

McGowan Meadow Restoration: 2021 Annual Report



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PREFACE

IAE is a non-profit organization whose mission is 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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Cover photograph: McGowan Meadow: middle of the northern meadow section facing west on November 9, 2021.

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1. EXECUTIVE SUMMARY

The Institute for Applied Ecology (IAE) has conducted habitat restoration at McGowan Meadow in partnership with the Bureau of Land Management (BLM) since 2008. In 2021, IAE performed a variety of habitat restoration activities including tree removal, hand weeding, herbicide treatments, mowing, and native species seeding. 2021 was the first full year the use of herbicides have been permitted at McGowan Meadow. IAE completed herbicide spot treatments to reed canarygrass (*Phalaris arundinacea*), false brome (*Brachypodium sylvaticum*), Himalayan blackberry (*Rubus bifrons*), and teasel (*Dipsacus fullonum*). Tree and shrub removal was completed to release Oregon white oak (*Quercus garryana*), maintain the open meadow, and prepare the meadow for a prescribed burn in 2022. Burning preparations also included stump grinding, removing lower limbs of meadow edge trees, and removing logs from the meadow interior. In 2021, a population census of meadow checkermallow (*Sidalcea campestris*) was conducted and a comparison to previous year's data shows a population increase in the northern section of the meadow, but a population decrease in the southern section. Future restoration activities will include weed management, mowing and/or burning to reduce woody vegetation, conifer removal to preserve the open meadow and release Oregon white oaks, revegetation with appropriate native seed, plugs, bulbs, or bareroot plants.

2. INTRODUCTION

McGowan Meadow is a 6.3-acre, regionally-rare, mid-elevation wet meadow located in the Cascade foothills northeast of Springfield, Oregon (Figure 1). It is managed by the Bureau of Land Management (BLM) Upper Willamette Field Office, Northwest Oregon District. McGowan Meadow is designated as a BLM Area of Critical Environmental Concern (ACEC) and hosts a diverse community of native species, including a large population of meadow checkermallow (*Sidalcea campestris*), a BLM Species of Concern. Its mid-elevation position allows for immigration of lower elevation populations upwards, which may be important for long term prairie conservation in response to climate change in the Willamette Valley ecoregion.

In 2005, the Native Plant Conservation Program of the Oregon Department of Agriculture (ODA) developed a prairie habitat assessment with management recommendations for McGowan Meadow (Mitchell et al. 2005). The Institute for Applied Ecology (IAE) began working in partnership with the BLM to implement restoration at McGowan Meadow in 2008. This report describes McGowan Meadow restoration activities implemented by IAE in 2021. See Appendix A for a summary of restoration activities conducted by IAE from 2008 to 2021.

Prior to September 2020, manual and mechanical weed removal techniques were the only tools available to managers 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. While manual techniques will still be important for the management of McGowan Meadow, the use of herbicides will result in more efficient and effective control of perennial non-native weeds.

