Garoutte Prairie restoration: 2022 annual report

May 2023

Report for Bureau of Land Management, Agreement #L21AC10245

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Institute for Applied Ecology

PREFACE

IAE is a non-profit organization whose mission is the conservation of native ecosystems through restoration, research, and education. IAE provides services to public and private agencies and individuals through development and communication of information on ecosystems, species, and effective management strategies. Restoration of habitats, with a concentration on rare and invasive species, is a primary focus. IAE conducts its work through partnerships with a diverse group of agencies, organizations, and the private sector. IAE aims to link its community with native habitats through education and outreach.

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ACKNOWLEDGEMENTS

Funding for this project was provided by the Bureau of Land Management (BLM) Upper Willamette Field Office, Northwest Oregon District. We are grateful to Jessica Celis, Upper Willamette Field Office botanist, and John Klock, Northwest Oregon District botanist, for their continued support and commitment to restoring Garoutte Prairie.

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Cover photographs: Common camas (*Camassia quamash*) in Unit 2 remnant prairie May 17, 2022. Photo by Rolando Beorchia.

Photo credits: All photos taken by IAE staff unless otherwise noted.

SUGGESTED CITATION

Beorchia, Rolando and Andrew Esterson. 2023. Garoutte Prairie restoration: 2022 annual report. Unpublished report for the Bureau of Land Management, Northwest Oregon District. Institute for Applied Ecology. Corvallis, Oregon. 10 pages plus appendices.

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EXECUTIVE SUMMARY

The Institute for Applied Ecology (IAE) has conducted habitat restoration at Garoutte Prairie in partnership with the Bureau of Land Management (BLM) Upper Willamette Field Office (UWFO), Northwest Oregon District, since 2013. In 2022, IAE performed a variety of restoration activities including herbicide and mowing treatments, broadcast seeding, and planting native bulbs and shrubs. This was the second full year herbicides were permitted at Garoutte Prairie. IAE completed herbicide spot treatments to Himalayan blackberry (*Rubus bifrons*) and one-seeded hawthorn (*Crataegus monogyna*).

This site hosts many native wetland prairie species and is home to the northernmost population of bay horsehair lichen (*Sulcaria badia*). Bay horsehair lichen was last surveyed throughout the prairie in 2020. Restoration activities in 2022 focused on reducing woody species encroachment in wetland prairie habitat by cutting Oregon ash (*Fraxinus latifolia*), Scotch broom (*Cytisus scoparius*), one-seeded hawthorn, sweet briar rose (*Rosa rubiginosa*), and Himalayan blackberry.

Eight bulb-forming species including narrowleaf onion (*Allium amplectens*), harvest brodiaea (*Brodiaea elegans*), Tolmie star-tulip (*Calochortus tolmiei*), common camas (*Camassia quamash*), ookow (*Dichelostemma congestum*), Henderson's shooting star (*Dodecatheon hendersonii*), chocolate lily (*Fritillaria affinis*), and tiger lily (*Lilium columbianum*) were planted totaling 1,850 bulbs. Osoberry (*Oemleria cerasiformis*), chokecherry (*Prunus virginiana*), and red-flowering currant (*Ribes sanguineum*) were planted along the south fence to start a living fence buffer between the road and meadow. Future restoration activities will include herbicide and manual weed treatments, mowing and/or burning to reduce woody vegetation, and revegetation with appropriate native plant materials.

1. INTRODUCTION

Garoutte Prairie is a wet meadow located west of Dorena Lake in Lane County, Oregon and managed by the Bureau of Land Management (BLM) Upper Willamette Field Office, Northwest Oregon District (Figure 1). The 46 acres of unique wet prairie, riparian, and ash-dominant forest is designated a BLM Area of Critical Environmental Concern (ACEC) and was once part of a contiguous prairie network with the nearby Dorena Prairie ACEC.

The Institute for Applied Ecology (IAE) began habitat restoration actions at Garoutte as part of another BLM-funded project at the nearby Dorena Prairie in 2013 (Banner). Garoutte Prairie became an independent restoration project in 2016. See Appendix A for a summary of completed and proposed management activities conducted by IAE from 2013-2025. See Appendix B for an annual photo point comparison from 2019-2022.

