postdoctoral Researcher, CSU (20 Minutes)
10. 7:55 pm Discussion Item: Update from Management of Open Space for Tomorrow (MOST) Tiger Team Regarding: Proposal to City Council to Develop Priorities and Goals for Future Management of City Open Space and OSAB Feedback (30 Minutes)
11. 8:25 pm Discussion Item: OSAB 2019 Goals & Accomplishment Review (15 Minutes)
12. 8:40 pm Discussion Items for Next Meeting on November 13th (5 Minutes)
13. 8:45 pm Adjourn

City of Louisville
COLORADO • SINCE 1878

Open Space Advisory Board Meeting Minutes
Wednesday September 11, 2019, 6:00pm – 7:00 pm

Louisville Public Library: First Floor Meeting Room
951 Spruce Street

JOINT MEETING: With Superior Open Space Advisory Committee (OSAC)
7:00pm start for Joint Meeting

1. Call to Order
Laura called the meeting to order at 6:00 pm.

2. Roll Call
Board Members Present: Laura Scott Denton, Peter Gowen, Fiona Garvin, Mike Schantz, David Blankinship, Tom Neville
Board Members Absent: Helen Moshak, Missy Davis
City Council Members Present: Bob Muckle
Staff Members Present: Ember Brignull, Lisa Ritchie (Planning Dept.)

3. Approval of Previous Meeting's Minutes
Peter proposed to revise the minutes in Section 5c to read as follows:
"Nathan gave an update which potentially affects upcoming discussion items. The Mayhoffer-Empire Road parcels D1, D4, and D5 (as identified on the acquisition table) may be on the market soon."

Peter moved to approve the minutes with the aforementioned change(s). Laura seconded. The motion passed unanimously.

4. Staff Updates— Ember
See updates provided by Ember on page 7 of the Sept. 2019 OSAB Meeting packet.

A. David asked about Coyote Run trail improvements. Ember described the project: sidewalk installation on the east side of Washington and trail work on the west side of Washington including realignment of the Powerline trail, formalizing of the west-east social trail, and adding a crosswalk and signage. Ember noted that Council will be reviewing the contract on October 15th.

B. David asked about fixing trail damage on Coyote Run Trail. Ember reported that this damage is coming from a homeowner property. Staff has repaired this section of trail several times in the past and is working with the homeowner to mitigate the source of the drainage.

5. City Council Liaison Update
None.

6. Board Updates

A. Laura reported that Bob would like to help OSAB craft a document for longer-term goals and priorities for Open Space management to help guide City Council, especially during the upcoming 2-year budgeting process. Bob, Ember, Helen, Nathan, and Laura have met to start drafting this document. Laura will be presenting a short power point to Council on 9/24/2019 to get their initial feedback on the concept and content. OSAB will review and discuss in October meeting.

B. David reported that the meeting for Conoco-Phillips property development was attended by 4 member of OSAB and approximately 200 members of the public. He noted that overall, the meeting was well handled. Laura stressed with developer that OSAB wants to be involved in discussions from beginning, and noted that their concept of Open Space seems to be small sections bisected by lots of roads. She pointed out to the developer that this would lead to habitat fragmentation. Some citizens seem to want more parks/sports fields on this property. Lisa clarified that the City did request that the developer work with OSAB earlier rather than later.

C. David attended the open meeting re: Transportation Master Plan. Most of the passionate responses were about traffic (congestion on Hwy 42) rather than Open Space.

7. Public Comments on Items Not on the Agenda

Carl Borrmann, 1545 Ford Ct, voiced his support for single-track trails and more mountain bike opportunities in Louisville.

Wendy Sweet, 2600 Dartmouth Ave Boulder, Operations Manager for Boulder Mountain Bike Alliance (900 members, 83 with 80027 zip code) voiced support for single-track trails and more mountain bike opportunities, especially to connect areas.

Aaron Clark, 957 Sunflower St, expressed his thanks and appreciation for OSAB's work. He supports more fun and safe bike routes through town, particularly for children. He also notes improved trail names and signage would be helpful.

8. Discussion Item: Transportation Master Plan (TMP) (see page 9 of packet)

Lisa explained the TMP's structure of Policies, Projects, and Plans. Peter noted that more detail is needed as plans become firmed up, but that overall it seems to be going in the right direction.

David questioned the need to remove turn lanes on Via Appia and S Boulder Rd, and commented that leaving infrastructure in place seems better than spending money to remove it. David supports the South St underpass (under Hwy.42). He noted that the trail along railroad tracks is of lower priority to him and would need coordination with Broomfield in order to implement an actual connection. He supports better Dillon Road crossings.

Laura supports not building parallel roads/trails near each other. Paradise Road and proposed roads/trails on Conoco Phillips property are an example of this.

David asked about dedicated bike lanes on Dillon Road. Lisa noted that the rural character of Dillon could be impacted by the addition of bike lane infrastructure. Laura and Peter supported making this corridor safer for biking. David asked if bike single-track could be placed on the current Warembourg property (joint ownership with Boulder County). Ember noted that this property has been walked & while this could be possible following the ditch alignment we must first talk to Boulder County staff.
David noted re: pg 4-21: not convinced on priority of multi-use path on the north side of McCaslin. The presence of lots of cross streets on McCaslin makes this road not particularly safe for biking, even with dedicated lanes. Laura and Fiona agreed.

David noted danger of crossing railroad tracks on the Lock St to Community Park connector. Lisa noted that details are not worked out yet, but City is working with BNSF (railroad company) on at-grade crossings.

David supports re-routing Coal Creek Trail around the neighborhood and keeping it more along the creek.

Laura asked that any additional TMP comments be sent to Ember by Mon. 9/16/2019; Ember will forward all comments to Lisa.

9. Discussion Items for October 9, 2019
- Conoco Phillips Development Review
- Storm Water Quality Master Plan
- CSU Weed Study update
- Review: 2019 OSAB Goals & Accomplishments
- Open Space Program SWOT Analysis (SWOT = Strengths, Weaknesses, Opportunities, and Threats)

10. 5-minute break

11. Call to order: Joint Meeting between OSAB & OSAC (pgs 11-28 in packet)
The Joint Meeting was called to order at 7:05pm.

12. Roll Call
OSAC members:
Ryan Welch – Chair, Tracy Koller - Co-Chair, Peter Ruprecht, Shawn Samuelson, Kate Senecal, Marcy Stras, Joel White

13. Approval of Agenda
Peter moved to approve the agenda as written. Shawn seconded. The motion passed unanimously.

14. Discussion Item: Trail Connections

A. US 36 Bikeway to Mayhoffer Singletree Trail System (pg 11 of Sept. 2019 packet)

Laura introduced the concept of connection with Davidson Mesa underpass, and that OSAB has regularly asked for assistance with this trail in our annual Boulder County request. Ryan and other OSAC members noted general support on OSAC for this trail. Laura noted that Option A (northern & western) would be

easier to build due to topography; Ember noted that Boulder staff is more supportive of Option B due to agricultural concerns. Laura noted that the Marshall Rd crossing would also need to be addressed.

Wendy Sweet spoke in favor of this connection.

Aaron Clark Spoke in favor of this connection and noted that longer trails are a "selling feature" for city with cyclists.

Ryan noted that OSAC annually ranks trails and this is #2; high on the list due to connectivity. He also plans to add this trail to Superior's submission to Boulder County request list. Ember noted that the deadline for Boulder County request lists is January, 2020.

B. Rocky Mountain Greenway and Superior's Response
Joel noted that OSAC's stance is to not proactively seek connections thru Superior with the Rocky Mountain Greenway trail organization (planned trail from Rocky Mountain Arsenal to Rocky Mountain National Park). OSAC prefers supporting trails that go around Rocky Flats due to potential radiation concerns, especially given the soil disruption that would occur with trail building.

C. Connectivity needs to Nawatny Ridge (aka Conoco-Phillips) Property (pg. 12 of Sept 2019 packet).

Ryan noted that the Hodgson-Harris Reservoir property is for sale; OSAC would like to acquire this property Open Space due to unique bird life. Development would probably consist of dense housing. He noted that OSAC is leaning towards skirting this property to the south with trails along 88th and then hooking up with Rock Creek Trail & Broomfield.

Laura noted OSAB interest in connecting new retail north towards downtown Louisville, and that developer is keen to make the Rock Creek trail connections work. She asked OSAC to keep us posted as plans develop.

Peter Ruprecht asked best way for OSAB & OSAC to work together. Laura noted that OSAC can be invited to any meetings where Nawatny Ridge developers are presenting.

15. Discussion Item: Superior's Coal Creek Trail Project & Nature Play
Ryan noted that re-build of trail after 2013 flood was influenced by the change in the course of the creek. Superior Parks & Rec developed the plans for parks on both sides of the creek, with the creek being an integral part of the park, encouraging wading/playing in the creek. Access is rock-lined to reduce stream-edge degradation.

16. Discussion Item: Wayfinding (pgs 13-28 of Sept 2019 packet)
Laura presented and described these pages. Consultants recommended emphasizing major arteries, with names, icons, and colors. Signage incorporates a small footprint using colors & icons to make artery intersections clear. City Council has been reluctant to approve the signage due to cost concerns. Ember noted efforts to clarify connections at edge of Louisville to other communities.

17. Discussion Items: Marshall Lake

Laura introduced the topic of possible trail access to Marshall Lake. The Rod & Gun Club leases some land at one end of the lake. Louisville & Superior are the 2 major water owners within FRICO (Farmer's Reservoir and Irrigation Company). Land around the lake is owned by Boulder County. Peter Ruprecht noted that Boulder County does not support using ditches as trail routes due to wildlife habitat concerns, but that other trails could take users relatively easily to the reservoir. Mike noted that the Rod & Gun Club likely stocks the lake at considerable expense & will probably not support other users fishing there without some consideration. Ryan noted that flood mitigation took most of the Boulder County funds for the past 6 years, but now that most of that work is done, trail request funding may be more likely.

18. Discussion Item: Miscellaneous Open Space Maintenance &Management Concerns

Joel mentioned OSAC's interest in the "Fun Route" concept that communities like Aspen are implementing to promote more use of trails.

Laura noted that social trail mitigation is on OSAB's agenda.

David asked what the management plan is for Coyote Ridge single-track trail network. Ryan explained that most of these trails are on Century Link property, and that this is their #1 acquisition priority.

Tracy asked if OSAB is looking at any parcel acquisition. Laura explained our every-3-year review process and listed the top-ranking several properties.

David asked about the status of the disk golf area. Joel noted recent renovations and increased use; additional improvements are in the works.

Ryan noted that a new trailhead is under construction from McCaslin out to Boulder Regional trails.

Kate Senecal noted an aspirational goal to extend trails down the slope towards Old Town Superior & incorporate some historical aspects. Amenities such as restrooms and water bottle fill station are being considered.

19. Adjourn

The meeting adjourned at 8:55pm.

City of Louisville
PARKS & RECREATION

Memorandum

To: **Open Space Advisory Board**

From: **Ember Brignull, Open Space Superintendent**

Date: **October 9, 2019**

Re: **Staff Updates**

General:

- Benjamin White-Patarino has been selected for the Ranger Naturalist position. White-Patarino started work on September 25, 2019.
- First interviews for the Senior Natural Resource Position occurred on October 1, 2019.
- The prescribed fire at Davidson Mesa has been postponed until spring 2020 due to Rocky Mountain Fire Protection District (RMFPD) assessment and desire to increase coordination efforts with CDOT.
- City Council is scheduled to review the Coyote Run Trail Contract on October 15, 2019.
- By request, staff presented on "How to Develop a Ranger Program" at the State Colorado Open Space Alliance Conference in September.
- Open Space seasonal terms will be ending in mid-October.
- Staff repaired trail damage at Davidson Mesa and Aquarius (Pictures on next page).
- Completed trail corridor mowing for 2019.

Education:

Past:

- Thursday, September 26, 2019 from 6:00 to 7:30 pm, Mountain Lions. Louisville Library, 1st floor meeting room (951 Spruce St.). 13 participants.

Upcoming:

- Monday, October 14, 2019 from 9:30 to 11:30 am (sessions held at 9:30, 10:00, 10:30, and 11:00), Astronomy: Tour the Night Sky by the Fiske Planetarium. Louisville Recreation Center (900 W. Via Appia). Registration required online or through the Louisville Recreation Center. Ages 5 and up.
- Saturday, October 19, 2019 from 9:00 to 10:30 am, Walkin' and Talkin' with the Mayor. Mayhoffer Open Space. All ages.
- Wednesday, October 30, 2019 from 6:00 to 7:30 pm, Spooktacular Critters. Louisville Recreation Center, Senior Center (900 W. Via Appia). Registration required online or through the Louisville Recreation Center. Ages 5 and up.

Davidson Mesa Trail Repair Pictures:

Aquarius Trail Repair Pictures:

Before:

After:

Extending the Duration of Annual and Biennial Weed Control on City of Louisville Open Space Properties with Esplanade Tank Mixes

City of Louisville Open Space Grant Final Report
September 2019

Submitted by:
Postdoctoral Researcher: Shannon Clark
Professor and Extension Specialist: Dr. Scott Nissen

Section 1: Abstract

Abstract:

Invasive species management on non-crop and rangeland remains a constant challenge throughout many regions of the United States. While there are over 300 rangeland weeds, downy brome (*Bromus tectorum* L.), Dalmatian toadflax (*Linaria dalmatica*), musk thistle (*Carduus nutans*), common mullein (*Verbascum thapsis*), and diffuse knapweed (*Centaurea* diffusa) have emerged as some of the most invasive and problematic. Downy brome (*Bromus tectorum* L.) is a competitive winter annual grass that is considered one of the most problematic invasive species in rangeland. It has been estimated the western United States rangeland is infested with over 22 million hectares of downy brome. While glyphosate, imazapic, and rimsulfuron are the current industry standards for annual grass control, all of these restoration options provide inconsistent control or cause injury to desirable perennial species. The increasing spread of biennial species is a result of their adaptability, life cycle, and prolific seed production. Herbicides with both foliar and soil-residual activity (2,4-D, aminocyclopyrachlor, aminopyralid, chlorsulfuron, clopyralid, dicamba, fluroxypyr, metsulfuron, and picloram) are most commonly used, yet these control options lack residual seedling control resulting in rapid re-invasions. For this study, vegetative surveys were conducted after herbicide treatments were applied to evaluate control of weed species and release of desirable perennial grasses and forbs. All data was analyzed in ARM by analysis of variance to determine optimum treatments. First year results showed that treatments including Esplanade or Plateau plus Method or Tordon had significant reductions in common mullein cover, while Esplanade treatments also provided Russian thistle control. By the second year, treatments which included Esplanade provided superior common mullein control compared to most treatments which included Plateau. The combination of Esplanade plus Method and Telar provided excellent common mullein control while also increasing perennial grass biomass and not effecting native forb cover. In year one, Plateau was the only treatment to provide downy brome control. By year two, only treatments which contained Esplanade (5 or 7 oz/A) were providing downy brome control (near 100%). This research ultimately provides a new, long-term control option for controlling noxious weed species on City of Louisville Open Space properties including Aquarius and Davidson Mesa Open Space.

Section 2: Introduction

Objective:

Objective 1: To demonstrate that indaziflam (Esplanade™, Bayer CropScience) can be used as a new chemical treatment for successfully restoring Open Space lands invaded by downy brome and other invasive weeds such as common mullein.

Objective 2: To better understand which herbicides alone, and in combination, provide long-lasting invasive weed seedling control without injuring perennial species.

Objective 3: To evaluate how desirable native grass, forb, and shrub species respond to herbicide treatments.

Objective 4: Compare the efficacy of herbicide treatments using a prescribed burn management approach as compared to non-burned sites

Hypothesis:

Research Hypothesis: We hypothesized that treatments including indaziflam would provide significantly longer annual and biennial weed control preventing re-establishment, as compared to treatment excluding indaziflam.

Section 2: Anticipated Value of the Research/Contribution to Management Needs:

Annual, biennial, and perennial weeds including downy brome, common mullein, diffuse knapweed, field bindweed and Russian thistle are often present on similar rangeland, roadside, and disturbed sites along the Front Range of Colorado. These species are found on City of Louisville Open Space properties including Aquarius and Davidson Mesa Open Space. These highly invasive species compete with desirable native species for early spring moisture and have the capability to spread from disturbed to undisturbed areas. Downy brome also germinates in the fall and early spring, exploiting moisture and nutrients before native plant communities begin active growth in the spring. Downy brome seeds are tolerant to temperature and moisture stress and can remain viable in the soil for up to 5 years. Land managers have been faced with the problem of selectively controlling biennial invasive species with broadleaf herbicides. For invasive winter annual grasses such as downy brome, chemical control options include imazapic, rimsulfuron, and glyphosate; however, these herbicides lack consistency beyond the initial year of application and have been shown to injure desirable plant communities.

Indaziflam (Esplanade™, Bayer CropScience) is a relatively new herbicide that is currently registered for annual weed control in turf, orchards, and noncropland. Indaziflam is used at rates between 3.5 and 7 oz/A and has excellent preemergence activity on many annual weed species (Fig. A1). Indaziflam has several attributes that make it an ideal candidate to control non-crop weeds that reproduce primarily by seed production, 1) long soil-residual activity and 2) no injury to perennial grasses, forbs, and shrubs (Figs. A2-9). This combination would increase the opportunity for successful restoration of City of Louisville Open Space properties. Because indaziflam is a root inhibiting herbicide this allows for increased safety on desirable perennial plants, that have roots below the layer where the herbicide is active (Fig. A1). The emerged plants at the time of application would be initially controlled by the tank mix partner (picloram, aminocyclopyrachlor, etc.), while indaziflam would provide the long-term control of subsequent seedlings. Field studies at CSU have demonstrated that indaziflam has excellent long term downy brome control (3+ years) with minimal injury to native perennial species (Figs. A2-6). A greenhouse study has shown indaziflam can control downy brome, diffuse knapweed, common mullein, and several other biennial seedlings at rates as low as 1 oz/A.