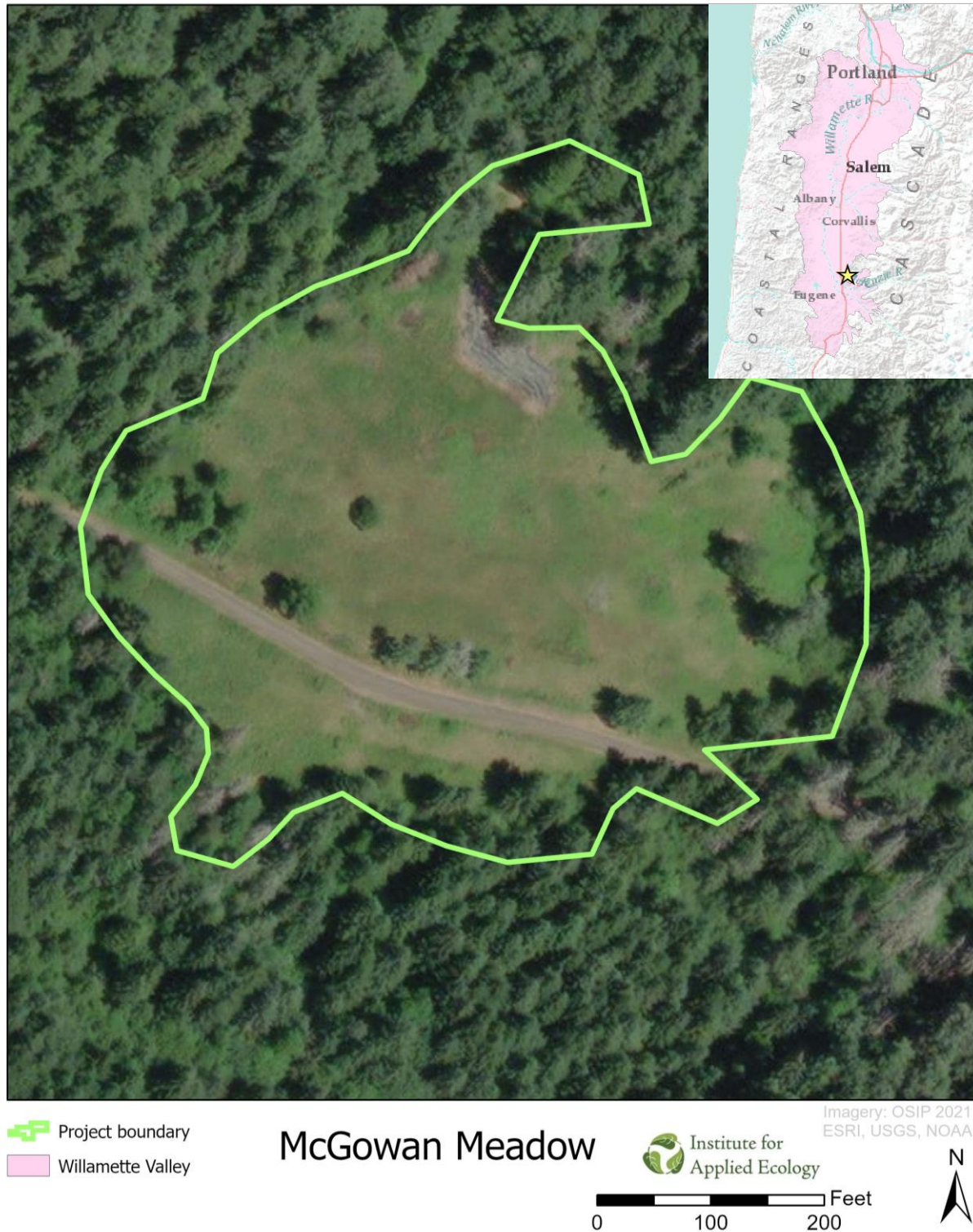


Figure 1. McGowan Meadow site location and project boundary.

3. PURPOSE AND OBJECTIVES

The purpose of this project is to assist the BLM with maintaining and improving rare mid-elevation prairie habitat in support of the native plant community and meadow checkermallow population at McGowan Meadow. The primary objectives of this project are to:

1. Control high priority invasive plants such as teasel (*Dipsacus fullonum*), false brome (*Brachypodium sylvaticum*), Scotch broom (*Cytisus scoparius*), reed canarygrass (*Phalaris arundinacea*), and Himalayan blackberry (*Rubus bifrons*).
2. Remove encroaching woody species to preserve open meadow habitat and release Oregon white oaks (*Quercus garryana*).
3. Prepare the site for prescribed burning.
4. Increase native plant community abundance and diversity.
5. Maintain and monitor the meadow checkermallow population.

4. 2021 RESTORATION ACTIVITIES

Restoration activities in 2021 included removing encroaching trees and shrubs, weed cloth removal, broadcast seeding to prepared areas and herbicide applications targeting reed canarygrass, false brome, teasel, and blackberry (Figure 2). See Table 2 for a complete list of activities completed at McGowan Meadow in 2021.

Trees and shrubs were cut down with chainsaws and dispersed under the forest canopy to release Oregon white oaks and prepare the site for prescribed burning in fall 2022. The removal of shrubs, lower branches and small trees along the meadow perimeter will make it easier to contain fire within the meadow during a prescribed burn.

2021 was a mowing year on the biennial mow plan. Mowing opens up space for native plants, reduces rose encroachment and thatch buildup, and allows for more effective herbicide treatments of non-native species. Cutaway Inc., an independent subcontractor, used a skid steer to mow the northern meadow section above of the road, grind 24 stumps and mow shrubs along the meadow edge, expanding the meadow by 0.1 acre (Figure 2). Due to the instability of wet soil in the southern meadow section, we were unable to mow and remove boulders and logs from the meadow interior with a skid steer. If possible, these actions should be completed in 2022.