Garoutte Prairie hosts a population of bay horsehair lichen (*Sulcaria badia*). Endemic to the Pacific Northwest, bay horsehair lichen is most often found hanging from the branches of apple (*Malus spp.*) and Oregon white oak (*Quercus garryana*) trees in well-lit overstories but can also live on conifers and Oregon ash (*Fraxinus latifolia*, Carlberg). At Garoutte, this epiphytic species has only been positively identified near the western edge of the ACEC and is found on mature Oregon ash and common apple

(*Malus x domestica*). While removal of encroaching woody vegetation is an important component of prairie restoration, trees that host bay horsehair lichen will be protected. Garoutte Prairie is at the northern edge of bay horsehair lichen's geographical range and is important for preserving genetic diversity in the lichen's population as a whole. Outlier populations may be crucial for species conservation as climate change pushes population distributions outside of their historical range.

Figure 1. Garoutte Prairie management units and meadow location within the Willamette Valley Ecoregion.

Prior to September 2020, manual and mechanical weed removal techniques were the only tools available to maintain the meadow and slow the spread of non-native species. Herbicides have since been approved for use in the BLM Northwest Oregon District, making it possible to more effectively address the threat posed by Himalayan blackberry (*Rubus bifrons*), one-seeded hawthorn (*Crataegus monogyna*), meadow knapweed (*Centaurea x moncktonii*), and Scotch broom (*Cytisus scoparius*). While manual techniques will still be important for site management, the use of herbicides will result in more efficient and effective control of non-native weeds. All units of the ACEC have Himalayan blackberry, one-seeded hawthorn, and Scotch broom and a considerable amount of work will be needed to remove these. Meadow knapweed is prevalent along the roadsides and poses a risk requiring diligent observation and treatment to keep out of the prairie.

In 2022, Garoutte Prairie management areas were redrawn to accurately represent the full extent of the ACEC and delineate areas for a targeted restoration approach. From 2013-2022, four management areas were utilized based on restoration priority (Figure 2). Since the boundaries of these four management areas did not align with BLM ACEC maps, IAE designated six replacement units to facilitate restoration beginning in 2022 (Figure 2).