Several research trials were conducted on the City of Louisville Open Space properties to ultimately provide additional management options for long-term control of invasive annual and biennial weeds where treatments in the past have provided inconsistent, short-term control. Fewer herbicide applications would mean additional years for native species to respond and recover, a lighter load of herbicides sprayed on managed properties, and the financial/labor savings from yearly herbicide treatments or mowing operations. This research provides an insight into the long-term control of invasive weed species and the effect of herbicide treatments on desirable grass and forb species.

Section 3: Methodology

Study Methods

1) Controlling Downy Brome and Common Mullein with Esplanade Tank-Mixes

In 2016 we conducted a study to test the hypothesis that herbicide treatments including Esplanade would provide increased weed seedling control of downy brome and common mullein compared to treatments without Esplanade. The site for this project is on Davidson Mesa Open Space Property located in the City of Louisville municipality. The Davidson Mesa site has a dense stand of common mullein (approximately 70-80% cover) with some downy brome and some remnant perennial grasses and forbs. Within this study we also evaluated herbicide treatments effect on desirable grass and forb species. Treatments were applied to 10 x 30 ft plots with four replications for each treatment, arranged in a randomized complete block design. Twelve herbicide treatments were applied after (POST) common mullein and downy brome emergence but while the plants were in an overwintering state in December 2016. Perennial grasses and forbs were dormant at the time of application. All treatments were applied with a CO_2 pressurized backpack sprayer at 207 kPa using 11002LP flat fan nozzles at 187 $L \cdot ha^{-1}$. Cover and cover evaluations by species were conducted in 2017 and 2018. Downy brome, perennial grass and forb biomass was also collected in 2017 and 2018. In 2017 the City of Louisville Open Space posted signage next to the studies to provide educational information to recreational users of the property and adjacent homeowners. Downy brome, perennial grass, and forb biomass were harvested from 2074 to 2019 using randomly placed 1 m^2 quadrats in each plot; quadrats were not placed in the same location in subsequent years. Biomass was converted to dry weight after collection. Percent cover estimates of all species were determined by conducting visual evaluations across each entire plot (18 m^2 plot area) in July 2017, 2018 and 2019. This study was designed to be conducted for 2-3 years with the last evaluations occurring in 2019.

Davidson Downy Brome/Common Mullein Protocol (1 Site- 1 Application Timing)

Trt No.	Treatment	Rate	Rate Unit	Volume/Plot	Growth
1	Esplanade	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
2	Plateau	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
3	Method	8	OZ/A	0.06 oz	December 2016
	Esplanade	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
4	Method	8	OZ/A	0.06 oz	December 2016
	Plateau	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
5	Tordon	1	QT/A	0.22 oz	December 2016
	Esplanade	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016

	NIS	0.25	% V/V		December 2016
6	Tordon	1	QT/A	0.22 oz	December 2016
	Plateau	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
7	Opensight	2.5	OZ/A	0.49 g	December 2016
	Esplanade	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
8	Opensight	2.5	OZ/A	0.49 g	December 2016
	Plateau	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
9	Method	8	OZ/A	0.06 oz	December 2016
	Telar	1	OZ/A	0.19 g	December 2016
	Esplanade	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
10	Method	8	OZ/A	0.06 oz	December 2016
	Telar	1	OZ/A	0.19 g	December 2016
	Plateau	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
11	Tordon	1	Qt/A	0.22 oz	December 2016
	Telar	1	OZ/A	0.19 g	December 2016
	Esplanade	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
12	Tordon	1	Qt/A	0.22 oz	December 2016
	Telar	1	OZ/A	0.19 g	December 2016
	Plateau	7	OZ/A	0.05 oz	December 2016
	Accord XRT II	24	OZ/A	0.17 oz	December 2016
	NIS	0.25	% V/V		December 2016
13	Untreated				December 2016

******Aminocyclopyrachlor (Method, Bayer CropScience)
Indaziflam (Esplanade, Bayer CropScience)
Picloram (Tordon, Dow AgroSciences)
Imazapic (Plateau, BASF)
Chlorsulfuron (Telar, Bayer CropScience)
Glyphosate (Accord XRTII, Dow AgroSciences)
Aminopyralid + Metsulfuron (Opensight, Dow AgroSciences)
Non-ionic Surfactant (NIS)

2) Long-term Control of Downy Brome with Esplanade

In 2016-2017 we conducted a study to test the hypothesis that the herbicide Esplanade would provide longer residual downy brome control without injury to the native plant community compared to Plateau. One site is located on Davidson Mesa Open Space and two sites are located on Aquarius Open Space. The Davidson Mesa site has a dense stand of downy brome (approximately 50% cover) with a diverse native perennial grass, forb and shrub understory. The Aquarius sites have a denser stand of downy brome (approximately 70-80% cover) with a native perennial grass and forb understory. Feral rye (*Secale cereale*), Western salsify (*Tragopogon*

dubius) and field bindweed (*Convolvulus arvensis*) were also present at the Aquarius sites. Within these study sites we also evaluated herbicide treatment effects on desirable grass and forb species. Treatments were applied to 10 x 30 ft plots with four replications for each treatment, arranged in a randomized complete block design. Eight herbicide treatments were applied before (PRE) and after (POST) downy brome emergence in December 2016 and March 2017. Due to the limited moisture in fall 2016, very few germinated downy brome seedlings were observed in the December timing. For this reason, the treatment was conducted as a pre-emergent timing and glyphosate was not added to control any germinated seedlings. Perennial grasses and forbs were dormant at the time of application. In March 2016 cool season grasses were coming out of dormancy so although downy brome had begun to germinate, glyphosate was not added to the treatments to avoid injury to the native species. All treatments were applied with a CO_2 pressurized backpack sprayer at 207 kPa using 11002LP flat fan nozzles at 187 $L \cdot ha^{-1}$. Percent cover estimates of perennial grass and forbs were determined by conducting visual evaluations across each entire plot (18 m^2 plot area) in July 2017 at all three sites. In winter 2017, a prescribed burn was conducted at Aquarius Open Space and included burning through the study sites, therefore in 2018 cover estimates were only collected at the Davidson Mesa site. In 2019, cover estimates were again collected at all three sites. Downy brome, perennial grass and forb biomass was also collected from the Davidson Mesa study site in July 2018 and 2019. This study was designed to be conducted for 2-3 years and one more year of evaluations will be collected in 2019.

Davidson Mesa Downy Brome Protocol (2 Application Timings)

Trt No.	Treatment	Rate	Rate Unit	Volume/Plot	Growth
1	Esplanade NIS	3.5 0.25	OZ/A % V/V	0.02 oz	December 2016 December 2016
2	Esplanade NIS	5 0.25	OZ/A % V/V	0.03 oz	December 2016 December 2016
3	Esplanade NIS	7 0.25	OZ/A % V/V	0.05 oz	December 2016 December 2016
4	Plateau Accord XRT II NIS	7 24 0.25	OZ/A OZ/A % V/V	0.05 oz 0.17 oz	December 2016 December 2016 December 2016
5	Esplanade NIS	3.5 0.25	OZ/A % V/V	0.02 oz	March 2017 March 2017
6	Esplanade NIS	5 0.25	OZ/A % V/V	0.03 oz	March 2017 March 2017
7	Esplanade NIS	7 0.25	OZ/A % V/V	0.05 oz	March 2017 March 2017
8	Plateau NIS	7 0.25	OZ/A % V/V	0.05 oz	March 2017 March 2017
9	Non-treated				

Statistical Analysis

To test the effect of herbicide treatment on percent cover estimates and biomass all data were subjected to analysis of variance and treatment means separated using Fisher's LSD. All response variables (weed, grass, and forb cover estimates, and downy brome, perennial grass and forb biomass) were evaluated for significant main effects by performing an analysis of variance

in ARM (Agricultural Research Management software by Gylling Data Management, Inc.). The factor included in the model statement was treatment. Transformations were performed to meet assumptions of normality. Comparisons between all pairs of least squares means were conducted to evaluate treatment effects.

Davidson Mesa Open Space Sites

Aquarius Open Space Sites

Results:

In the common mullein site, all treatments, had significantly reduced common mullein cover compared to the non-treated check 30 months after treatment (MAT) (Table 1, Figure 1). The Method + Esplanade treatment was omitted due to what appears to be an application error. The Tordon+Esplanade, Method/Telar + Esplanade and Tordon/Telar + Esplanade treatments were providing the best control 30 MAT, with an average of only 0.8% common mullein cover across all three treatments. Overall, treatments including Esplanade, except for Esplanade alone, had significant reductions in common mullein compared to treatments with Plateau (Table 1 and Figure 1). Treatments which included Esplanade also had 0% diffuse knapweed cover, while treatments which included Plateau did not reduce diffuse knapweed cover compared to the control (Table 1). Overall, treatments containing Esplanade had less weed cover compared to treatments without Esplanade (Figure 2). The Esplanade plots did have higher cover of Russian thistle and field bindweed compared to the other treatments. Downy brome seemed to outcompete Russian thistle and field bindweeds in treatment that lacked downy brome control (Figure 2).

Evaluating perennial grass response at the Davidson Mesa common mullein site, there were significant increases in perennial grass biomass in the Tordon+Esplanade and Tordon/Telar+Esplanade compared to the non-treated check (Table 2 and Figure 3). Treatments without Esplanade did not have any increases in perennial grass. There were no significant differences in forb biomass, although forbs are inconsistently dispersed throughout the site. In the initial application season, all treatments except for Esplanade alone provided downy brome control, but by 30 MAT only treatments which included Esplanade continued to provide downy brome control (Table 1 and Figure 2).

Downy brome, perennial grass and forb biomass were collected at the Davidson Mesa downy brome site. Initially, in the season following application (2017), Plateau was the only treatment to significantly control downy brome at both timings. In the assessment done 30 MAT, Esplanade treatments at 5 and 7 oz/A, along with the 3.5 oz/A rate at the late POST timing, had no downy brome present in the plots, while the Plateau treatments at both timings were no longer providing downy brome control (Figure 4). There were some increases in perennial grass and forb biomass among a few of the Esplanade treatments, especially treatments applied at the late POST timing (Figure 5).

Downy brome, perennial grass, and forb cover was evaluated at the Aquarius Trailhead and Hillside sites in 2019. Diffuse knapweed cover was also evaluated at the Trailhead site. These sites were burned approximately 10 months after the early POST herbicide applications and 8 months after the late POST herbicide applications. Even with the burning, Esplanade at 5 and 7 oz/A were still providing excellent downy brome control, with cover averaging <1% among both treatments at the two sites (Tables 3 and 4, Figure 6). At the Aquarius Trailhead site, significant increases in perennial grass cover were observed in most of the treatments that were providing significant reductions in downy brome cover, while no increases in grass cover were observed in treatments that did not reduce downy brome cover (Table 3). Furthermore, all Esplanade treatments that provided significant reductions in downy brome cover also provided significant reductions in diffuse knapweed at the Trailhead site (Table 3). At the Aquarius Hillside site, there was less downy brome invasion, dense perennial grass and no forbs present. Perennial grass cover was not impacted at this site (Table 4).

Description Rating Type Rating Unit		Common mullein Cover %	Diffuse Cover %	Downy brome Cover %
Trt Treatment	Rate			
1 Non-treated		40.0a	5.6ab	46.6a
2 Esplanade	7oz/a	13.8bcd	0.0c	0.4c
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
3 Plateau	7oz/a	25.0b	1.8abc	46.2a
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
5 METHOD 240SL	8oz/a	22.5b	4.7ab	58.8a
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
6 Tordon	1qt/a	0.0d	0.0c	0.6bc
Esplanade	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
7 Tordon	1qt/a	17.0bc	2.2abc	49.6a
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
8 Opensight	2.5oz/a	3.0cd	0.0c	3.4b
Esplanade	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
9 Opensight	2.5oz/a	18.8b	0.8bc	53.5a
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
10 METHOD 240SL	8oz/a	0.0d	0.0c	0.3c
Telar	1oz/a			
Esplanade	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
11 METHOD 240SL	8oz/a	20.0b	7.2a	67.2a
Telar	1oz/a			
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
12 Tordon	1qt/a	0.0d	0.3c	1.0bc
Telar	1oz/a			
Esplanade	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
13 Tordon	1qt/a	14.3bc	1.3abc	40.9a
Telar	1oz/a			
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
LSD P=.05		14.02	4.32 - 6.30	2.76 - 46.17
Standard Deviation		9.75	0.44t	0.34t
CV		62.79	131.06t	32.12t

Table 1: Least significant difference of means table for common mullein, diffuse knapweed, and downy brome cover at the Davidson Mesa common mullein site. Means followed by same letter or symbol do not significantly differ (P=0.05, LSD). Mean descriptions are reported in transformed data units for difuse knapweed and downy brome, and are not de-transformed.

Description Rating Unit		Downy brome lb/ac	Perennial Grass lb/ac	Forbs lb/ac
No. Treatment	Rate Unit			
1Non-treated		224.94052ab	687.55367cd	129.5630ab
2Esplanade	7oz/a	0.00000c	1042.30210a-d	192.0030ab
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
3Plateau	7oz/a	91.14147bc	961.84370bcd	82.7330ab
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
5METHOD 240SL	8oz/a	240.05849ab	778.98368cd	318.4440ab
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
6Tordon	1qt/a	0.00000c	1589.05356ab	93.6600ab
Esplanade	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
7Tordon	1qt/a	285.65816ab	1066.07391a-d	46.8300b
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
8Opensight	2.5oz/a	0.00000c	1312.93493abc	159.2220ab
Esplanade	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
9Opensight	2.5oz/a	575.33564a	634.52426cd	449.5680a
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
10METHOD 240SL	8oz/a	0.00000c	1230.64792a-d	341.8590ab
Telar	1oz/a			
Esplanade	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
11METHOD 240SL	8oz/a	295.51374ab	599.78086d	154.5390ab
Telar	1oz/a			
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
12Tordon	1qt/a	51.53969bc	1696.94097a	81.1720ab
Telar	1oz/a			
Esplanade	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
13Tordon	1qt/a	217.91033ab	1011.21590a-d	88.9770ab
Telar	1oz/a			
Plateau	7oz/a			
ACCORD XRT II	24oz/a			
Induce (NIS)	0.25% v/v			
LSD P=.05		296.007593 - 441.119316	712.875203	383.44419
Standard Deviation		8.639580t	497.096180	267.38010
CV		87.21t	47.36	156.81

Table 2: Least significant difference of means table for perennial grass and forb biomass at the Davidson Mesa common mullain site. Means followed by same letter or symbol do not significantly differ (P=0.05, LSD).

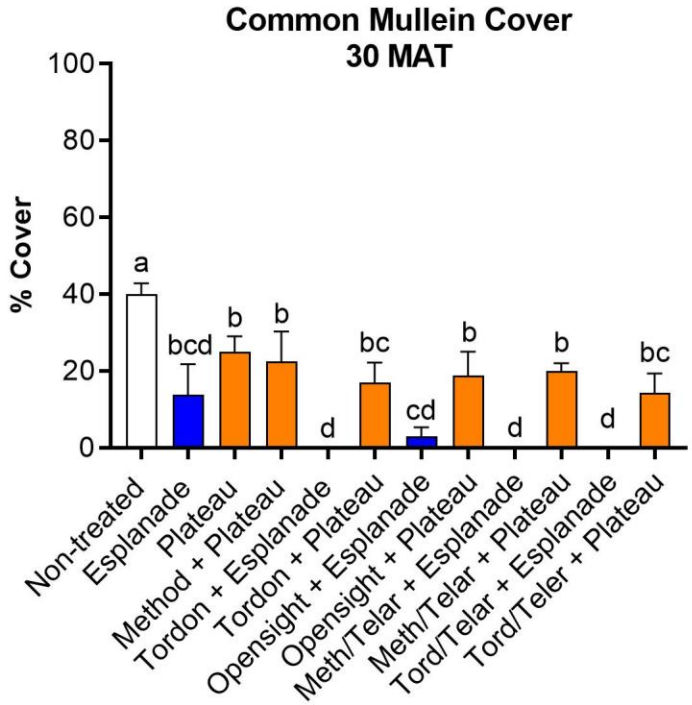

Figure 1: Percent common mullein cover at Davidson Mesa site 30 months after treatment (MAT). Application timing POST, mullein rosettes in overwintering stage. Letters indicate differences among herbicide treatments using least squares means ($P < 0.05$).