Weed cloth that was installed in 2014 to control reed canary grass was removed from two locations in 2021. The weed cloth was successful at weed suppression and now the use of herbicide should allow us to eradicate the population. The smaller patch of weed cloth was removed in April and the larger patch was removed in September. Both areas were sprayed with herbicide in November to kill remaining vegetation then seeded with a native seed mix the same day.

Twelve pounds of middle elevation sourced native seed was purchased and combined with 15 pounds of older middle elevation seed that was donated to the project (Table 1). The seed was broadcast on bare ground across the site (Figure 2). All of the purchased seed, except soft rush (*Juncus effuses*), was broadcast entirely into the weed cloth removal areas. The donated seed and soft rush seed was used in the weed cloth removal areas and to exposed ground throughout the meadow.

In 2021, IAE spot-treated reed canarygrass, false brome, teasel, and Himalayan blackberry with glyphosate. All of these herbicide treatments took place in the northern section of meadow (Figure 2).

Table 1. Native seed mix broadcast at McGowan Meadow in 2021

Scientific Name	Common Name	Amount donated (lbs)	Amount purchased (lbs)	Total Seed (lbs)
<i>Achillea millefolium</i>	common yarrow		0.044	0.04
<i>Camassia quamash</i>	common camas	0.121		0.12
<i>Clarkia amoena</i> ssp. <i>lindleyi</i>	farewell-to-spring	0.126	0.15	0.28
<i>Danthonia californica</i>	California oatgrass	10.088	3.70	13.79
<i>Elymus glaucus</i>	blue wildrye		6.35	6.35
<i>Eriophyllum lanatum</i>	woolly sunflower	0.060	0.16	0.22
<i>Erythranthe guttata</i>	seep monkeyflower	0.012		0.01
<i>Erythranthe moschata</i>	musk monkeyflower	0.0002		0.0002
<i>Geranium oreganum</i>	Oregon geranium		0.68	0.68
<i>Geum macrophyllum</i>	large-leaved avens	0.005	0.0045	0.01
<i>Juncus effuses</i>	soft rush		0.41	0.41
<i>Juncus patens</i>	spreading rush	0.029		0.03
<i>Madia elegans</i>	showy tarweed		0.028	0.03
<i>Plectritis congesta</i>	shortspur seablush	0.085	0.07	0.15
<i>Potentilla gracilis</i>	slender cinquefoil	0.009		0.01
<i>Prunella vulgaris</i> var. <i>lanceolata</i>	common selfheal		0.38	0.38
<i>Ranunculus occidentalis</i>	western buttercup	0.013		0.01
<i>Ranunculus orthorhynchus</i>	straightbeak buttercup	0.018		0.02
<i>Sidalcea campestris</i>	meadow checkermallow	0.049		0.05
<i>Sidalcea virgata</i>	rose checkermallow	0.040		0.04
<i>Veratrum californicum</i> var <i>caudatum</i>	corn lily	0.199		0.20
<i>Veronica americana</i>	American speedwell	0.008		0.01
<i>Wyethia angustifolia</i>	narrowleaf mule's ear	4.001		4.00
	Totals:	14.864	11.977	26.841