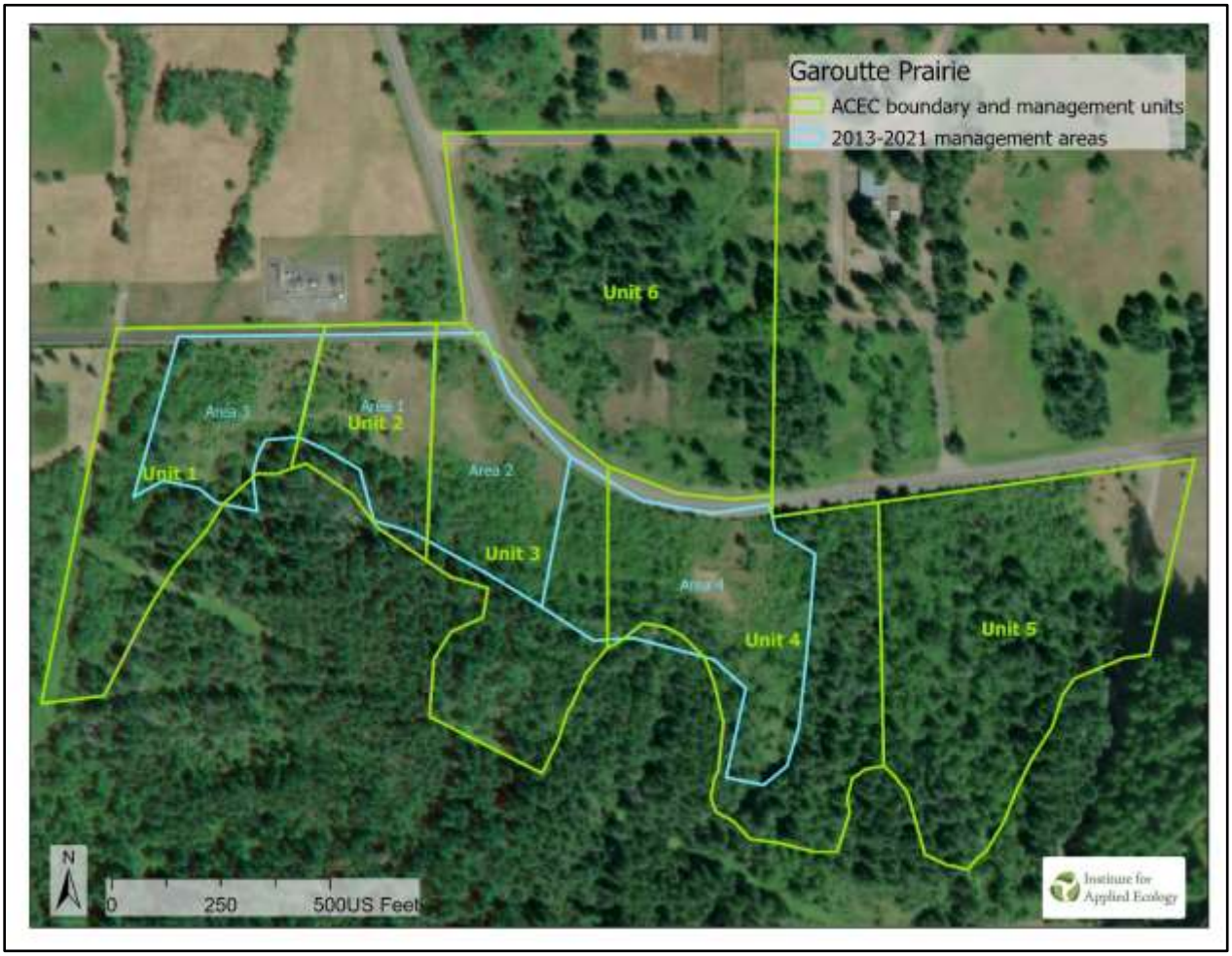

Figure 2. New management units established in 2022 and previously used management areas from 2013-2021.

2. GOALS AND OBJECTIVES

The purpose of this project is to assist the BLM with maintaining and improving rare mid-elevation (850 ft) prairie habitat in support of the native plant community and bay horsehair lichen population at Garoutte Prairie.

There are four primary objectives of this project:

1. Control high priority invasive plants such as Scotch broom, Himalayan blackberry, one-seeded hawthorn, and meadow knapweed
2. Remove encroaching woody species to preserve open meadow habitat
3. Increase native plant abundance and diversity
4. Maintain and improve bay horsehair lichen habitat

3. 2022 RESTORATION ACTIONS

In 2022, restoration actions focused on herbicide and mowing treatments of priority invasive shrubs in Units 1, 2, 3, and 6 (Table 1). IAE applied Garlon 3A (triclopyr) herbicide to Himalayan blackberry and one-seeded hawthorn (Figure 3), mowed Scotch broom, Himalayan blackberry, Oregon ash and one-seeded hawthorn, removed Douglas-fir (*Pseudotsuga menziesii*) trees, broadcast native seed, and planted bulbs and shrubs (Figure 4). See Appendix A for a complete list of management actions at Garoutte Prairie from 2013-2022.

Table 1. 2022 management actions at Garoutte Prairie.