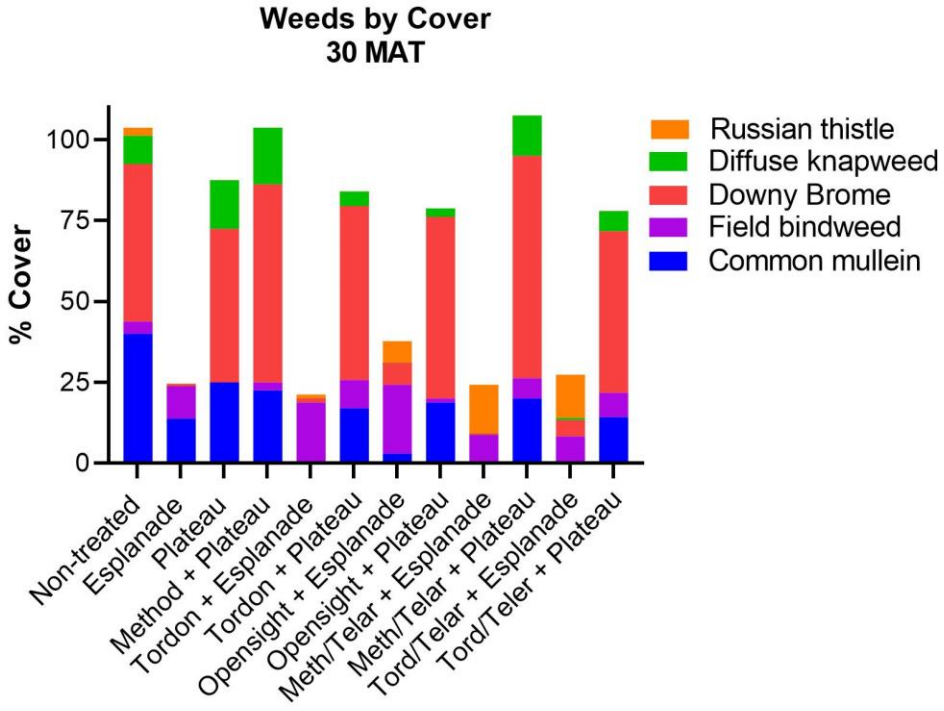

Figure 2: Percent cover by weed species at Davidson Mesa common mullein site 30 months after treatment (MAT).

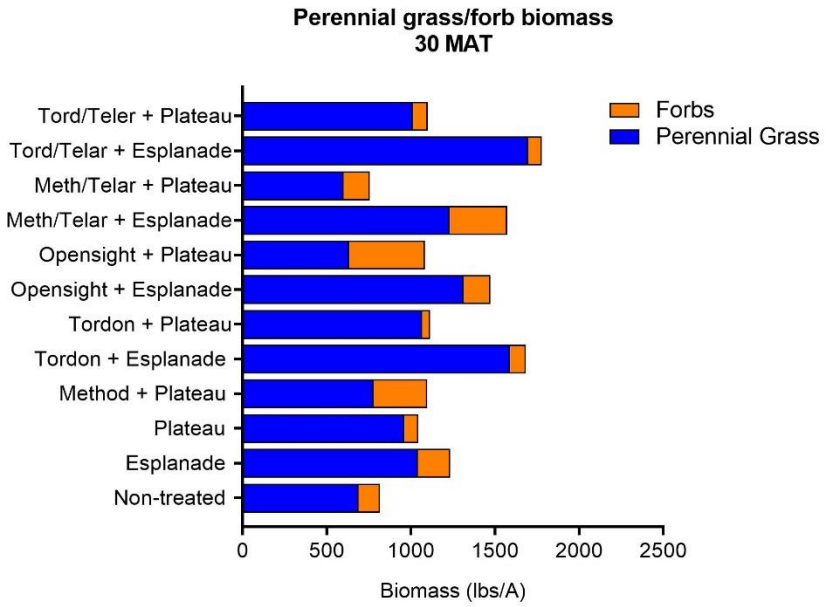

Figure 3: Biomass (lbs/A) of perennial grass and forbs at Davidson Mesa mullein site 30 months after treatment (MAT).

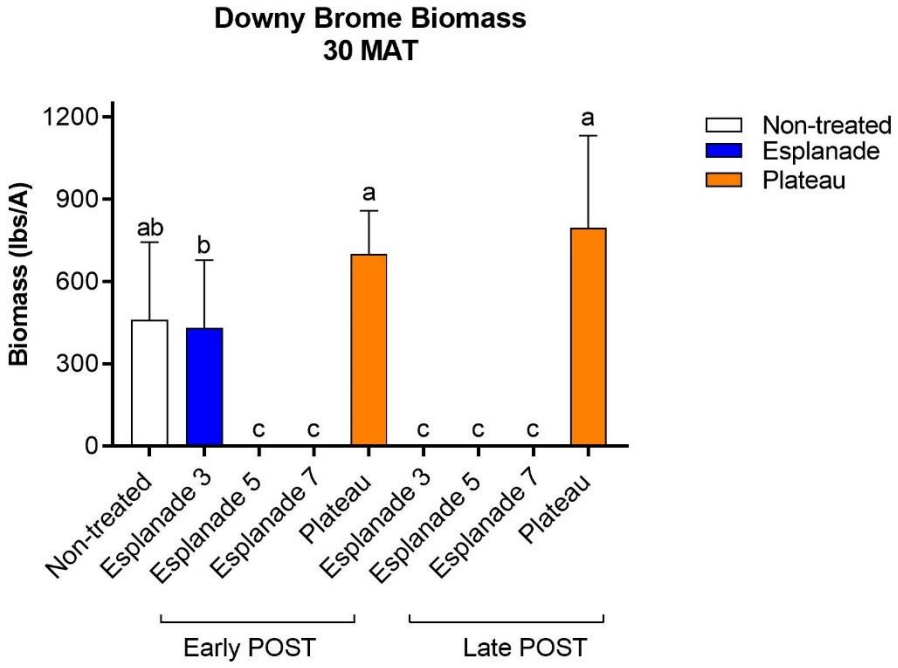

Figure 4: Biomass (lbs/A) of downy brome at Davidson Mesa Downy Brome Study 30 months after treatment (MAT). Application timings Early POST (December 2016) and Late POST (March 2017). Early POST timing- little downy brome germination, Late POST timing- downy brome at the one-tiller stage. Letters indicate differences among herbicide treatments using least squares means ($P < 0.05$).

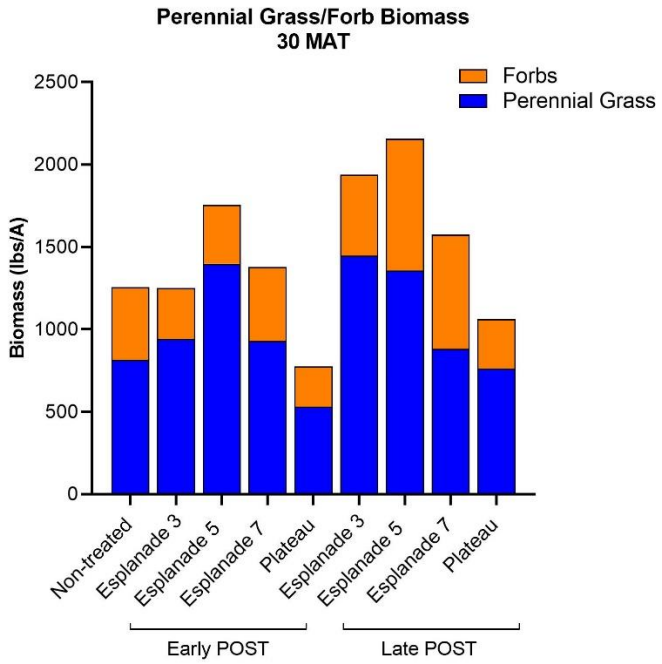

Figure 5: Perennial grass and forb biomass at Davidson Mesa Downy Brome Study compared with the non-treated check 30 months after treatment (MAT). Application timings Early POST (December 2016) and Late POST (March 2017). Early POST timing- little downy brome germination, Late POST timing- downy brome at the one-tiller stage.

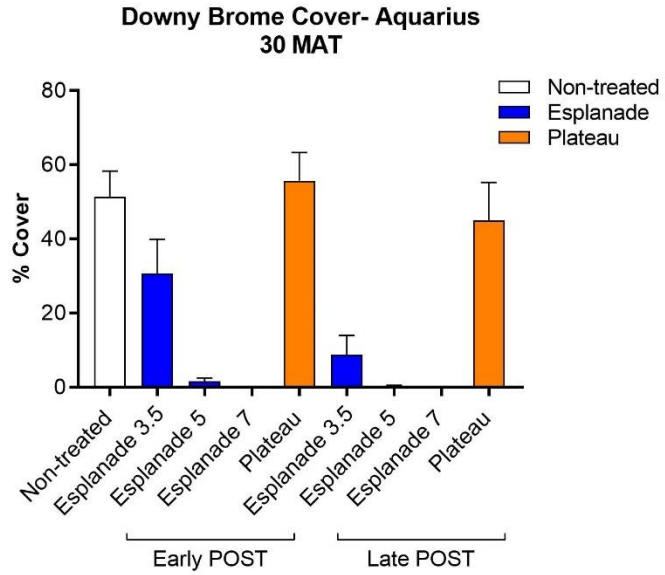

Figure 6: Percent downy brome cover at Aquarius Trailhead and Aquarius Hillside sites combined, 30 months after treatment (MAT) and 20 months post burn. Application timings Early POST (December 2016) and Late POST (March 2017). Early POST timing- little downy brome germination, Late POST timing- downy brome at the one-tiller stage.

Description Rating Type Rating Unit			Downy brome Cover %	Perennial grass Cover %	Forbs Cover %	Diffuse knapweed Cover %
Trt Treatment	Rate	Appl				
1non-treated			60.0a	33.3b	7.0ab	27.5a
2Esplanade	3.5oz/a	DEC POST	44.7a	52.1ab	7.1ab	16.3ab
ACCORD XRT II	12oz/a	DEC POST				
Induce (NIS)	0.25% v/v	DEC POST				
3Esplanade	5oz/a	DEC POST	2.2bc	67.4a	20.8a	1.5b
ACCORD XRT II	12oz/a	DEC POST				
Induce (NIS)	0.25% v/v	DEC POST				
4Esplanade	7oz/a	DEC POST	0.0c	67.6a	7.9ab	0.0b
ACCORD XRT II	12oz/a	DEC POST				
Induce (NIS)	0.25% v/v	DEC POST				
5Plateau	7oz/a	DEC POST	65.2a	41.5ab	8.5ab	6.3ab
ACCORD XRT II	12oz/a	DEC POST				
Induce (NIS)	0.25% v/v	DEC POST				
6Esplanade	3.5oz/a	MARCH POST	6.5b	66.9a	10.2ab	1.8b
ACCORD XRT II	12oz/a	MARCH POST				
Induce (NIS)	0.25% v/v	MARCH POST				
7Esplanade	5oz/a	MARCH POST	0.4bc	60.6a	15.8ab	0.0b
ACCORD XRT II	12oz/a	MARCH POST				
Induce (NIS)	0.25% v/v	MARCH POST				
8Esplanade	7oz/a	MARCH POST	0.0c	57.9ab	4.8b	0.0b
ACCORD XRT II	12oz/a	MARCH POST				
Induce (NIS)	0.25% v/v	MARCH POST				
9Plateau	7oz/a	MARCH POST	61.5a	41.6ab	8.8ab	11.3ab
ACCORD XRT II	12oz/a	MARCH POST				
Induce (NIS)	0.25% v/v	MARCH POST				
LSD P=.05			6.55 - 25.89	25.87 - 29.46	12.92 - 15.08	21.37
Standard Deviation			1.23t	0.17t	0.35t	14.64
CV			29.85t	9.65t	34.52t	204.32

Table 3: Least significant difference of means table for downy brome, perennial grass, forb and diffuse knapweed cover at the Aquarius Trailhead downy brome site. Means followed by same letter or symbol do not significantly differ (P=0.05, LSD). Mean descriptions are reported in transformed data units, and are not de-transformed.

Description Rating Type Rating Unit				Downy brome Cover %	Perennial grass Cover %
Trt	Treatment	Rate	Appl		
1	non-treated			38.3ab	70.0bc
2	Esplanade	3.5oz/a	DEC POST	6.9cd	75.0abc
	ACCORD XRT II	12oz/a	DEC POST		
	Induce (NIS)	0.25% v/v	DEC POST		
3	Esplanade	5oz/a	DEC POST	0.0e	80.0a
	ACCORD XRT II	12oz/a	DEC POST		
	Induce (NIS)	0.25% v/v	DEC POST		
4	Esplanade	7oz/a	DEC POST	0.0e	75.0abc
	ACCORD XRT II	12oz/a	DEC POST		
	Induce (NIS)	0.25% v/v	DEC POST		
5	Plateau	7oz/a	DEC POST	41.6a	68.3c
	ACCORD XRT II	12oz/a	DEC POST		
	Induce (NIS)	0.25% v/v	DEC POST		
6	Esplanade	3.5oz/a	MARCH POST	2.4de	75.0abc
	ACCORD XRT II	12oz/a	MARCH POST		
	Induce (NIS)	0.25% v/v	MARCH POST		
7	Esplanade	5oz/a	MARCH POST	0.0e	78.3ab
	ACCORD XRT II	12oz/a	MARCH POST		
	Induce (NIS)	0.25% v/v	MARCH POST		
8	Esplanade	7oz/a	MARCH POST	0.0e	75.0abc
	ACCORD XRT II	12oz/a	MARCH POST		
	Induce (NIS)	0.25% v/v	MARCH POST		
9	Plateau	7oz/a	MARCH POST	20.4bc	73.3abc
	ACCORD XRT II	12oz/a	MARCH POST		
	Induce (NIS)	0.25% v/v	MARCH POST		
LSD P=.05				11.85 - 21.17	8.65
Standard Deviation				7.68t	5.00
CV				53.51t	6.72

Table 4: Least significant difference of means table for downy brome and perennial grass cover at the Aquarius Hillside downy brome site. Means followed by same letter or symbol do not significantly differ (P=0.05, LSD). Mean descriptions are reported in transformed data units, and are not de-transformed.

Discussion

By the third year of the study we started to see clear differences in treatments which included Esplanade versus treatments without. All treatments continued to provide common mullein control, although we started to see a difference in the level of control, with <1% cover in the treatments that included Esplanade combined with a post-emergent mullein herbicide. Treatments including Esplanade provided significantly better control than treatments that included Plateau in place of Esplanade. Treatments containing Esplanade also had less overall weed cover and several had more perennial grass. This year, significant reductions in diffuse knapweed cover with Esplanade treatments were also observed at two of our study sites. Past greenhouse studies conducted at CSU and a field study conducted at Mayhoffer Open Space in Boulder County (Clark et al. 2019a, Sebastian et al. 2017) have shown that Esplanade is more active in controlling germinating broadleaf weed seeds than other broadleaf herbicides with soil residual (i.e. Method, Tordon, Milestone). Since Esplanade is a pre-emergent herbicide, the additional weed control being provided at the sites is due to preventing emergence of weed seeds from the soil seed bank. Although initial weed control was achieved by the post-emergent products, Esplanade continues to provide soil residual control while Plateau starts to breakdown. Esplanade also does not impact native perennial species (Clark et al. 2019b) and provides long-term downy brome control, therefore allowing enough time to re-establishm the remnant native

plant community and leading to increases in perennial grass and forb biomass. Although the Davidson Mesa mullein site was highly degraded by weed pressure, there was still a remnant native plant community which responded favorably to treatments. This finding could mean that less intensive management might be adequate to restore some sections Louisville Open Space properties, as the remnant plant community could be released following herbicide treatments. This would prevent the need for costly revegetation work. To note, weed pressure from species such as Russian thistle and field bindweed were increased once the common mullein and downy brome were controlled in the Davidson Mesa site. Continued management of the site for new invasions would be necessary to achieve restoration.

At 30 MAT, Esplanade at 5 and 7 oz/A still had nearly 100% downy brome control at the three brome study sites (Davidson Mesa and Aquarius Open Spaces), while the Plateau treatments had failed at every site. The Esplanade treatments also had a positive effect on the native plant community, as several Esplanade treatments promoted significant increases in perennial grass biomass. In winter 2017 a prescribed burn was conducted at the Aquarius sites, approximately 10 and 8 months after our early POST and late POST herbicide applications, respectively. This is the first study to evaluate Esplanade efficacy with burning after herbicide application. Even with burning after herbicide applications, the response at the Aquarius sites mirrored the Davidson Mesa site, Esplanade at 5 and 7 oz/A were still providing near 100% control 30 MAT. Furthermore, significant control of diffuse knapweed was observed in the Esplanade treatments after burning.

This study has allowed us to provide critical information for the City of Louisville Open Space managers. Managing common mullein and other weeds on city Open Space properties has been challenging for the managers, due to extremely dense weed cover and limited herbicide options for long-term control. Providing only one season of control allows the weeds to quickly reinvade from the soil seed bank without enough time to re-establish the remnant native plant community, which is why long-term options are needed. Based on the results of our study, Esplanade is a viable option for the City of Louisville Open Space to extend the length of both annual grass and annual/biennial broadleaf weed control and release native species. Management should focus first on restoring the Open Space areas with a remnant plant community and then move into areas that will require a more in-depth management plan which will include revegetation.

Conclusion

This study aimed to evaluate differences in the length of common mullein and downy brome control with Esplanade versus Plateau. During the first year of this study we found that herbicide treatments performed similarly in reducing common mullein cover, while Plateau was superior in year one reducing downy brome cover. By year two, common mullein began to return in plots treated with Plateau while treatments which contained Esplanade had over 95% reduction in common mullein cover. Downy brome reinvaded plots treated with Plateau by year two, while Esplanade treatments (5 and 7 oz/A) prevented new germination and provided near 100% control by year two. By year three, common mullein had been reduced <1% cover in the Esplanade treatments, while the mullein had returned in the Plateau treatments. Downy brome control was still near 100% in the Esplanade treatments, while the Plateau treatments were no longer providing control. Additionally, significant reductions in diffuse knapweed were observed at two of the study sites. Our study showed that only treatments with Esplanade provided significant reductions in annual/biennial broadleaf weed and winter annual grass cover. Esplanade

treatments also had a positive impact to the remnant native plant community at all four sites. Our research shows that Esplanade is a viable tool for the City of Louisville Open Space weed managers to manage winter annual grasses and extend the control of several broadleaf weeds. The long-term weed control provided by Esplanade could also assist in the restoration and release of the remnant native plant community.