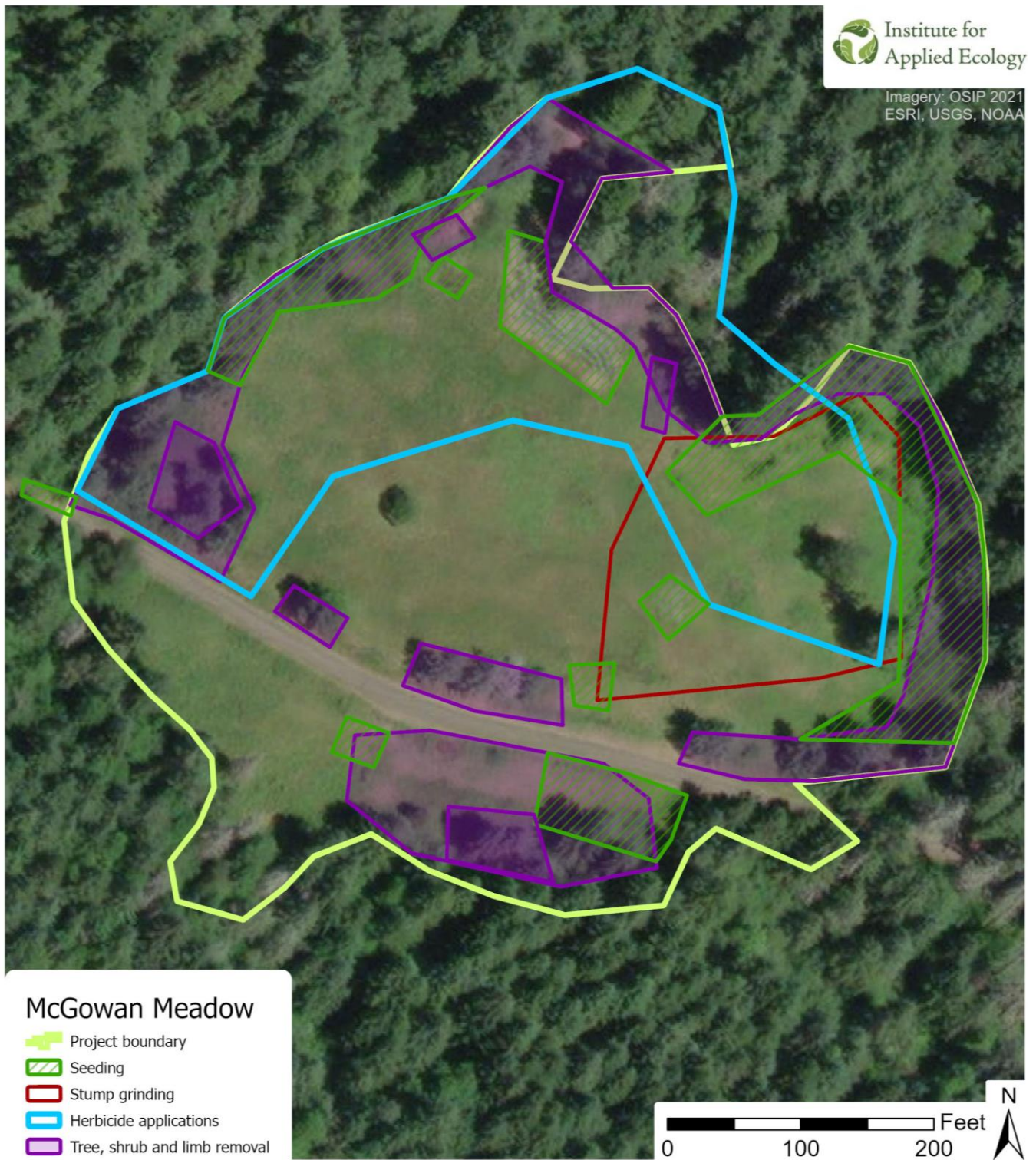


Figure 2. 2021 McGowan Meadow restoration activity map

Table 2. 2021 Restoration actions at McGowan Meadow.

Date	Personnel*	Task
March 16	IAE	Assessed reed canarygrass (<i>Phalaris arundinacea</i>) and false brome (<i>Brachypodium sylvaticum</i>) for treatment needs.
March 26	IAE	Weed-wacked Himalayan blackberry (<i>Rubus bifrons</i>). Removed woody material from meadow.
April 21	IAE	Spot sprayed reed canarygrass and false brome with glyphosate. Removed weed cloth from small patch.
May 6	IAE and BLM	Inspected site with BLM botanist and fire staff, evaluated readiness to burn in 2022 and identified preparation tasks. Mechanically removed shrubs and woody material from meadow edge.
May 18	IAE	Used chainsaws and brush cutters to remove brush and trees to prepare the meadow for prescribed burning. Pulled meadow knapweed (<i>Centaurea x moncktonii</i>)
June 3	IAE	Evaluated meadow checkermallow (<i>Sidalcea campestris</i>) phenology. Spot treated Himalayan blackberry, teasel (<i>Dipsacus fullonum</i>) and reed canarygrass. Hand pulled Scotch broom (<i>Cytisus scoparius</i>).
July 1	IAE	Monitored population of meadow checkermallow (<i>Sidalcea campestris</i>).
September 7	IAE	Removed weed cloth from large patch.
November 8-9	IAE and Cutaway Inc.	Cutaway Inc. mowed the northern meadow section, ground 24 stumps and IAE staff cut out 8 stumps and limbed 41 trees with chainsaws.
November 24	IAE	Spot sprayed weed cloth removal areas. Spot sprayed teasel and Himalayan blackberry in north meadow section.
November 24	IAE	Broadcasted a native seed mix to bare ground exposed from removal of the weed cloth, herbicide applications, and mowing.