Date	**Personnel***	**Activity**
May 17	IAE	Treated Himalayan blackberry (*Rubus bifrons*) and one-seeded hawthorn (*Crataegus monogyna*) with Garlon 3A (triclopyr).
May 20	IAE	Treated Himalayan blackberry and one-seeded hawthorn with Garlon 3A (triclopyr).
Aug 22	IAE	Site evaluation determined spring herbicide treatment was effective and there is a need for mowing.
Aug 31	IAE	Mowed Scotch broom (*Cytisus scoparius*) in Unit 6.
Sep 7	IAE, Volunteers	Mowed Scotch broom in Unit 6. Mowed Himalayan blackberry, one-seeded hawthorn and Oregon ash (*Fraxinus latifolius*) resprout in Units 1, 2, and 3. Felled and limbed Douglas-fir (*Pseudotsuga menziesii*) for fall branch piling and log removal.
Sep 8	IAE	Mowed Himalayan blackberry, one-seeded hawthorn and Oregon ash resprout in Units 1, 2, and 3.
Sep 30	IAE	Treated Himalayan blackberry and one-seeded hawthorn with Garlon 3A (triclopyr).
Oct 25	IAE, Volunteers	Planted bulbs in Units 2 and 3.
Oct 28	IAE	Planted bulbs in Units 2 and 3.
Oct 31	IAE	Planted shrubs roadside in Units 2 and 3.
Nov 8	IAE, NCCC	Removed Douglas-fir trees, piled branches into burn piles and piled logs roadside for local firewood removal. Planted bulbs in Units 2 and 3.
Dec 7	IAE	Planted bulbs in Units 2 and 3. Broadcast seed in Units 2 and 3.

*Institute for Applied Ecology (IAE), AmeriCorps National Civilian Community Corps (NCCC), community volunteers (volunteers)

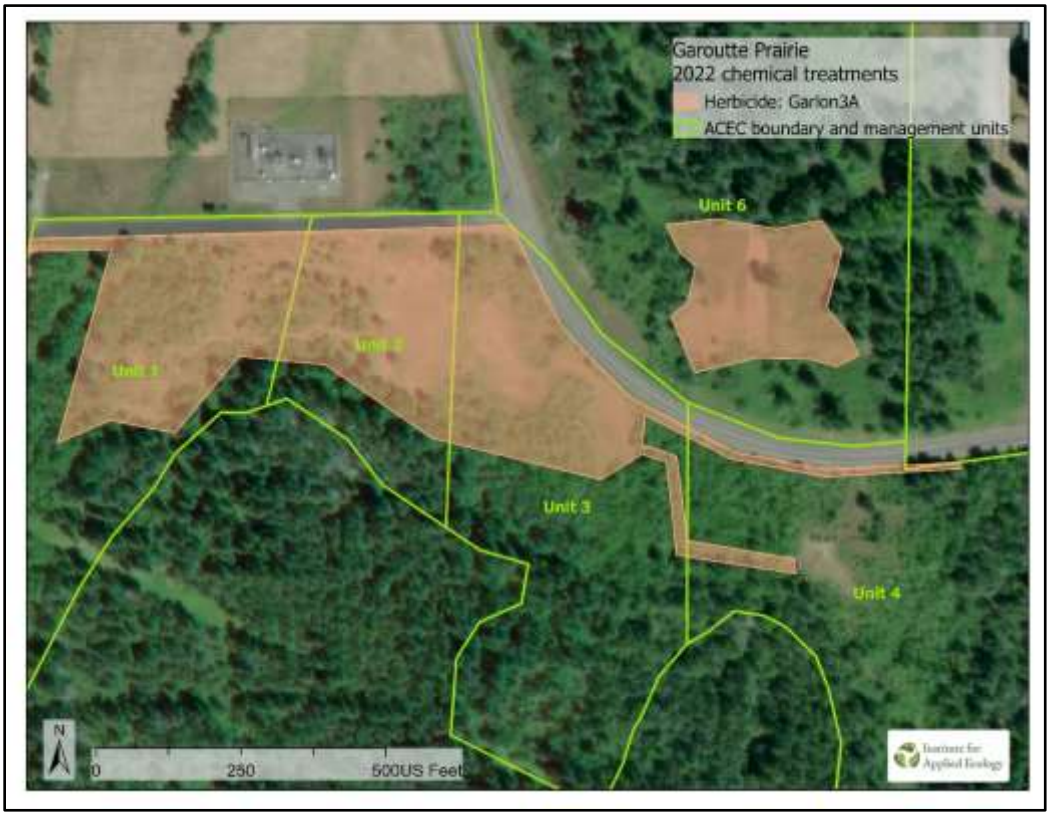

Figure 3. 2022 Garlon 3A treatments at Garoutte Prairie.