References

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Clark SL, Sebastian DJ, Nissen SJ, Sebastian JR (2019b) Effects of Indaziflam on Native Species in Natural Areas and Rangeland. Invasive Plant Sci Manag 12:60-67

Sebastian DJ, Nissen SJ, Sebastian JR, Meiman PJ, Beck KG (2017) Preemergence control of nine invasive weeds with aminocyclopyrachlor, aminopyralid, and indaziflam. Invasive Plant Sci Manag 10: 99-109

Evaluating Long-term Weed Control Strategies on City of Louisville Open Space Properties

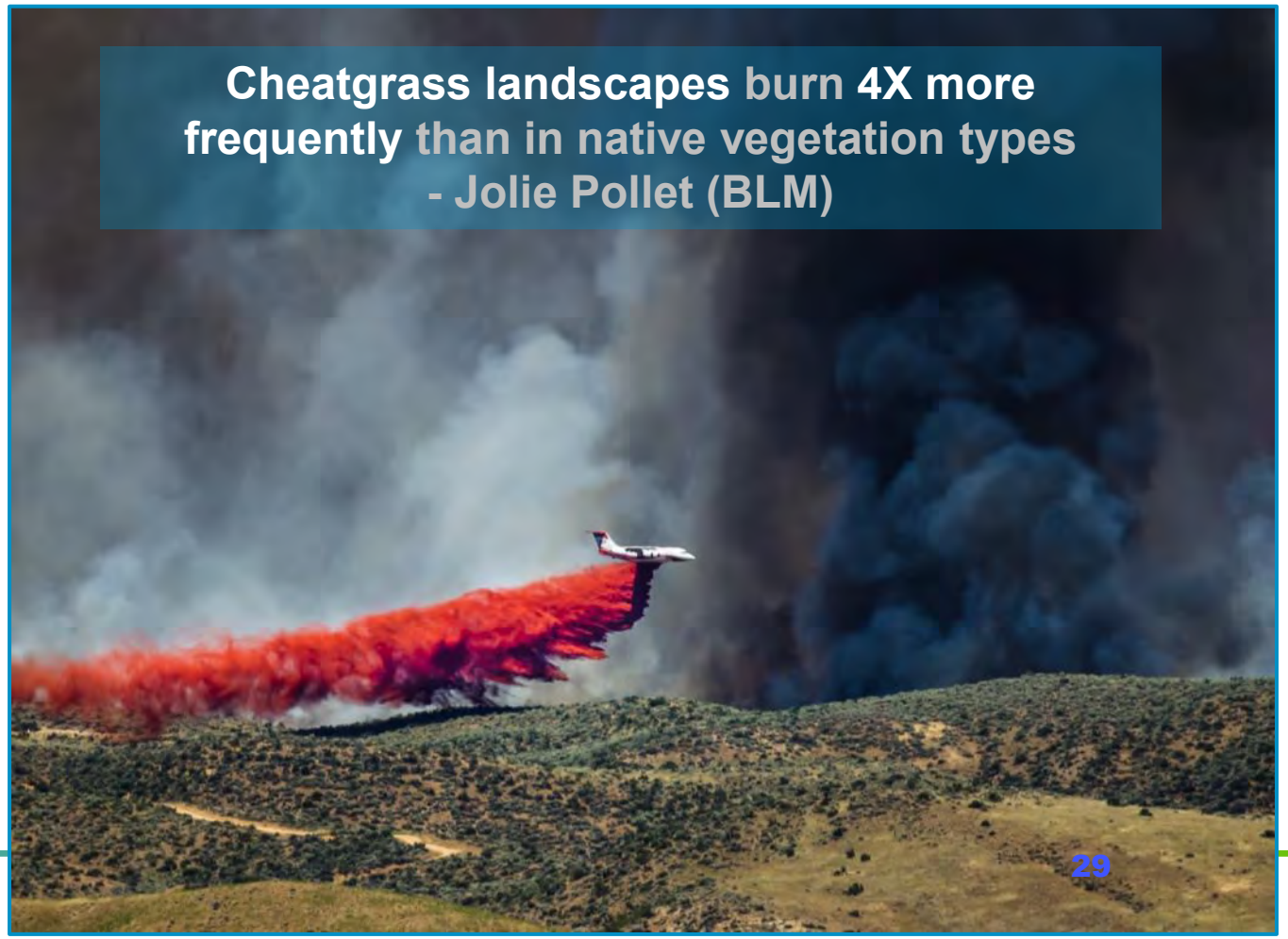
Shannon Clark
Postdoctoral Researcher
Weed Research Lab
Colorado State University

Transforming Western Lands at a Landscape Scale

Increased Wildfire Frequency

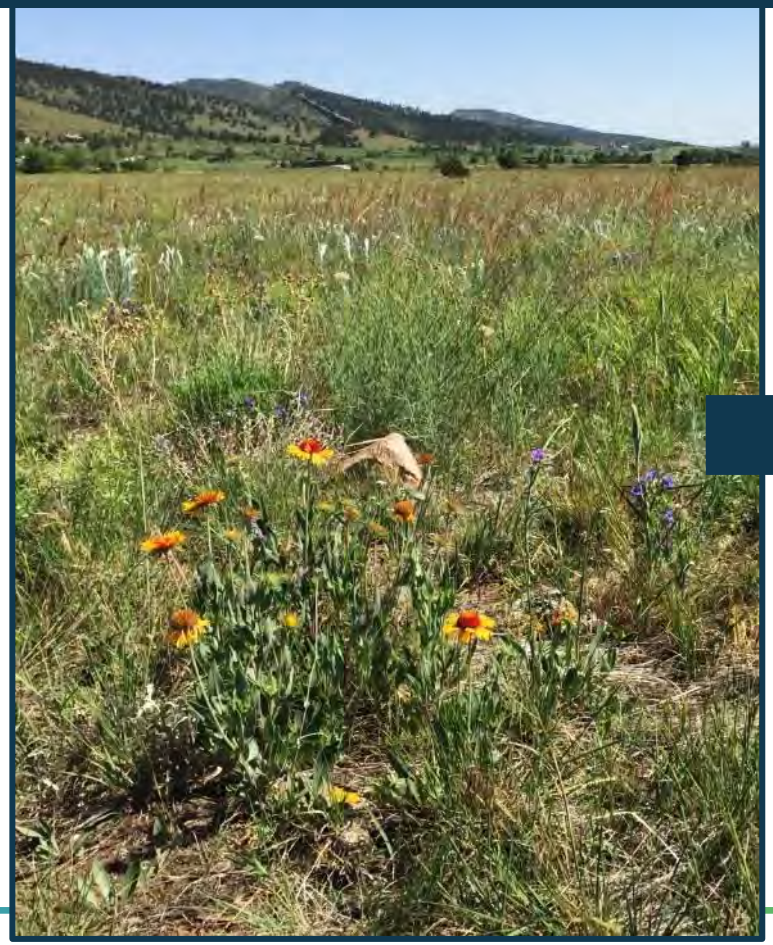
In the last 20 years, 74% of DOI acres burned have been rangelands…80% of the 12 million acres burned have been on cheatgrass invaded rangelands
- Jolie Pollet (BLM)

Cheatgrass landscapes burn 4X more frequently than in native vegetation types
- Jolie Pollet (BLM)



Transforming Western Lands at a Landscape Scale

Decreased Ecosystem Diversity/Productivity



Transforming Western Lands at a Landscape Scale

Displaced and Decreased Wildlife/Pollinator Habitat

Cheatgrass in Nevada

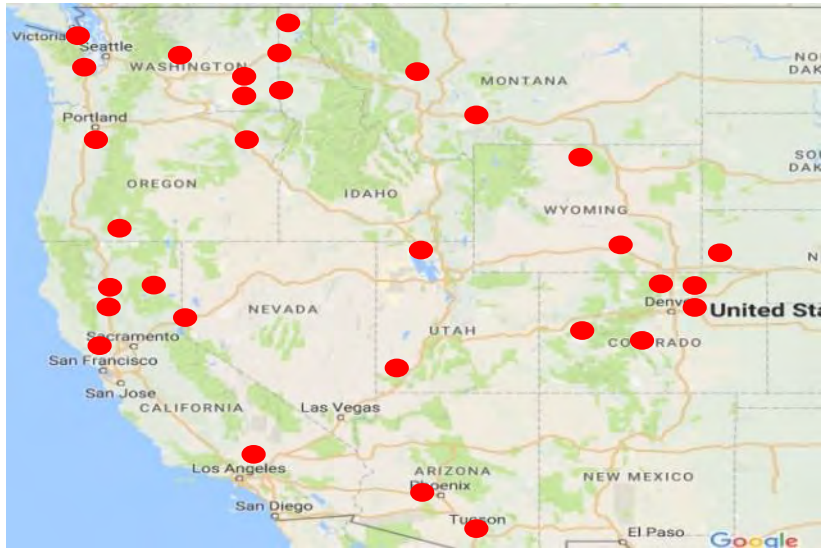
- What we know:
  - Sites are continuing to transition to annual grass monocultures.
  - Past restoration tools (imazapic, glyphosate, burning,...) have been variable and short lived.

- New tools are needed to provide the long-term control to deplete the invasive annual grass soil seed banks (~3 years)!

Evaluating Natural Areas Restoration with Esplanade®

Release or restoration of desirable perennial grasses, forbs, shrubs, and trees

- Since fall 2015, pilot project in Colorado expanded to 12 western states
- Efficacy is documented in over 100 replicated field trials on all major invasive winter annual grasses (downy brome, Japanese brome, jointed goatgrass, feral rye, medusahead, ventenata)
- **For use in non-crop areas <u>such as:</u>**
  - Parks and open space
  - Wildlife management areas
  - Recreational areas
  - Fire rehabilitation areas/ fire breaks
  - Prairies
- Cannot currently treat areas grazed by domestic livestock

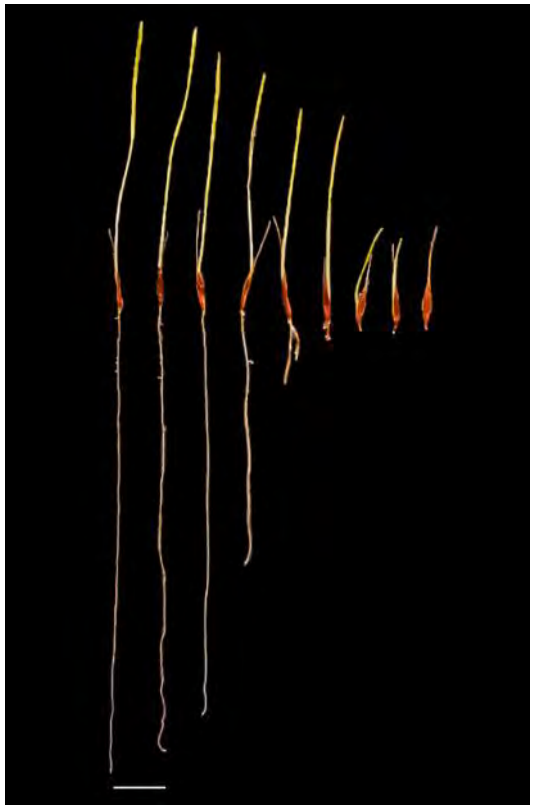


How does Esplanade® 200 SC work?

Cellulose biosynthesis inhibitor (Group 29)

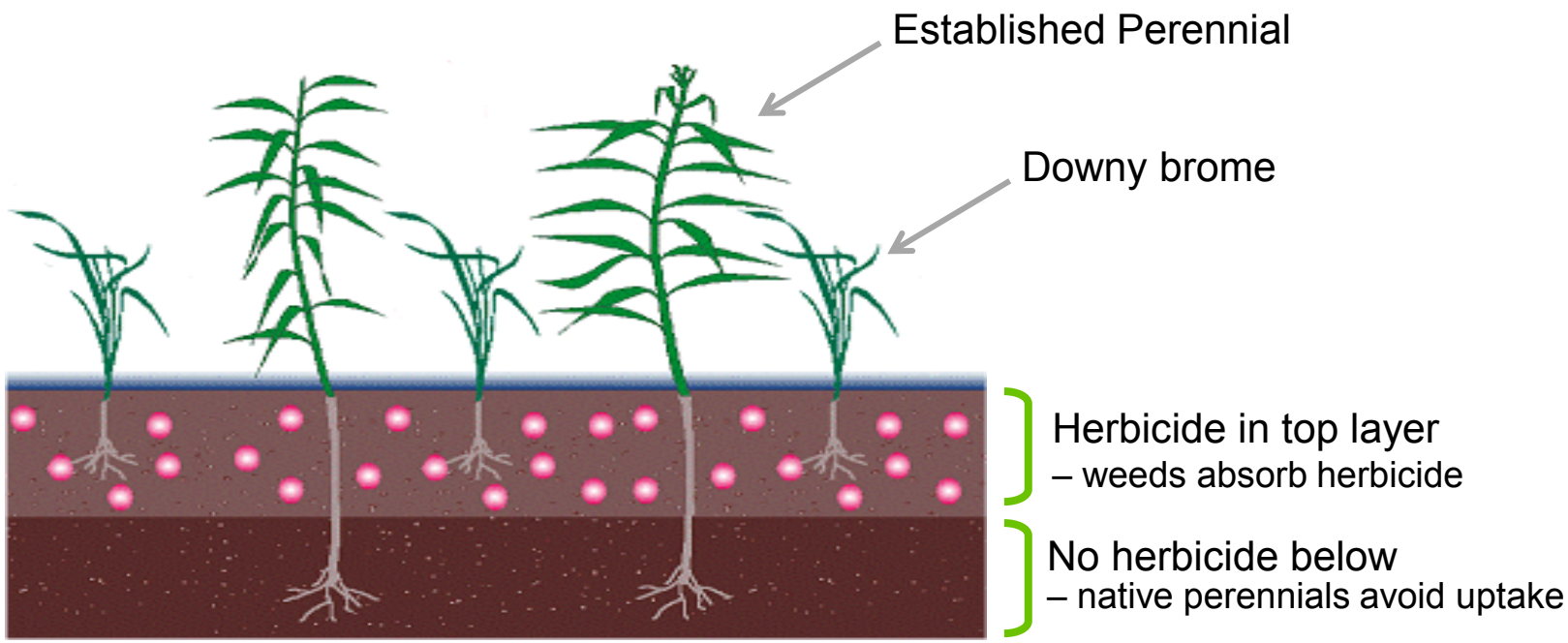
Providing pre-emergence control through root inhibition of emerging seedlings

Downy brome (*Bromus tectorum*)



Increasing Esplanade® 200SC Concentration

Herbicide Selectivity (Safety on Native Perennials)