*IAE=Institute for Applied Ecology, BLM=Bureau of Land Management

5. MEADOW CHECKERMALLOW MONITORING

5.1. Methods

In 2005, IAE established monitoring plots in McGowan Prairie and conducted a complete census of meadow checkermallow in 2005, 2008, 2009 and 2011 (Blakeley-Smith and Kaye 2005, 2006, 2008, 2010a, 2011). The census in 2005, 2008, 2009, and 2011 used seven plots, each containing between 20 and 120 subplots, which recorded the location of individual plants (Blakeley-Smith 2011). In 2021, a population census was performed but the plot and subplot methods were not used as with previous monitoring years. Beginning in 2009, vegetative plants were no longer recorded and only reproductive plants were tallied since vegetative meadow checkermallow very closely resembles vegetative dwarf checkermallow (*Sidalcea malviflora* ssp. *virgata*) and Oregon geranium (*Geranium oregonum*) and the confidence in the vegetative data was low.

In 2021, IAE Ecologists and BLM Botanist Jessica Celis evaluated previous methods used to census meadow checkermallow and it was determined that modifications to the protocol were necessary in order

to collect accurate data. Because meadow checkermallow spreads rhizomatously it can be difficult to determine individual plants, therefore, rhizomes separated by six-inches or more would be counted as individual plants. Rhizomes less than six inches would be considered to be one plant with multiple stems. It was also decided that a flowering stem would originate from the basal part of the plant and all higher branching would be considered the same stem. Only reproductive plants were counted to avoid misidentification with dwarf checkermallow and Oregon geranium. To complete the census, temporary lanes were created with meter tapes to create manageable areas for counting and locations of individual plants was not recorded as in previous years (Figure 3).



Figure 3. Meadow checkermallow (*Sidalcea campestris*) monitoring: Jessica Celis (BLM) and Julia Fields (IAE). Photo by Rolando Beorchia, July 01, 2021.

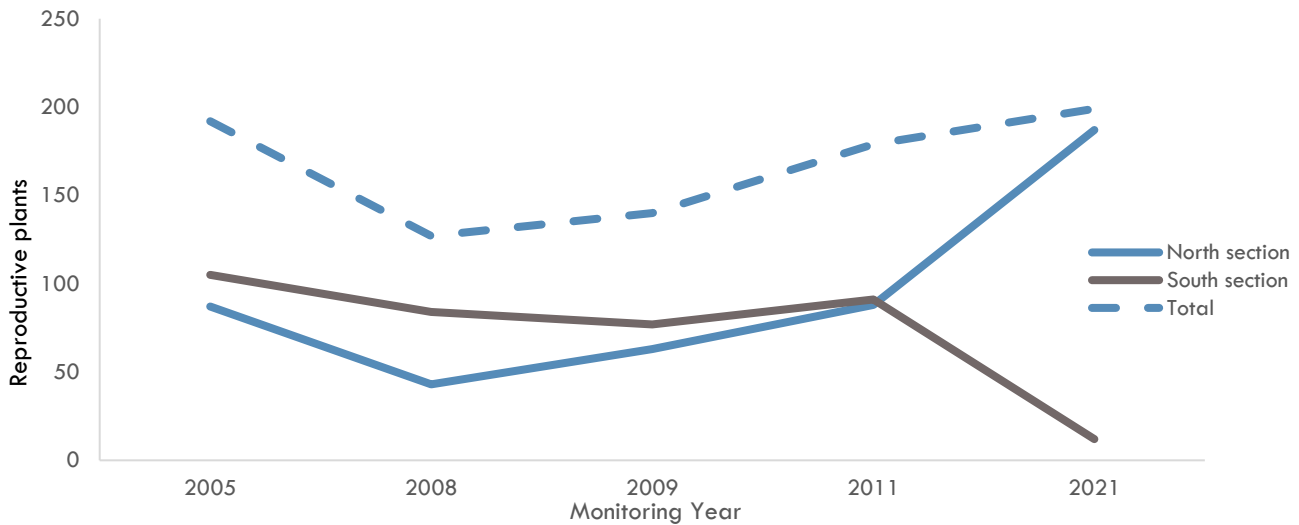
5.2. Results

Monitoring meadow checkermallow in 2021 showed an increase in reproductive plant population of 11%, from 179 plants (2011) to 199 plants (2021). There was a 16% increase in flowering stems from 225 stems (2011) to 261 stems (2021) (Table 3). A divergence in the data appeared when the population was separated by north and south meadow sections, which are geographically separated by the paved road. The north meadow section plants have increased 113% from 88 (2011) to 187 (2021) and flowering stems increased 130% from 108 (2011) to 249 (2021). The south meadow reproductive plants decreased 87% from 91 (2011) to 12 (2021) and flowering stems decreased 90% from 117 (2011) to 12 (2021) (Table 3, Figure 4).