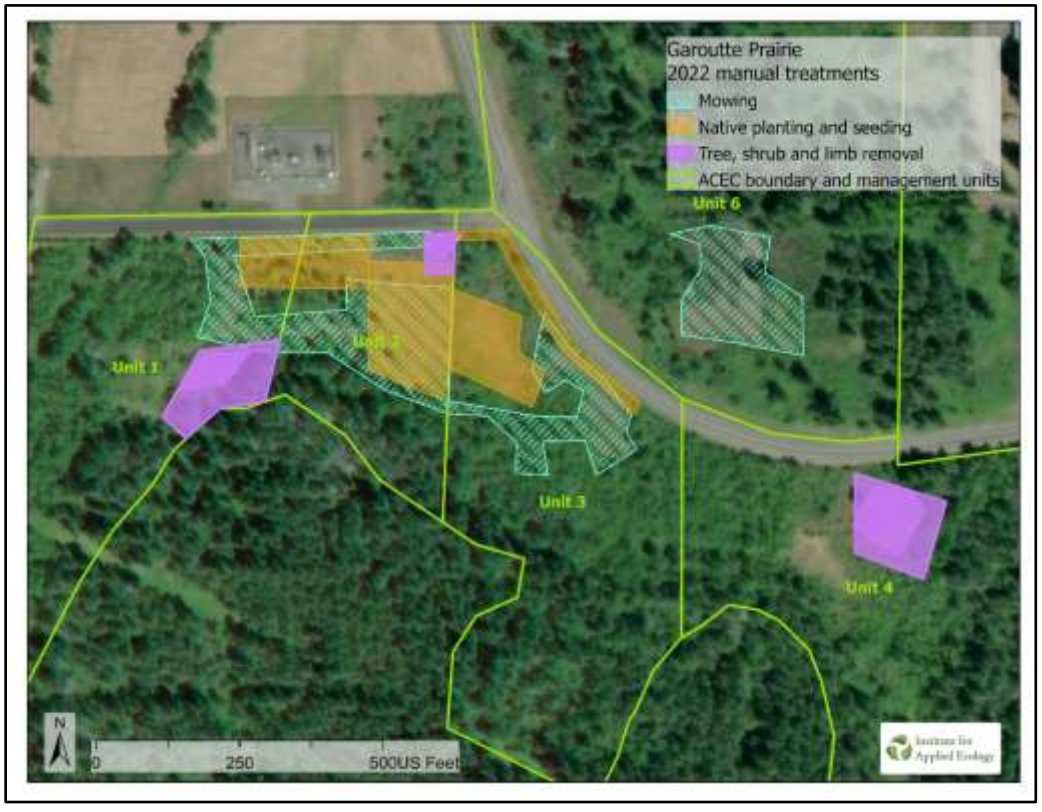

Figure 4. 2022 mowing, tree removal, planting and seeding treatments at Garoutte Prairie.

Himalayan blackberry, Scotch broom, and one-seeded hawthorn pose a priority threat to Garoutte Prairie. As a result, we performed multiple treatments in 2022 to reduce their abundance. In May, we applied Garlon 3A (triclopyr) to target Himalayan blackberry and one-seeded hawthorn in Units 1, 2, and 3. In August and September, we mowed Scotch broom in Unit 6 to begin reclaiming the grassland from the Scotch broom that had formed a dense stand over many years. Units 1, 2, 3, and 6 received a fall herbicide application of Garlon 3A (triclopyr) to treat Himalayan blackberry, Scotch broom, and one-seeded hawthorn. Future herbicide and mow treatments of these three species will be necessary to reduce their impact on the native plant community.

Figure 5. Scotch broom (*Cytisus scoparius*) mowed in Unit 6, August 31, 2022.

In 2022, reduction of tree encroachment in the prairie continued by felling Douglas-fir and mowing Oregon ash re-sprouts. In September, we felled and limbed eight Douglas-fir from within Units 1 and 2. Re-sprouting Oregon ash were mowed in Unit 2 and 3, and their abundance was anecdotally less in 2022 than previous years. In December, IAE and AmeriCorps National Civilian Community Corps (NCCC) piled the limbs from these trees into burn piles and piled bucked logs along Garoutte Road for local residents to remove for firewood.