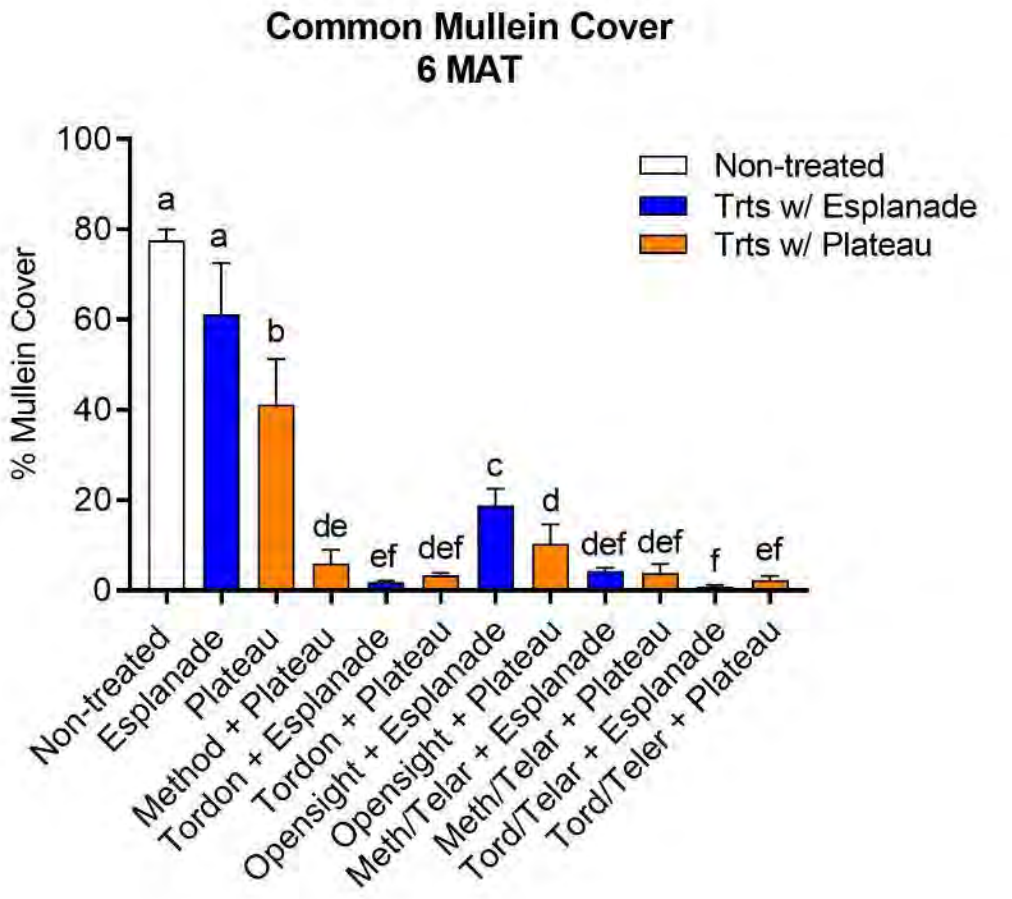


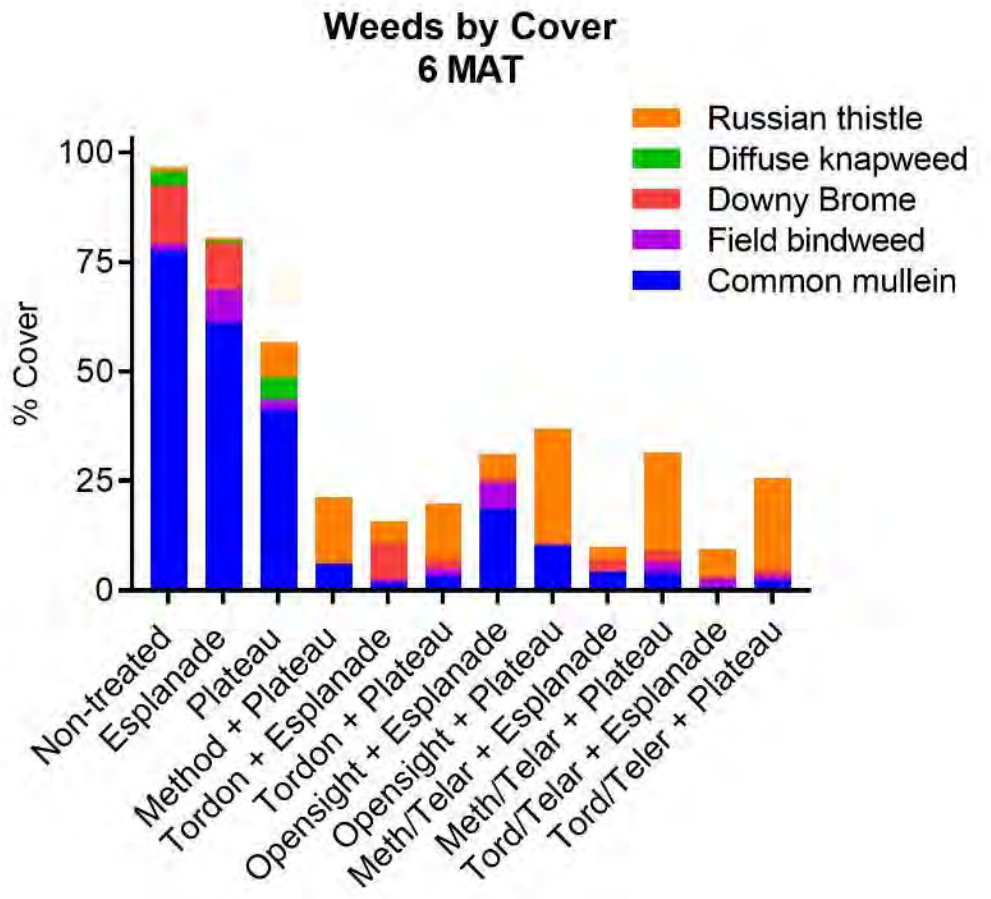
Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes

Davidson Mesa Open Spaces and Natural Areas

- Common mullein, downy brome, Russian thistle, diffuse knapweed
- Early POST application (December 2016)
- Herbicide combinations including Esplanade or Plateau for residual weed seedling control
- Collected biomass and cover estimates 2017-2019

Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes





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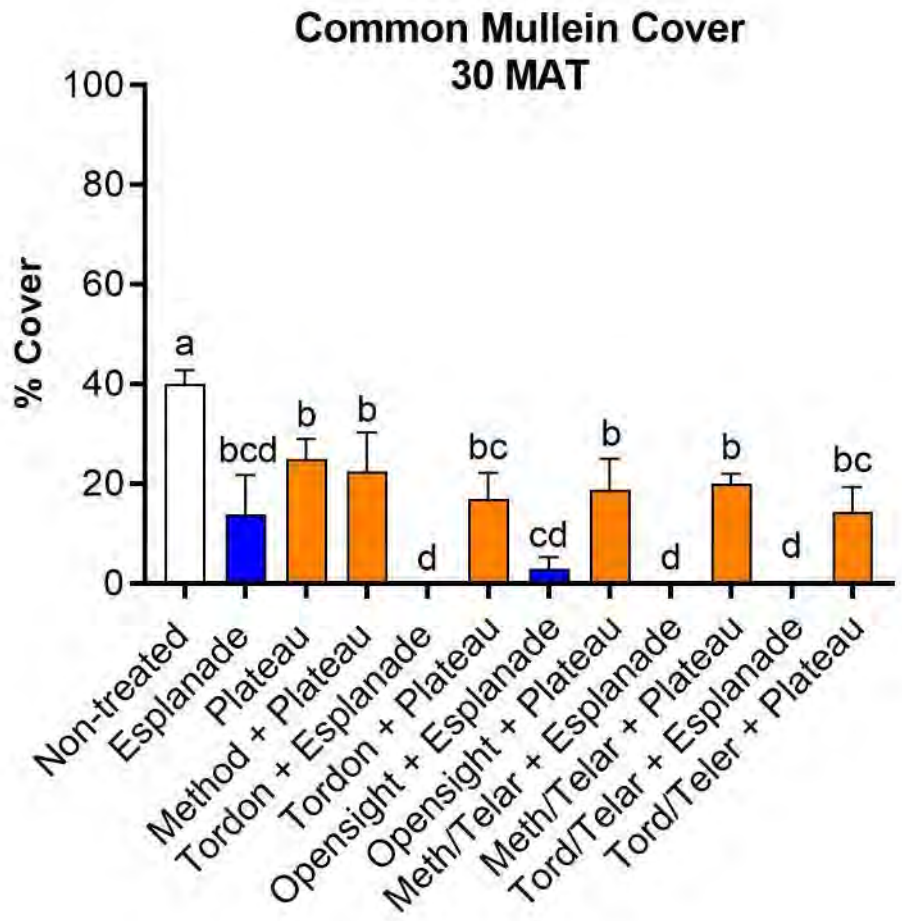

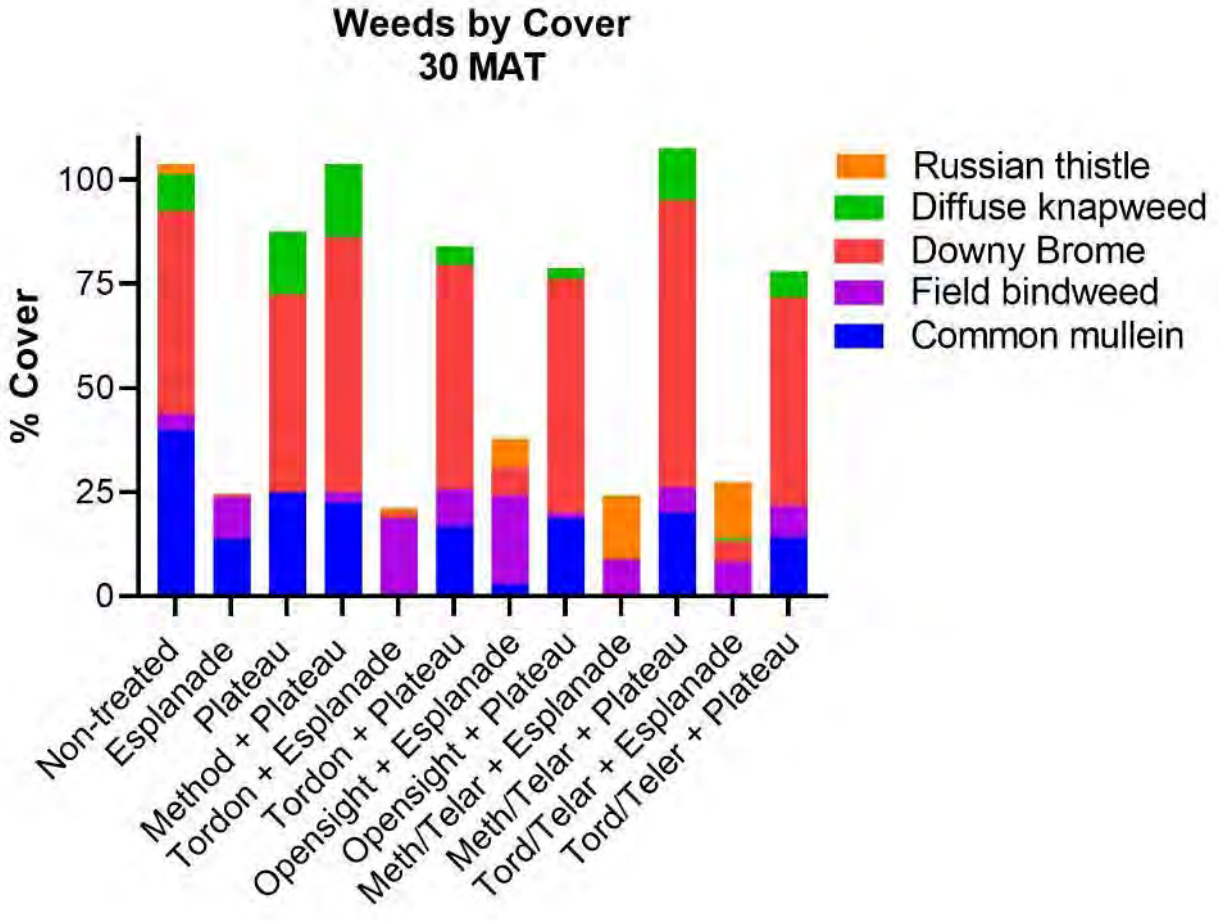

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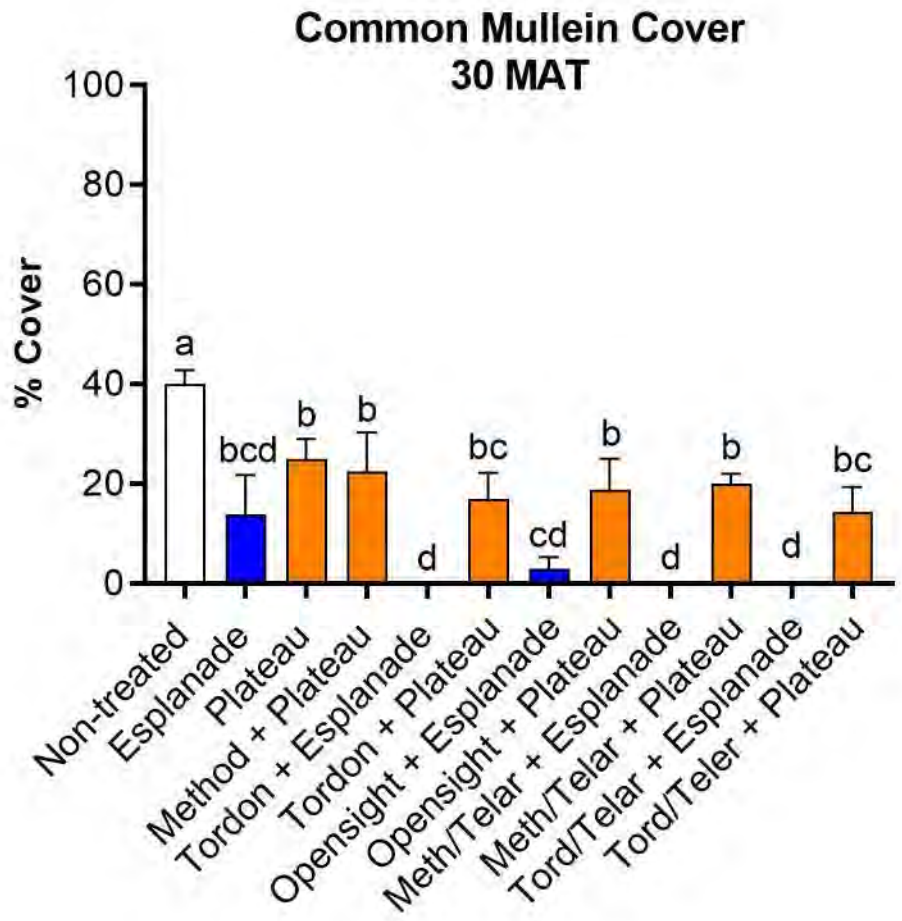