Table 3. Meadow checkermallow (*Sidalcea campestris*) population monitoring results 1992-2021

Monitoring Year	1992	2005	2008	2009	2011	2021
McGowan north section: reproductive plants (flowering stems)		87 (118)	43 (62)	63 (86)	88 (108)	187 (249)
McGowan south section: reproductive plants (flowering stems)		105 (119)	84 (110)	77 (96)	91 (117)	12 (12)
Total:	25	192 (237)	127 (172)	140 (182)	179 (225)	199 (261)

*1992 data was not monitoring data, but the number of plants reported by J. Koenig on a Eugene District BLM Sensitive Plant Siting Form.

**Figure 4.** Meadow checkermallow (*Sidalcea campestris*) monitoring results McGowan north and south meadow sections, 2005-2021.

6. DISCUSSION

Monitoring results in 2021 revealed a divergence in meadow checkermallow abundance between the north and south sections. One explanation may be differences in mowing treatments between the north and south sections of the meadow. The south section of the meadow has not been mowed since 2016 and Nootka rose (*Rosa nutkana*) has formed dense patches that are over five feet tall and there is an accumulation of non-native grasses and thatch. The more accessible north section of the meadow was mowed in 2016, 2019, and 2021. Meadow checkermallow plugs were planted in the north and south sections in March 2010 (348 plugs) and in November 2013 (485 plugs), but it is unclear whether the plantings had an effect on the overall meadow checkermallow population.

From 2008 to 2019, treatments included hand pulling, grubbing or using chainsaws, mowers and weed whackers to fell or remove woody species. These efforts maintained open prairie habitat and limited the

spread of non-native species. The approval of the use of herbicides to control non-native species in 2020 increased the likelihood of significantly reducing the cover of non-native species, including reed canarygrass, false brome, Himalayan blackberry, and non-native thistles. Properly timed spot spray treatments will be a more efficient and effective method to control these species. Reed canarygrass treatments around the perimeter of the weed cloth removal areas continue in the spring and fall until it is eradicated from the meadow.

Other high priority non-native weeds should continue to be treated (Table 4). False brome, Himalayan blackberry, teasel, meadow knapweed (*Centaurea x moncktonii*), and thistles should be spot-treated in the spring before they have a chance to reproduce. Alternatively, these species can be hand-pulled or florets removed prior to setting seed. Hand-pulling teasel has been successful at reducing the abundance of this species over time.

In addition to non-native species, encroachment of woody species is a significant threat to the prairie habitat at McGowan Meadow. Himalayan blackberry can be spot-treated with herbicide throughout the meadow; however, many encroaching species, including Nootka rose, Oregon ash (*Fraxinus latifolia*), and trailing blackberry (*Rubus ursinus*) are native and cannot be targeted with herbicide. Therefore, it is essential that the meadow be mowed or burned every other year to maintain open habitat. Prescribed burning in 2022 should be followed by herbicide spot treatments and broadcast seeding of a diverse mix of native forbs and grasses including meadow checkermallow to expand the existing population.

Conifer removal in 2021 expanded open meadow habitat and reduced competition with Oregon white oaks along the edges of the meadow. IAE will continue with oak release and woody shrub reduction on the meadow edge.

Table 4. Non-native species that occur at McGowan Meadow

Scientific name	Common name
<i>Arrhenatherum elatius</i>	tall oatgrass
<i>Brachypodium sylvaticum</i>	false brome
<i>Centaurea x moncktonii</i>	meadow knapweed
<i>Cirsium arvense</i>	Canada thistle
<i>Cirsium vulgare</i>	bull thistle
<i>Cytisus scoparius</i>	Scotch broom
<i>Daucus carota</i>	Queen Anne's lace
<i>Dipsacus fullonum</i>	teasel
<i>Hypericum perforatum</i>	St. Johnswort
<i>Leucanthemum vulgare</i>	oxeye daisy
<i>Phalaris arundinacea</i>	reed canarygrass
<i>Rubus bifrons</i>	Himalayan blackberry
<i>Senecio jacobaea</i>	tansy ragwort