Figure 6. Limbs piled for future burning in Unit 3, November 8, 2022.

In October, November, and December, IAE enhanced native plant diversity in Units 1, 2, and 3 at Garoutte Prairie by planting bulbs and bareroots of native forbs (Table 2) and broadcasting a seed mix (Table 3). We planted 1,850 bulbs of narrowleaf onion (*Allium amplectens*), harvest brodiaea (*Brodiaea elegans*), ookow (*Dichelostemma congestum*), common camas (*Camassia quamash*), Henderson's shooting star (*Dodecatheon hendersonii*), chocolate lily (*Fritillaria affinis*), Tolmie star-tulip (*Calochortus tolmiei*), and tiger lily (*Lilium columbianum*) in the open prairie areas of these units (Figure 4).

Table 2. Bulbs, bareroot forbs, and potted shrubs planted 2022.

Species/Variety	Common Name	Bulbs (bareroot)	Rooted shrubs
Allium amplectens	narrowleaf onion	175	
Brodiaea elegans	harvest brodiaea	300	
Calochortus tolmiei	Tolmie star-tulip	175	
Camassia quamash	common camas	200	
Dichelostemma congestum	ookow	300	
Dodecatheon hendersonii	Henderson's shooting star	300	
Fritillaria affinis	chocolate lily	200	
Lilium columbianum	tiger lily	200	
Oemleria cerasiformis	osoberry		7
Prunus virginiana	chokecherry		2
Ribes sanguineum	red-flowering currant		10
	Totals	**1,850 bulbs**	**19 shrubs**

Additionally, we planted a "living fence" along the roadsides using shrubs, small deciduous trees, and tenacious grass. Once fully grown, this living fence will provide structural shelter and forage to birds and mammals frequenting the meadow and will help limit the introduction of non-native seed from the road into the meadow. To make an effective weed barrier multiple vegetative layers needed to be planted. The upper layer (one to eight feet tall) is composed of a shrub row containing osoberry (*Oemleria cerasiformis*), chokecherry (*Prunus virginiana*), and red-flowering currant (*Ribes sanguineum*) (Table 2, Figure 4). The ground layer (under one foot tall) was heavily seeded with Roemer's fescue (*Festuca roemeri*). A native seed mix composed of both upland prairie and wet prairie species was broadcast to areas of Unit 1, 2, and 3 disturbed by mowing, herbicide and tree removal using belly bag seeders (Table 3, Figure 4).

Table 3. 2022 Garoutte Prairie native seed mix.

Scientific Name	Common Name	Total Seed (lbs)
Achillea millefolium	common yarrow	0.03
Agrostis exarata	spike bentgrass	0.03
Barbarea orthoceras	American yellowrocket	0.17
Camassia leichtlinii	tall camas	1.62
Carex densa	dense sedge	0.25
Carex pachystachya	chamisso sedge	0.18
Carex scoparia	pointed-broom sedge	0.13
Carex stipata	saw-beaked sedge	0.28
Carex unilateralis	one-sided sedge	0.15
Clarkia amoena	farewell-to-spring	0.03
Clarkia purpurea	winecup clarkia	0.02
Collomia grandiflora	large-flowered collomia	0.66
Danthonia californica	California oatgrass	1.39
Deschampsia cespitosa	tufted hairgrass	0.06
Deschampsia danthonioides	annual hairgrass	0.06
Deschampsia elongata	slender hairgrass	0.05
Downingia elegans	elegant calicoflower	0.51
Epilobium densiflorum	denseflower willowherb	0.04
Eriophyllum lanatum	woolly sunflower	1.1
Festuca roemeri	Roemer's fescue	4*
Grindelia integrifolia	Puget Sound gumweed	0.25
Iris tenax	toughleaf iris	1.32
Juncus tenuis	path rush	0.01
Lomatium nudicaule	barestem biscuitroot	1.32
Lupinus rivularis	river lupine	1.12
Madia elegans	showy tarweed	0.975
Perideridia oregana	Oregon yampah	0.27
Plagiobothrys figuratus	fragrant popcornflower	0.57
Plagiobothrys nothofulvus	rusty-haired popcornflower	0.5
Plectritis congesta	shortspur seablush	0.05
Potentilla gracilis	slender cinquefoil	0.09
Prunella vulgaris	common selfheal	0.32
Ranunculus occidentalis	western buttercup	0.66
Ranunculus orthorhynchus	straightbeak buttercup	0.46
Sanguisorba occidentalis	western burnet	0.2
Sidalcea campestris	meadow checkermallow	2.765
Sidalcea malviflora ssp. virgata	dwarf checkermallow	0.33
Thalictrum polycarpum	tall meadow-rue	0.43
Wyethia angustifolia	mule ears	5
	Total (lbs):	**27.4**