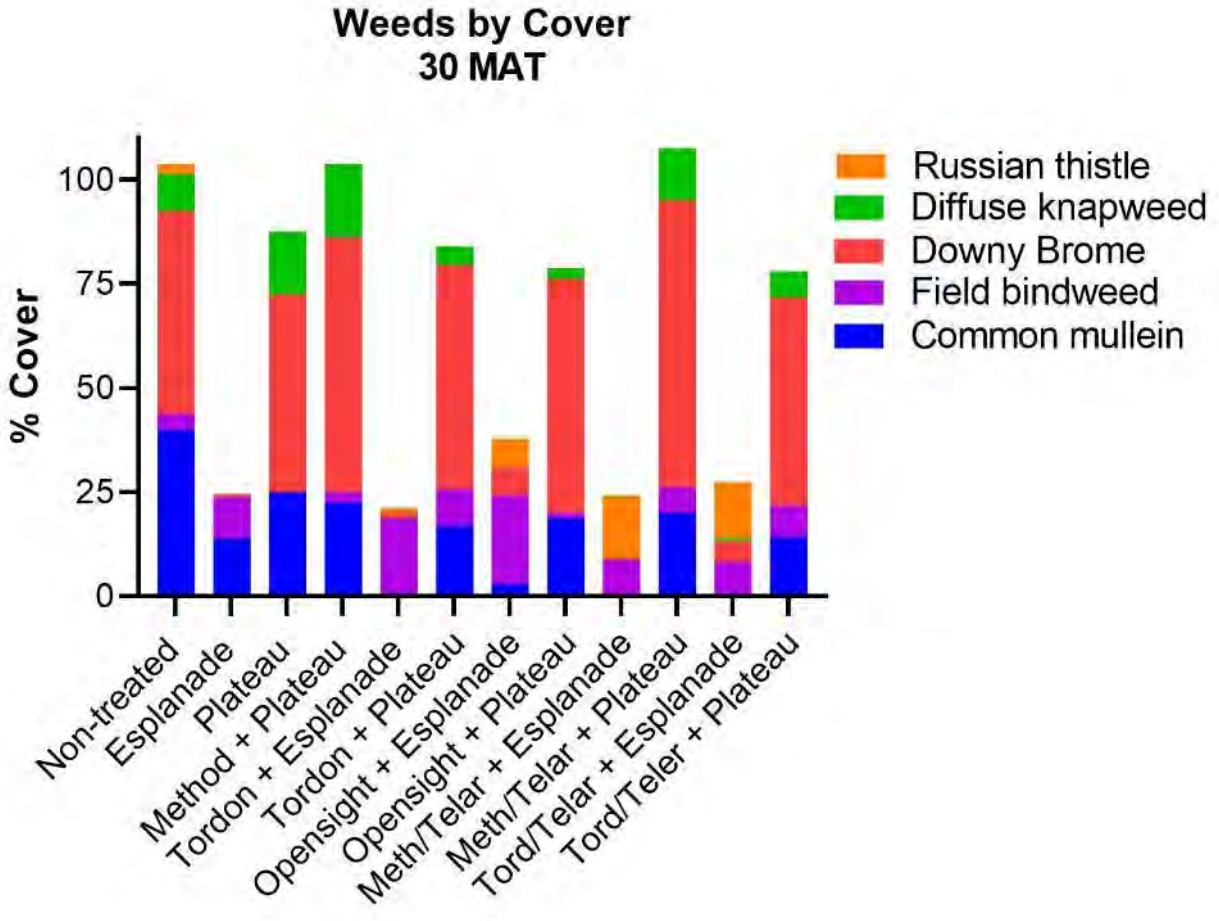

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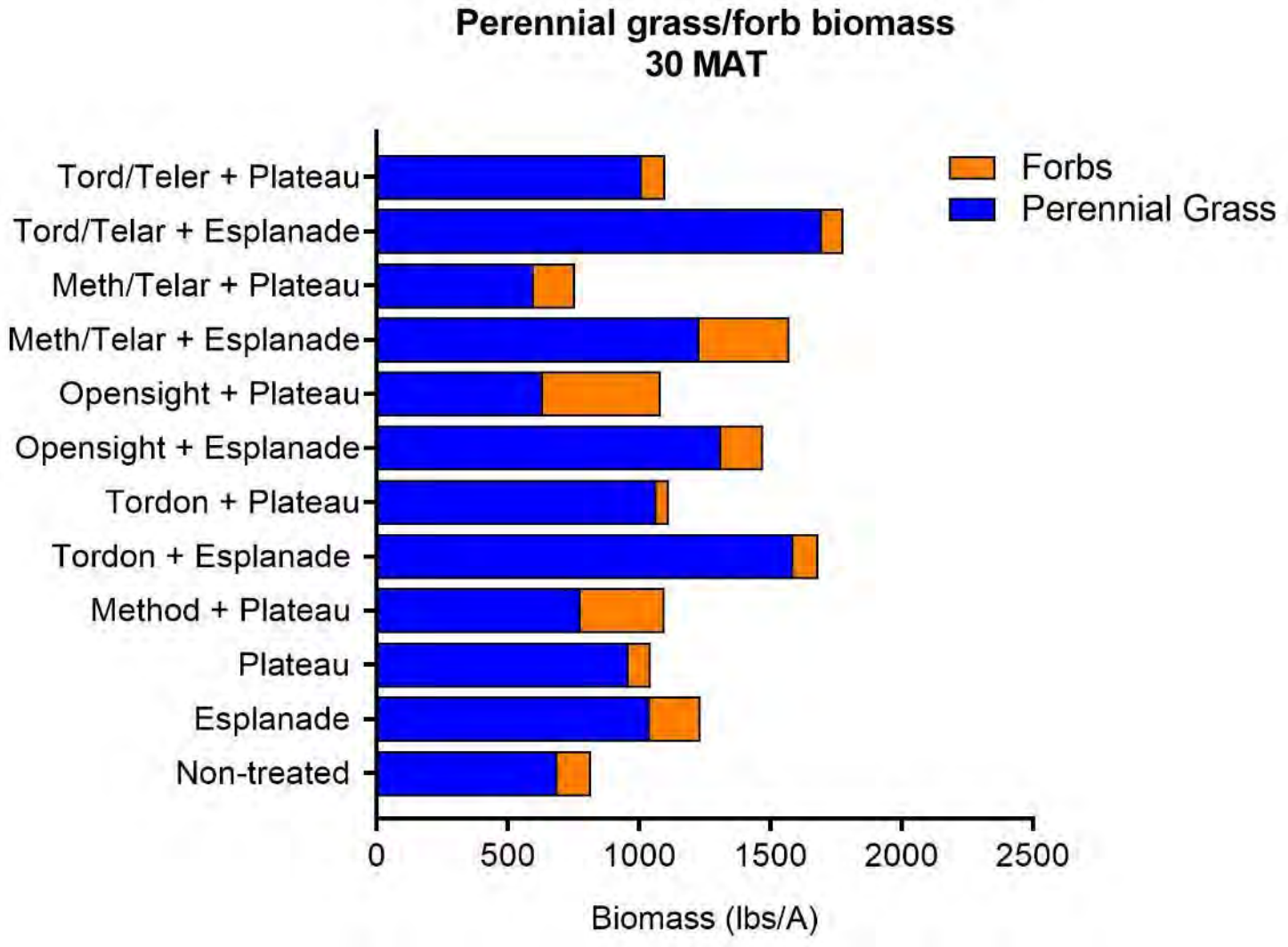

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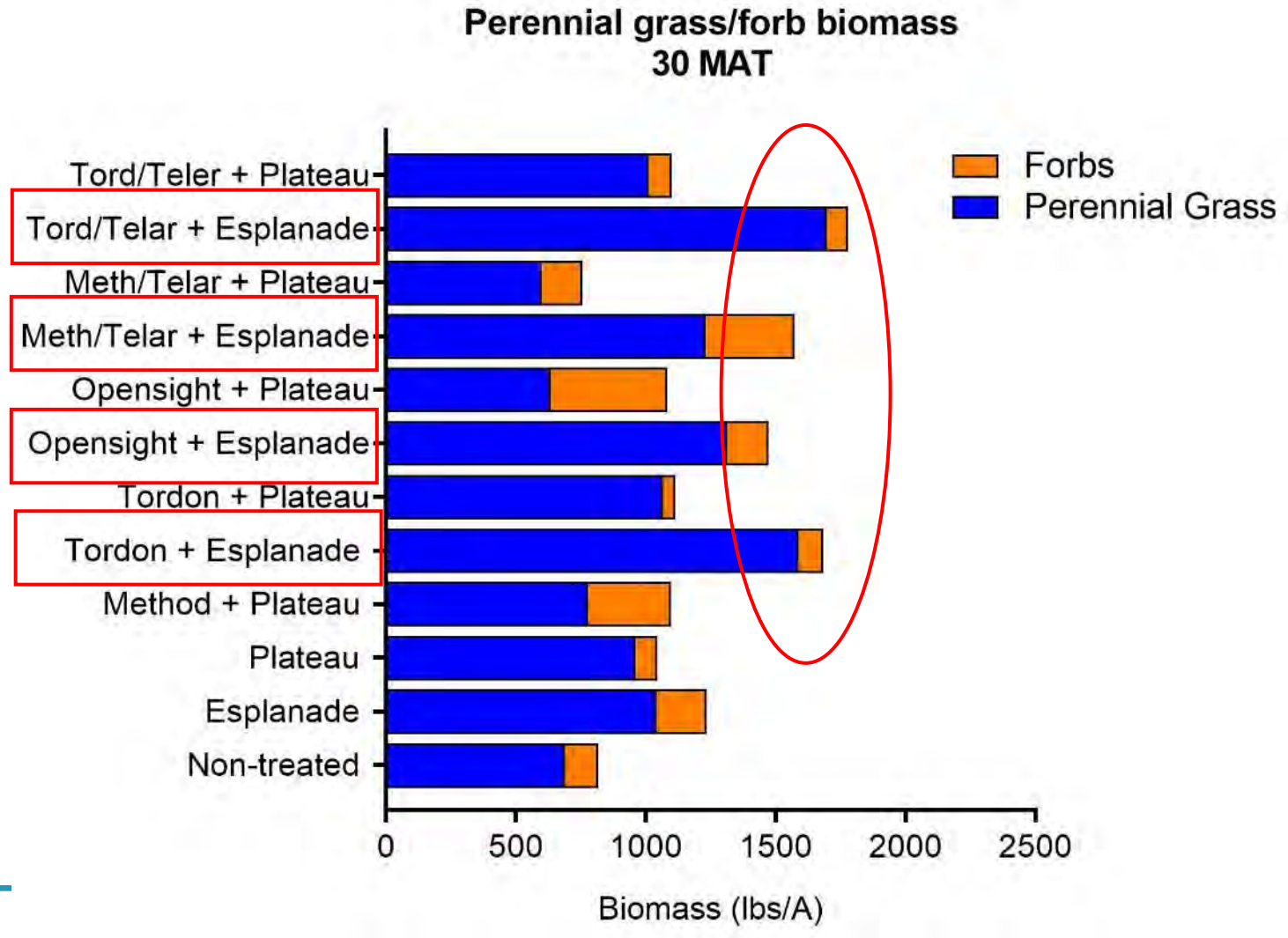


Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes

6 months after treatment

Non-treated

Tordon/Telar
+ Plateau

Tordon/Telar
+ Esplanade

Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes

30 months after treatment

Non-treated

Tordon/Telar
+ Plateau

Tordon/Telar
+ Esplanade

Extending Biennial/Perennial Weed Seedling Control with Esplanade Tank-Mixes

Mayhoffer Open Space- Boulder County

Before Treatment

Method 8 oz/A +
Esplanade 7 oz/A

Extending Biennial/Perennial Weed Seedling Control with Esplanade Tank-Mixes

Colp Open Space- Boulder County

Tordon 32 oz/A + Esplanade 7 oz/A

Tordon 32 oz/A

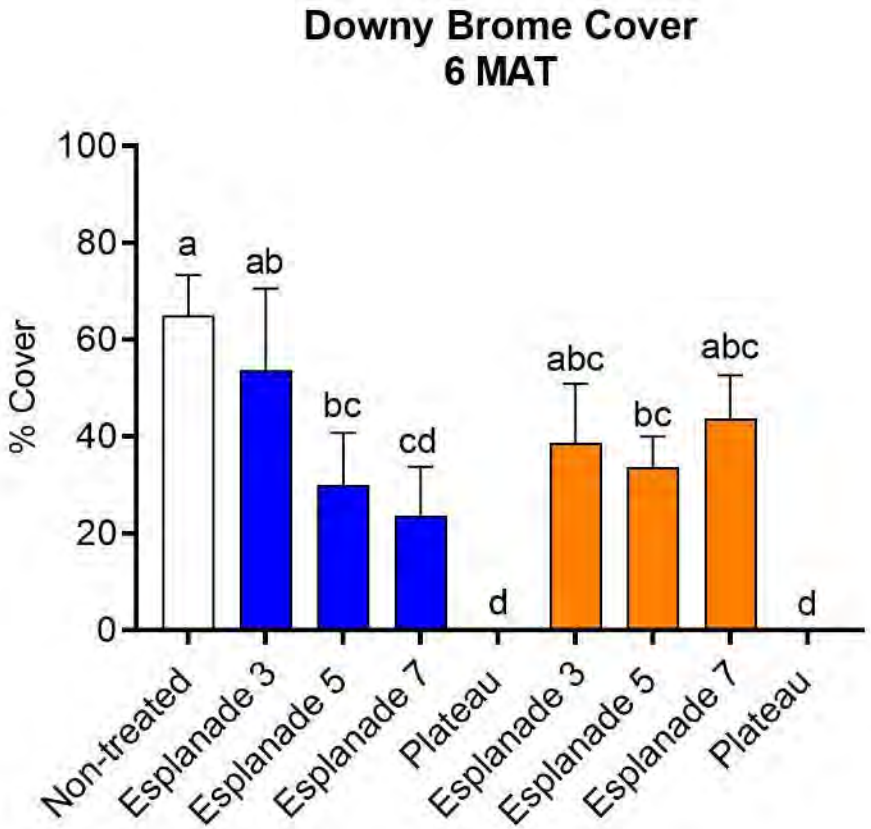
Evaluating Long-term Downy Brome Control with Esplanade

Davidson Mesa and Aquarius Open Spaces

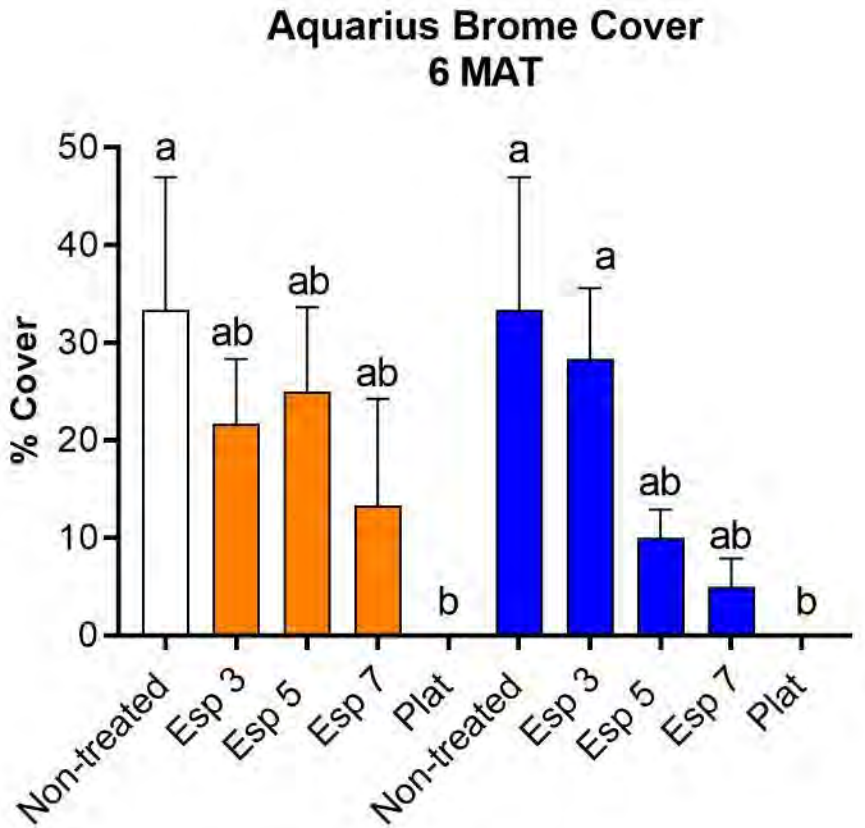
- Three downy brome invaded sites with a remnant native plant community
- Early POST application (December 2016) and late POST application (March 2017)
- Comparing Esplanade to Plateau for long-term downy brome control
- Collected biomass and cover estimates 2017-2019 at Davidson Mesa
- Collected cover estimates at Aquarius 2017 and 2019

Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes

Davidson Mesa Results

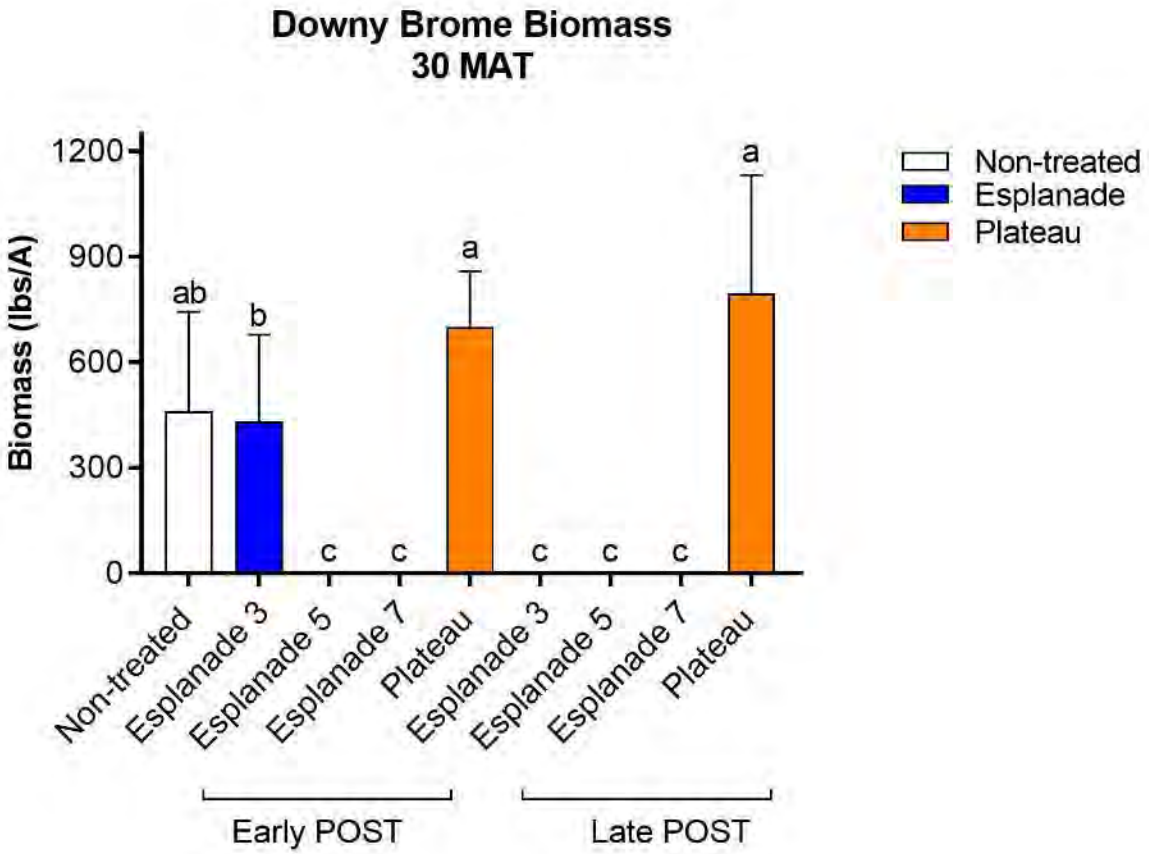


Aquarius Results

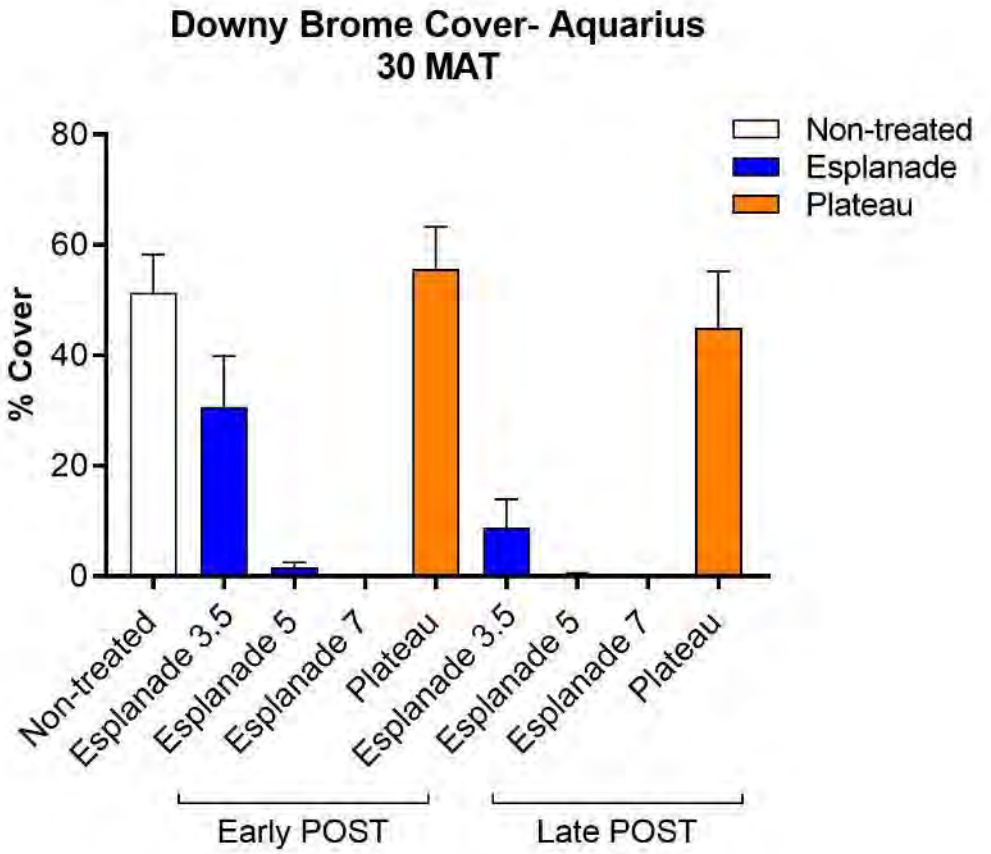


Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes

Davidson Mesa Results



Aquarius Results



Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes

Davidson Mesa Results- 30 MAT

Non-treated

Plateau 7 oz/A

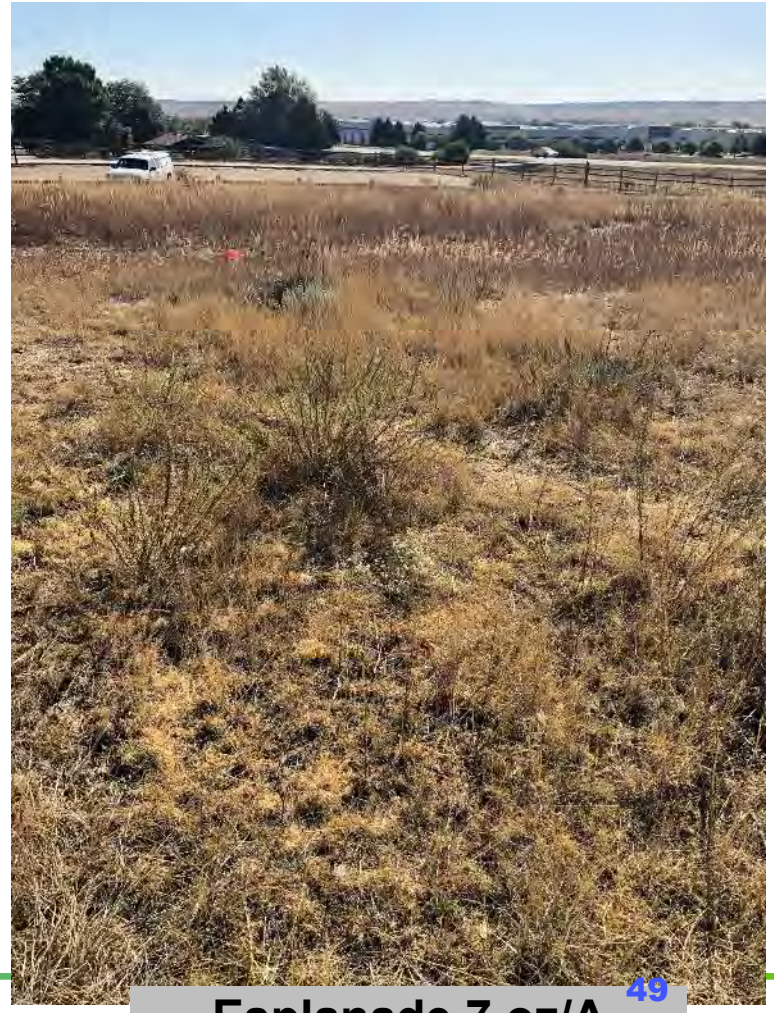
Esplanade 7 oz/A

Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes

Aquarius Trailhead Results- 30 MAT

Non-treated

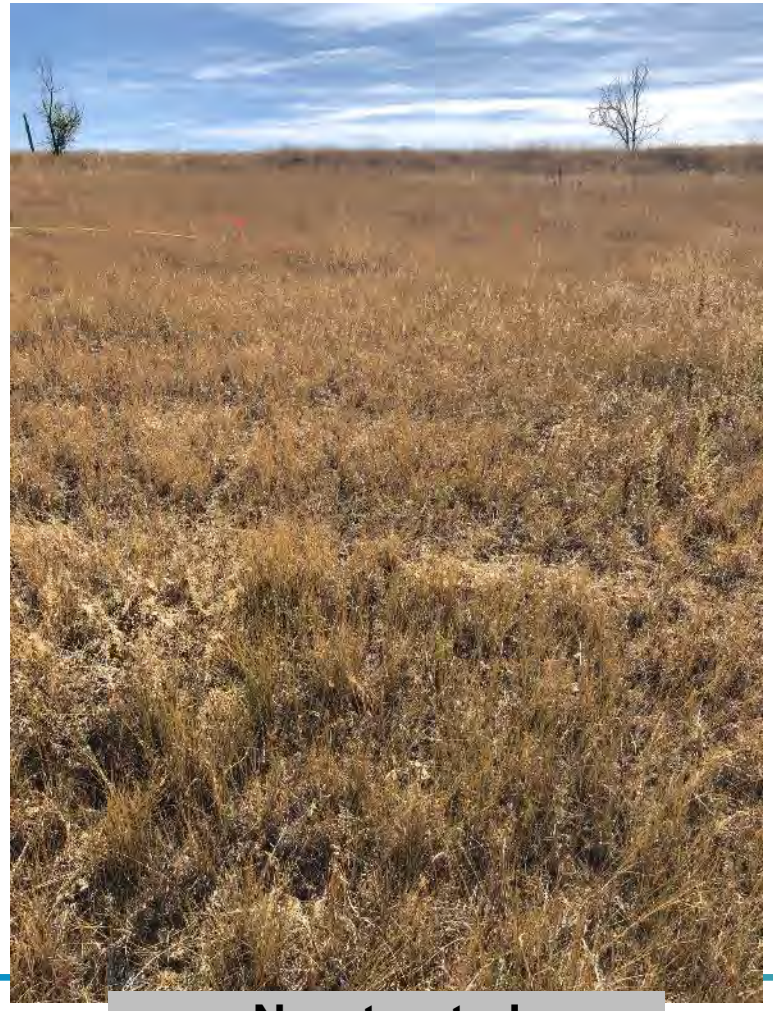
Plateau 7 oz/A



Esplanade 7 oz/A

Evaluating Extended Biennial/Perennial Weed Control with Esplanade Tank-mixes

Aquarius Hillside Results- 30 MAT



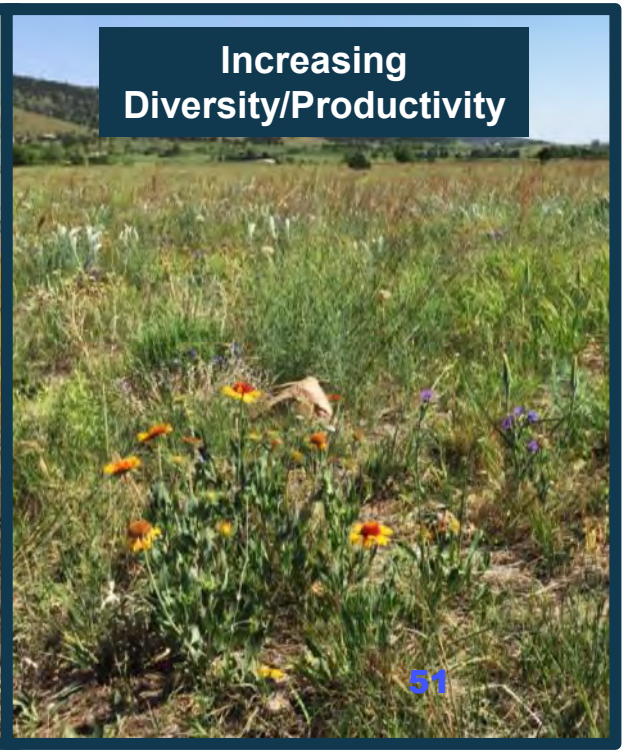
Non-treated

Plateau 7 oz/A

Esplanade 7 oz/A

The Key to Long-Term Restoration Success on Louisville Open Space Properties

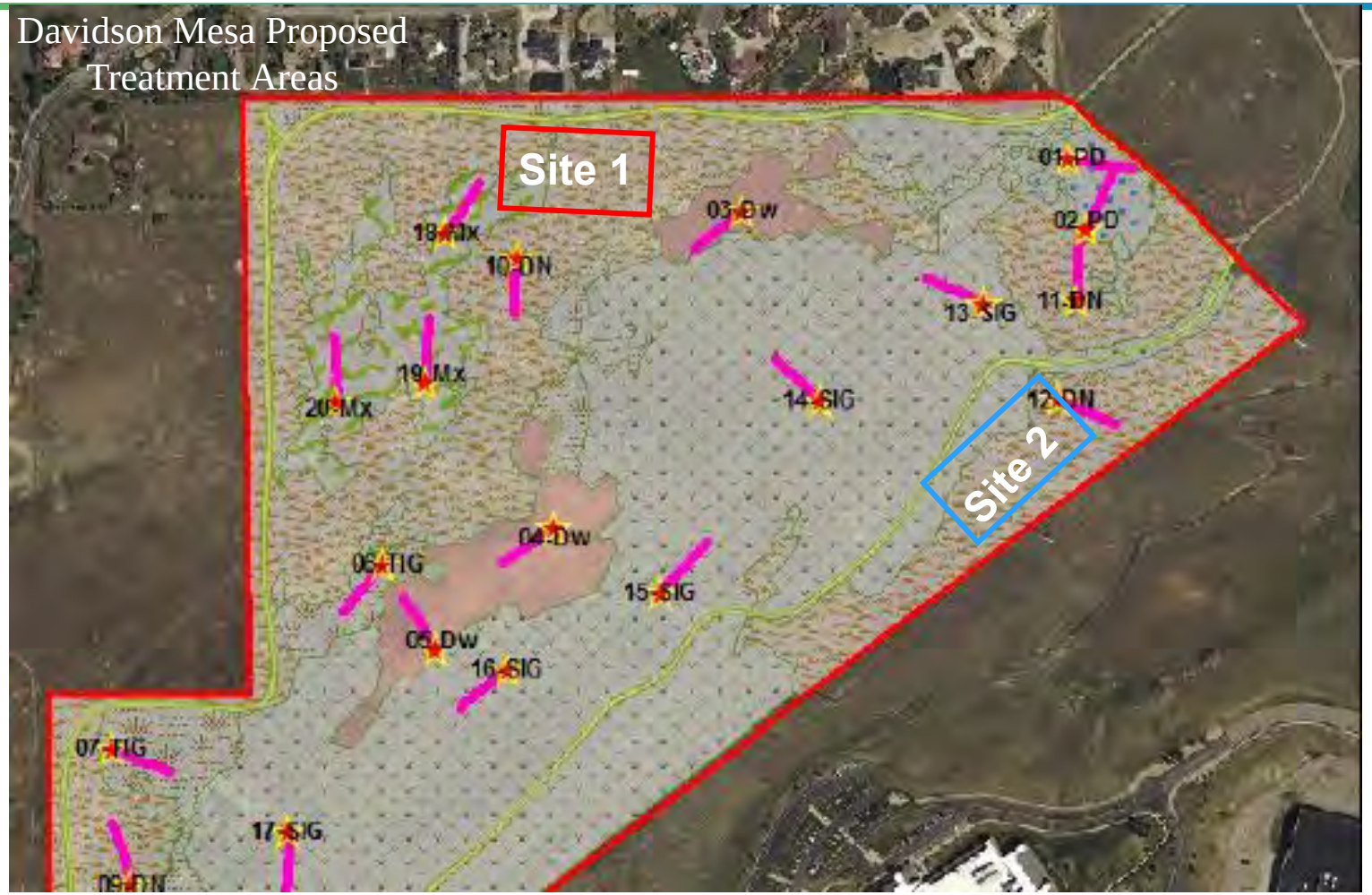
- Long-term invasive winter annual grass control is critical
- Targeting the soil seed bank of invasive annual grasses and broadleaf weeds
- Re-establishing perennial native grasses, forbs, and shrubs increases ecosystem resistance and resilience



Improving Invasive Weed Control with Adaptive Strategies: Prescribed Fire Plus Site Specific Management

Proposed Site Plan

- Herbicide treatments applied with UTV
- Site 1: Treatments applied after burning
- Site 2: Treatments applied without burning
- Revegetation to half of the total plot area at each site



Questions?

Shannon.Clark@colostate.edu
719-510-3310

Colorado State University
Shannon Clark
Dr. Scott Nissen

Extending the Duration of Annual and Biennial Weed Control on City of Louisville Open Space Properties with Esplanade Tank Mixes

Davidson Mesa Common Mullein Site

Non-treated check

Esplanade + Glyphosate

Plateau + Glyphosate

Method + Plateau + Glyphosate

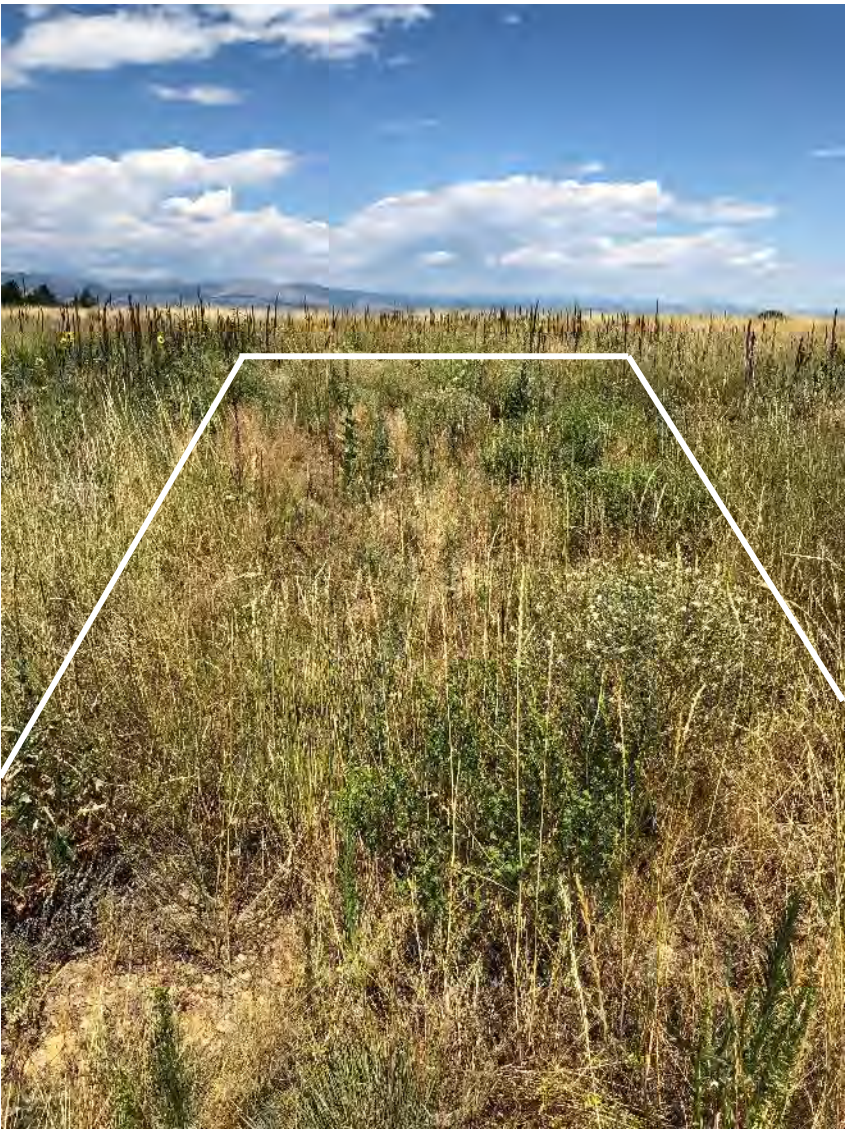
Tordon + Esplanade + Glyphosate

Tordon + Plateau + Glyphosate

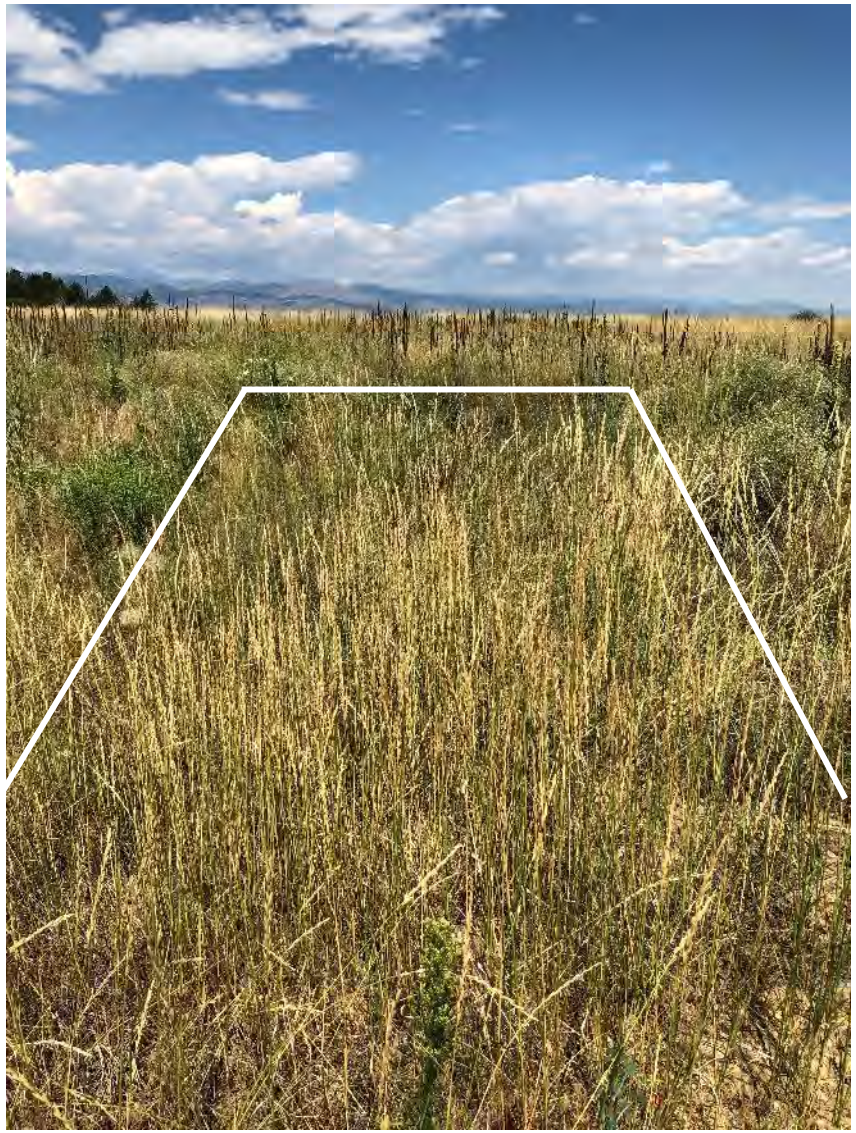
Opensight + Esplanade + Glyphosate

Opensight + Plateau + Glyphosate

Method/Telar + Esplanade + Glyphosate



Method/Telar + Plateau + Glyphosate



Tordon/Telar + Esplanade + Glyphosate

Tordon/Telar + Plateau + Glyphosate

Davidson Mesa Downy Brome Site

Non-treated check

Esplanade 3 oz/A (early-POST)