7. 2022 MANAGEMENT RECOMMENDATIONS

The overarching goal of this project is to restore regionally rare wet meadow habitat at McGowan Meadow by controlling priority invasive species and managing woody species encroachment. To achieve this goal, the following restoration activities are recommended in 2022 and beyond:

- Herbicide treatments:
 - Continue efforts to control and eradicate reed canarygrass by spot spraying with glyphosate in the spring and fall.
 - Spot spray false brome within the meadow and along the forest edge in summer and fall with glyphosate.
 - Spot spray Himalayan blackberry in fall with glyphosate or triclopyr.
 - Spot spray teasel in the rosette to bolting stage in spring and fall with glyphosate or clopyralid.
 - Spot spray thistles and meadow knapweed in the bolting to bud stage in spring with clopyralid.
- Manual weed removal:
 - Hand-pull priority weeds if they are not treated with herbicide prior to flowering: teasel, meadow knapweed, false brome, and Scotch broom. Site visits each year to pull weeds should continue for years to come.
 - Cut and bag inflorescences of Queen Anne's lace (*Daucus carota*), oxeye daisy (*Leucanthemum vulgare*), and thistles, and remove them from the site if they are not treated with herbicide prior to the flowering stage.
- Complete and implement a prescribed burn plan for McGowan Meadow to reduce woody species encroachment and thatch buildup in fall 2022.
- Mow the entire McGowan Meadow every two years to prevent woody species encroachment. If no prescribed burn occurs in 2022, then mow in 2023. If the burn does occur, next mowing is recommended two years after the burn.
- Remove conifers within and surrounding the meadow to expand the open meadow habitat and release Oregon white oak.
- 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.
- Once aggressive weed species are controlled, consider introduction of rare species, including meadow checkermallow.
 - Annually monitor survival of planted meadow checkermallow for at least three years to determine establishment success.
- Census naturally occurring population of meadow checkermallow annually or a minimum of every three years as resources allow.

8. REFERENCES

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APPENDICES

Appendix A: History of restoration activities (2008-2021)

2008

- Site inspection and partner coordination.
- Monitored meadow checkermallow (*Sidalcea campestris*).
- Seed collection of meadow checkermallow and mule's ear (*Wyethia angustifolia*).
- Brush cut Nootka rose (*Rosa nutkana*) and shrubs.
- Mowed 4 acres with front-loaded skid-steer with tracks.
- Felled and removed over 50 trees of various size including Douglas-fir (*Pseudotsuga menziesii*), Oregon ash (*Fraxinus latifolia*), incense cedar (*Calocedrus decurrens*), and English hawthorn (*Crataegus monogyna*).
- Hand pulled teasel (*Dipsacus fullonum*), false brome (*Brachypodium sylvaticum*), Scotch broom (*Cytisus scoparius*), and Himalayan blackberry (*Rubus bifrons*).
- Mowed reed canarygrass (*Phalaris arundinacea*).
- Trillium Gardens in Eugene, OR began production of ~500 plugs each of meadow checkermallow, western yarrow (*Achillea millefolium*), Hall's aster (*Symphotrichum hallii*), tufted hairgrass (*Deschampsia cespitosa*), splitawn sedge (*Carex tumulicola*), aspen fleabane (*Erigeron speciosus*), barestem biscuitroot (*Lomatium nudicaule*), and goldenrod (*Solidago canadensis*) to be planted in 2010.

2009

- Site inspection, partner coordination and public outreach with members of the Native Plant Society of Oregon and meeting attendees of meeting with NW Ecology Group and Central Cascades Adaptive Management Partnership.
- Monitored meadow checkermallow.
- Continued production of ~500 plugs for each of 8 species that began in 2008.
- Hand pulled teasel, false brome, Scotch broom, Himalayan blackberry.
- Mowed reed canarygrass.
- Cut and removed of Douglas-fir, incense cedar, and English hawthorn saplings and limbs of larger trees.
- Cut stems of English hawthorn re-sprouting from stumps cut in 2008 and 2009.

2010

- Site inspection and partner coordination.
- Planted 348 meadow checkermallow in March and monitored survival (100) in July.
- Cut and removed of Douglas-fir (*Pseudotsuga menziesii*) and incense cedar (*Calocedrus decurrens*) saplings and limbs of larger trees.
- Hand pulled teasel, Scotch broom, and meadow knapweed (*Centaurea x moncktonii*).
- IAE hired a labor crew to pull false brome.
- Mowed reed canarygrass prior to seed-set.
- Cut stems of English hawthorn re-sprouting from stumps cut in 2008, 2009, and 2010.