* Roemer's fescue (*Festuca roemerii)* was broadcast roadside only.

4. MANAGEMENT RECOMMENDATIONS

The overarching goal of this project is to restore regionally rare, wet meadow habitat at Garoutte Prairie by controlling priority invasive species and managing woody encroachment. Units 1, 2, and 3 show the best potential for expanding suitable meadow habitat and work should prioritize reduction of Himalayan blackberry, one-seeded hawthorn, and Scotch broom, which threaten the open prairie habitat. Units 4 and 6 have potential to become quality meadow, but they are inundated with invasive shrubs. Intensive weed treatment followed by native species revegetation will be needed to rehabilitate these units. Moving forward, we suggest evaluating the desired target levels for recovery and establishing metrics for achieving these targets.

The following maintenance goals are suggested:

1. Reduce low abundance invasive plants in open prairie to below 5% cover (or eradication): Scotch broom, Himalayan blackberry, one seeded-hawthorn, Canada thistle (*Cirsium arvense*), meadow knapweed, and bull thistle (*Cirsium vulgare*)
2. Reduce high abundance priority invasive plants to below 10% cover: Oxeye daisy (*Leucanthemum vulgare*), and Queen Anne's lace (*Daucus carota*)
3. Reduce high abundance invasive grasses in open prairie below 10% cover by implementing regular burning, mowing, and herbicide applications
4. Increase meadow native plant abundance and diversity by augmenting species occurring in low abundance
5. Increase forest-meadow ecotone diversity by increasing fruit and nut bearing shrubs

With these goals in mind, the following restoration actions are recommended for 2023 and beyond:

- Mow treatments:
    - Mow Oregon ash regrowth with brush mower. The growth appears to be less in 2022 than previous years. Hopefully this anecdotal trend continues and the trees in the middle of unit 3 meadow stop producing shoots.
    - Mow the approximate three acres of potential meadow in Unit 6 to reduce Scotch broom.
    - Open forest-meadow ecotone by mowing and using a woodchipper to remove branch piles.
- Cover burn piles in spring 2023 and request that the BLM burn them in fall 2023.
- Herbicide treatments:
    - Spot spray Himalayan blackberry, Scotch broom, and one-seeded hawthorn in spring and/or fall with glyphosate or triclopyr.
    - Spot spray thistles in the bolting-to-bud stage in spring with clopyralid.
- Manual weed removal:
    - Hand-pull priority weeds (teasel and Scotch broom) if they are not treated with herbicide prior to flowering.
    - Cut and bag inflorescences of Queen Anne's lace, oxeye daisy, Canada thistle, and bull thistle and remove them from the site if they are not treated with herbicide prior to the flowering stage.
- Revegetation and increasing diversity:
    - Revegetate areas disturbed by restoration activities in the fall using a mix of native forb and grass seed. Native prairie species abundance and diversity can also be improved by augmentation with appropriate plugs, bulbs, and bare root plants.

- There are lots of non-native common apple and pear trees on site that seem to support at least one bear that inhabits the meadow edge trees. We suggest leaving these fruit-bearing species specifically for wildlife forage and to provide host for the bay horsehair lichen known to grow on common apple. Seeding and/or planting Pacific crabapple (*Malus fusca*) may provide an alternative native host and a transition could be possible while maintaining a host for the lichen.
- Continue planting a "living fence" along both roads. We recommend planting more fruit and nut bearing shrubs to enhance bird and mammal forage.