Esplanade 5 oz/A (early-POST)

Esplanade 7 oz/A (early-POST)

Plateau 7 oz/A (early-POST)

Esplanade 3 oz/A (POST)

Esplanade 5 oz/A (POST)

Esplanade 7 oz/A (POST)

Plateau 7 oz/A (POST)

City of Louisville
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CITY COUNCIL COMMUNICATION
AGENDA ITEM ___

SUBJECT: **DISCUSSION/DIRECTION – PROPOSAL TO DEVELOP PRIORITIES AND GOALS FOR FUTURE MANAGEMENT OF CITY OPEN SPACE**

DATE: **SEPTEMBER 24, 2019**

PRESENTED BY: **LAURA SCOTT-DENTON, OPEN SPACE ADVISORY BOARD CHAIR ON BEHALF OF THE MANAGEMENT OF OPEN SPACE FOR TOMORROW WORKING GROUP**

SUMMARY:
Since late August, a working group of representatives from THE Open Space Advisory Board (OSAB), City Staff, and the OSAB City Council Liaison have met to develop a process for providing input on priorities and goals for the future management of City of Louisville Open Space's. Inspired by City Council's commitment to progressive multi-year budget planning and collaboration with advisory boards and the recent major purchase of the Mayhoffer property, this group met to brainstorm on how OSAB, staff, citizens and City Council can partner over the next six months to provide City Council with input and identify Open Space management priorities and goals for the next ten years.

The working group is called the Management of Open Space for Tomorrow (MOST). Members include Laura Scott-Denton and Helen Moshak of OSAB, City Staff Ember Brignull and Nathan Mosley and the OSAB City Council Liaison and Mayor, Bob Muckle. The aim is to build on the foundation laid by the Parks, Recreation, Open Space and Trails Master Plan (PROST) 2011, the Open Space Master Plan (2004) and the Transportation Master Plan currently in development.

The goal is to develop a collaborative and transparent process to provide community and OSAB input for Staff and City Council to:

- Identify priorities and goals for future Open Space Management.
- Refine the vision for City of Louisville Open Space.
- Create a sustainable management model and budget that balances operations and acquisitions to enhance, protect and preserve Open Space for the benefit of our environment and community.

The group recognizes that future Open Space management priorities must emphasize that the majority of city resources and efforts will shift from acquiring new properties to managing and maintaining the sole and jointly-owned 2,000+ acres of open space in our care. Future priorities will also identify and allocate resources for the building and maintenance of the trail system.

The proposed goals will be proactive, fiscally responsible and innovative. To be successful, the City must ensure that the Open Space and Parks Fund, City General Funds and external grants, awards and partnership funding are effectively leveraged and citizen science and volunteer programs resources are expanded in order to capture the full potential of the return on these investments.

PROPOSAL:
The MOST working group and OSAB propose to brainstorm and collaborate with community members in OSAB monthly meetings and specials events, partner with PPLAB and other advisory boards and neighboring communities, and work closely with staff and the City Council OSAB liaison over the next six months to draft a proposed list of Open Space management priorities and goals to City Council by utilizing the following planning process:

Step	Lead(s)	Partner(s)
1. Engage with City Council, OSAB, PPLAB, staff and the community to collaborate in an iterative process to reevaluate, enhance, and identify new long-term priorities and goals for Open Space Management through 2030.	MOST	OSAB, City Council, Community and Staff
2. Identify appropriate baselines, bench marking, key performance indicators, best practices, and/or community standards as appropriate to measure progress on each goal and provide data for a rough order of magnitude budget and resource planning including staffing and volunteer time.	Staff and MOST	OSAB, City Council and Community
3. Update and align the current Open Space Management plan to emphasize or incorporate the priorities and goals.	City Council and Staff	OSAB
4. Develop and finalize annual and multi-year operations and capital budgets to meet the approved goals.	City Council and Staff	OSAB
5. Develop or amend policies and procedures to guide the implementation of the management plan and manage the budgets.	City Council and Staff	OSAB
6. Implement the multi-year management plan and budgets.	Staff	OSAB, volunteers and partners
7. Monitor, measure and evaluate progress on the plan	Staff, OSAB and	OSAB,

each year.	City Council	volunteers and partners
8. Adjust and refine the plan to continue to meet the priorities and goals.	Staff	City Council and OSAB
9. Update or renew the priorities, goals and plans in an iterative process.	City Council, OSAB and Staff	OSAB, volunteers and partners

PROPOSED TIMELINE

October 1, 2019 - March 31, 2020 - 6 months for brainstorming, collaborating and drafting proposed management priorities and goals and presenting to City Council for review and approval of a final list along with budget implications.

Progress briefings/memos to City Council every two months.

Beginning in 2020 and annually thereafter - Open Space Management Plan updates and budget proposal/coordination based on City Council's approved Open Space management priorities and goals (Steps 6-9 above).

PROGRAM/SUB-PROGRAM IMPACT:
Open Space Management Plan/Vision supports the following Open Space Sub-Programs:

Open Space Maintenance and Management Sub-Program by ensuring that Open Space is protected and managed "in a manner consistent with good stewardship and sound ecological principles that benefits citizens of Louisville by promoting native plants, wildlife, wildlife and plant habitat, cultural resources, agriculture and scenic vistas and appropriate passive recreation."

Open Space Education & Outreach Sub Program by informing and educating "residents and visitors about the City's diverse Open Space properties and the many benefits associated with these lands. To involve residents and visitors in activities that encourage understanding and stewardship of these lands."

Open Space New Trails and Trails Maintenance Sub-Program by planning for the construction of "the highest priority new trails and trail connections to enhance the trail system in a manner consistent with City Council adopted plans. Maintain all trails to a satisfactory level to encourage recreation and to enable safe walking, running and bike riding around Louisville"

OPEN SPACE MISSION: To conserve and restore Open Space through land acquisition and management for the protection of natural and cultural resources and provide opportunities for education, volunteering and appropriate passive recreation.

OPEN SPACE VISION: An Open Space program funded for future generations that enriches the experience of living in Louisville by providing opportunities for citizens to reconnect with nature and their cultural heritage while also enhancing their mental and physical well-being.

Program enhancements will impact both operational and capital budgets. Fiscal impacts will be developed following project refinement.

RECOMMENDATION:
The MOST Working Group will report monthly to the full Open Space Advisory Board for further discussion of and guidance on this work with OSAB, the community, PPLAB and Staff to brainstorm, identify and formalize proposed priorities and goals for future Open Space management over the next six months as well as budget implications. MOST and OSAB will provide regular progress briefings to City Council via memo and presentations. City Council will provide direction and feedback to OSAB via the City Council Liaison to OSAB and at City Council meetings on future implementation.

ATTACHMENT(S):
1. Presentation

STRATEGIC PLAN IMPACT:

☐	**Financial Stewardship & Asset Management**	☒	**Reliable Core Services**
☐	**Vibrant Economic Climate**	☒	**Quality Programs & Amenities**
☒	**Engaged Community**	☐	**Healthy Workforce**
☐	**Supportive Technology**	☒	**Collaborative Regional Partner**

City of Louisville Open Space Management Priorities & Goals

Result of meetings with Open Space Advisory Board Tiger Team, Mayor Muckle, and Open Space Staff

Presented by Laura Scott Denton, OSAB chair

Goal of the exercise:

- Identify long-term goals and priorities for Open Space management, especially as the City shifts from “acquisition” mode into “management” mode.
- Determine how to measure successful implementation of practices, identify gaps in funding.
- Identify costs associated with “optimal practice” for each priority according to the timeline in the associated memo, coordinate with the 2021/22 budget process.
- Help Open Space staff align workload to City’s priorities.
- Build upon/revisit PROST Master Plan and Parks/Recreation/Open Space Master Plan (2012)

What follows is a rough draft list of priorities:

- These are subject to discussion and should be seen as preliminary (e.g. missing cost estimates).
- Examples/ideas are given under each suggestion.
- The order of slides should not be interpreted as an ordering of priorities.

Foster citizen engagement

- Continue tradition of education programming excellence.
- Use City marketing resources to enhance citizens' sense of pride in the land and stewardship of our open space legacy.
- Increase volunteer engagement and visibility. Volunteer work should have purpose and impact.

Manage the resources we have

- Leveraging the Senior Natural Resource Manager staff position.
- Native prairie restoration in key locations.
- Enhancement of wildlife habitat.
- Weed management using best known practices.

Invest in our wetlands

- Bird habitat enhancement on Hecla Lake and particularly Harper Lake. Can we let some aquatic species grow?

- Coal Creek investments for nature play/citizen access.

- Management for riparian whole-ecosystem health (nutrients, insects, fish, amphibians, vegetation, birds, mammals).

Pursue a scientific approach to land management

- Repeatable, in-house inventories of vegetation and wildlife done in a manner that is representative and repeatable. Resource manager position must be a candidate capable of this sort of scientific approach.

- An ongoing, long-term ecosystem health scoring system.

- Updates available to public: how are we doing preserving the our land for perpetuity?

Enhance user experience

- Outreach & enforcement of rules/regulation (e.g. ranger program).
- Decreasing barriers to usability (e.g. Wayfinding signs to lower user reluctance to use trails, increasing network connectivity).
- Serving diverse user types: nature-lovers, dog-lovers, bike commuters, recreational cyclists, destination walkers (e.g. school kids), joggers, seniors, ADA users.
- Looking for opportunities to enhance nature play and access.
- Provide for adequate maintenance staffing and citizen-responsive procedures.

Respond to citizens' trail needs

- Social trail prevention and remediation.
- Develop a Trails Master Plan.
- A new category for trails: "hiking trail" (single track?).
- A city-wide "trail network" level approach to land dedication and trail building. New trails should further the network or access to the network.

City of Louisville
Open Space Advisory Board

OPEN SPACE ADVISORY BOARD - 2019 GOALS

DRAFT

Goal Area:	**ACQUISITIONS**	Lead Person:	Missy

1. Support staff in updating "Opportunities for Preserving Open Space and Improving Connectivity."			
Specific Actions:	Who	When (Q#)	Status
Action 1: Revisit format and goals of document			
Action 2: Property evaluation/site visit field trip(s) to re-rate land for document			
2. Serve as resource to Council in assessing properties for Open Space land and trail potential.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Provide input when requested			
Action 2: Property evaluation activity/site visit field trip(s)			
3. Advise and advocate for trails and acquisition.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Advise on the City of Louisville Transportation Master Plan			
Action 2: Vote on Annual Boulder County Trail & Land Acquisition Recommendations			
Action 3: Revisit the OSAB New Trails evaluation document			
Action 4: Continue to advocate for Wayfinding Plan projects.			

Goal Area:	**RESOURCE MANAGEMENT**	Lead Person:	David

1. Provide recommendations for the new Senior Natural Resource Specialist position.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Brainstorm priorities and responsibilities for the position as a discussion item.			
2. Continue to look for solutions to Open Space dog issues.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Support clean up initiatives and events			
Action 2: Help the City incorporate the dog Park Siting Study into future plans.			
Action 3: Work with PPLAB to address dog issues on Park Land.			
3. Advocate for management and restoration projects.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Advocate for prescribed fire management			

Action 2: Comment and advise on Warembourg Fishing Pond Master Plan			
Action 3: Comment and advise on landscaping/weed issues on Open Space			
Action 4: Participate in review of management/planning work as requested			
Action 5: Follow up on cheatgrass work at Davidson Mesa			
Action 6: Updates and comments on work at Harney Lastoka			
Action 7: Review and comment on impacts of Coyote run slump remediation on OS			
4. Serve as a resource to City Council in assessing properties and trails.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Advise as requested			
Action 2: Monitor the City for changes to advise			

Goal Area:	**WAYFINDING**	Lead Person:	Helen

1. Activate the Wayfinding Tiger Team to work on re-scoping for reducing sign costs and implementation.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Select Tiger Team members			
Action 2: Tiger Team meets with each other and with staff to research and design on strategy			
Action 3: Tiger Team reports to the board for discussion of recommendations to staff.			
2. Advocate for Wayfinding Standards and network goals for all projects and development plans.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Adhere to Wayfinding goals at all PUD reviews			
Action 2: Work to keep goals in the minds of staff and Council.			

Goal Area:	**EDUCATION & OUTREACH**	Lead Person:	Laura

1. Support education programs.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Review 2019 staff educational plan proposals			
Action 2: Review educational programs as they come and their attendance			
Action 3: Advise on marketing for educational events			
2. Support community outreach.			
Specific Actions:	Who	When (Q#)	Status

Action 1: Board members attend Open Space booth at Farmer's Market			
Action 2: Board members volunteer at events			
3. Advocate for Rec. Center/Open Space Division cross-marketing and joint activities.			
Specific Actions:	Who	When (Q#)	Status
Action 1: Coordination with Senior Center—ranger led walks?			
Action 2: Coordination with other organizations, e.g., Balfour			

Goal Area:	**GENERAL BUSINESS**	Lead Person:	Mike or Peter

1. Coordination with PPLAB			
Specific Actions:	Who	When (Q#)	Status
Action 1: "Pass the baton" to PPLAB for the dog park siting study			
Action 2: Meeting for PPLAB and OSAB chairs and staff			
Action 3: Joint PPLAB/OSAB meeting			
2. Key Indicator Surveys			
Specific Actions:	Who	When (Q#)	Status
Action 1: Revisit Council's goals for the Trail Maintenance Key Indicator survey.			
Action 2: Perform a Trail Maintenance survey as requested by staff and City Council			
3. Monitor Operations and CIP Open Space budgets			
Specific Actions:			
Action 1: Inspect and review budgets as a meeting discussion item			
Action 2: Advise and review budgets as appropriate			
4. Monitor Council and staff activity as pertains to Open Space issues			
Specific Actions:			
Action 1: Continue Jeff Lipton's monthly meeting updates			
Action 2: Board members monitor other meetings and local media for Open Space news			

Open Space Advisory Board TENTATIVE* Board Items Calendar

(Updated October 2, 2019)

November 13, 2019	December 11, 2019	January 8, 2020
Action Items: • Storm Water Management Plan (Public Works) **Updates/Discussion from the Department:** • Hecla to Waneka Trail • Dutch Creek/Elephant Park Design and Potential Impacts to Open Space (Allan Gill/Nathan Mosley) **Updates/Discussion from the Board:** • Social Trails in Open Space	**Action Items:** • Finalize OSAB 2019 Accomplishments **Updates/Discussion from the Department:** • Dog Park Siting Guidelines Handoff to PPLAB **Updates/Discussion from the Board:** • Board Recommend OSAB 2020 Goals	**Action Items:** • Agenda Posting Locations • Officer Elections • Finalize OSAB 2019 Accomplishments • Finalize OSAB 2020 Goals **Updates/Discussion from the Department:** • Introduce New Board Members • Update OSAB Member Contact List • Distribute Open Government & Ethics Pamphlet **Updates/Discussion from the Board:**
February 12, 2020	**March 11, 2020**	**April 8, 2020**
Action Items: • Finalize OSAB 2020 Goals **Updates/Discussion from the Department:** • Review Department Trail Priorities & Make Recommendations on New Trails (Allan Gill) • Review of Proposed Operational Budget and Capital Improvement Projects • OSAB Draft Recommendations for Future Operational and Capital Improvement Projects **Updates/Discussion from the Board:**	**Action Items:** • Finalize Department Trail priorities • Finalize OSAB Recommendations for Future Operational and Capital Improvement Projects **Updates/Discussion from the Department:** **Updates/Discussion from the Board:**	**Action Items:** **Updates/Discussion from the Department:** **Updates/Discussion from the Board:**

*All items are subject to change. A final version of the agenda is posted on the web during the week prior to the OSAB meeting.