A simplified timeline of these recommended and planned activities for 2023-2025 can be found at the bottom of Appendix A.

5. REFERENCES

Banner, G and B. Axt. 2013. Restoration of Dorena Prairie ACEC. Unpublished report prepared for the Bureau of Land Management Northwest Oregon District. Institute for Applied Ecology, Corvallis, Oregon.

Carlberg, T. and D. Toren. 2006. *Sulcaria badia,* Sponsorship for the CALS Conservation Committee. Bulletin of the California Lichen Society 13 (2).

APPENDIX A. COMPLETED AND PROPOSED MANAGEMENT ACTIONS: 2013-2025

2013

- Brush cut Himalayan blackberry (*Rubus bifrons*) and Scotch broom (*Cytisus scoparius*).

2014

- Scotch broom, Himalayan blackberry, and fruit tree removal.

2016

- Scotch broom, Oregon ash (*Fraxinus latifolia*), one-seeded hawthorn (*Crataegus monogyna*), and fruit tree removal with AmeriCorps Gold 5 crew.

2017

- Oregon ash trees in the meadow were felled, bucked, and piled for burning by the Bureau of Land Management (BLM) fire management crew.
- Covered burn piles with plastic for fall burning.
- Removal of Scotch broom in prairie.
- Purchased native seed for sowing into burned areas.

2018

- Manual removal of Himalayan blackberry.
- BLM fire management crew burned slash piles in the fall.
- Broadcasted native seed mix in areas burned or disturbed by restoration activities.

2019

- Manual removal of Himalayan blackberry and Scotch broom.
- Cut and piled sprouting Oregon ash, fruit trees, and one-seeded hawthorn and removed from open prairie.
- Seeded areas disturbed by restoration activities.

2020

- Surveyed for bay horsehair lichen (*Sulcaria badia*) and riparian loop lichen (*Hypotrachyna riparia*).
- Pulled Scotch broom and cut sprouting Oregon ash.
- Began cutting a corridor between Areas 2 and 4 on the eastern side of the prairie.
- Drafted a habitat management plan.

2021

- Pulled Scotch broom.
- Cut and piled sprouting Oregon ash.
- Surveyed for bay horsehair lichen prior to cutting trees.
- Removed trees from open meadow that do not have bay horsehair lichen.
- Treated meadow knapweed (*Centaurea x moncktonii*) and other perennial weeds with herbicide in the spring.
- Treated Himalayan blackberry and other non-native woody species with herbicide in the fall.

- Coordinated with BLM fire management crew to burn piles of woody material.
- Seeded areas disturbed by restoration activities.
- Took photo points in June.

2022

- Removed Douglas-fir (*Pseudotsuga menziesii*) trees from open meadow that do not have bay horsehair lichen, creating burn piles with the limbs.
- Treated Himalayan blackberry, Scotch broom and one-seeded hawthorn with herbicide.
- Seed areas disturbed by restoration activities.
- Planted native fruit bearing shrubs.
- Planted native bulb forming forbs.

2023 (Proposed)

- Complete habitat management plan.
- Survey for bay horsehair lichen within ACEC and nearby BLM riparian areas.
- Mow Oregon ash regrowth, blackberry, one-seed hawthorn and Scotch broom.
- Spot spray Himalayan blackberry, Scotch broom, and one-seeded hawthorn in spring and/or fall with glyphosate or triclopyr.
- Spot spray thistles in the bolting-to-bud stage in spring with clopyralid.
- Cover burn piles and request BLM burn them fall 2023.
- Seed native mix, plant bulbs, plant fruit and nut bearing "living fence."

2024 (Proposed)

- Continue survey for bay horsehair lichen on nearby BLM riparian.
- Continue mowing, herbicide, and manual removal treatments of non-native plants.

2025 (Proposed)

- Completed survey for bay horsehair lichen on nearby BLM riparian areas.
- Continue mowing, herbicide, and manual removal treatments of non-native plants.

APPENDIX B. GAROUTTE PRAIRIE UNIT 2 PHOTO POINT 2019-2022