2010 cont.

- Planted 3,388 native species plugs with dibbles. Species included meadow checkermallow, western yarrow, Hall's aster, tufted hairgrass, splitawn sedge, aspen fleabane, mule's ear (*Wyethia angustifolia*), slender cinquefoil (*Potentilla gracilis*), slough sedge (*Carex obnupta*), common rush (*Juncus effusus*), lance selfheal (*Prunella vulgaris* v. *lanceolata*), dwarf checkermallow (*Sidalcea malviflora* ssp. *virgata*), and goldenrod.

2011

- Site inspection, partner coordination and installation of "No Shooting" signs by BLM.
- Monitored meadow checkermallow population and survival of 2010 plantings (64).
- Hand pulled false brome.
- IAE hired a labor crew to remove all teasel seed heads.
- Mowed entire meadow with front-loaded skid-steer with tracks.
- To release Oregon white oak (*Quercus garryana*), BLM felled ~50 Douglas-fir trees over 10 inches in diameter. Wood was cut into firewood to be removed from the site in 2012.

2012

- Site inspection and partner coordination.
- Bucked downed trees and removed wood and piled slash in the forest matrix.
- Seeded disturbed area with native species including western yarrow, Alaska brome (*Bromus sitchensis*), Columbia brome (*Bromus vulgaris*), California oatgrass (*Danthonia californica*), tufted hairgrass, blue wildrye (*Elymus glaucus*), Oregon sunshine (*Eriophyllum lanatum*), California fescue (*Festuca californica*), toughleaf iris (*Iris tenax*), slender cinquefoil, lance selfheal, western buttercup (*Ranunculus occidentalis*), and mule's ear.
- Hand pulled Scotch broom, teasel, and meadow knapweed.
- Mowed large forested patch of false brome during flowering.

2013

- Site inspection and partner coordination.
- Planted slender cinquefoil, western coneflower (*Rudbeckia occidentalis*), and dwarf checkermallow.
- Planted 485 meadow checkermallow
- Hand pulled false brome, teasel, and Scotch broom.
- Mowed false brome with a brush cutter.

2014

- Site inspection and partner coordination.
- Hand pulling of false brome, teasel, and bull thistle.
- Mowed entire meadow with IAE brush mower.
- Placed weed cloth over majority of reed canarygrass patch.

2015

- Site inspection and partner coordination.
- Repaired weed cloth covering reed canarygrass patch.
- Hand pulled false brome, teasel, and bull thistle.

2016

- Site inspection and partner coordination.
- Repaired weed cloth covering reed canarygrass patch.
- Pulled and removed seed heads from reed canarygrass extending beyond the weed cloth.
- Hand removed of false brome, teasel, Queen Anne's lace, and bull thistle.
- Contracted mowing of meadow using a skid-steer in November 2016.

2017

- Site inspection and partner coordination.
- Teasel removal.
- Repairing and weeding around and within weed cloth.

2018

- Site inspection and partner coordination.
- Hand removal of false brome, teasel, Scotch broom, reed canary grass, and conifer saplings.
- Monitor and mapping of plant community at McGowan Meadow for the Fire Dependent Ecosystem Project (Fire Resiliency Project).

2019

- Hand removal of teasel, false brome, and conifer seedlings and saplings within the meadow and along the meadow-forest edge.
- North section of the meadow was mowed the meadow to reduce effects of woody plant encroachment.
- Mowed around and within weed cloth edge where reed canarygrass was resprouting and repaired weed cloth.
- Removed approximately 24 trees ~20in. DBH and girdled another twelve.

2020

- Site inspection and partner coordination.
- Hand removal of teasel and meadow knapweed.
- Weed whacked reed canarygrass around weed cloth and spot sprayed with glyphosate.
- Spot sprayed false brome, teasel, and non-native thistle with glyphosate.
- Removed one tree, ~20 DBH and re-girdled several that were not significantly impacted by initial girdling.

2021

- Removed all weed cloth from the meadow.
- Spot sprayed reed canarygrass, false brome, Himalayan blackberry, teasel, and area where weed cloth was removed.
- Bur preparation:
 - Used a chainsaw to limb 41 trees and removed shrubs and from meadow edge.
 - An IAE subcontractor used an auger mounted to a skid steer to grind 32 stumps and remove woody debris from interior of the meadow.
- Mowed Himalayan blackberry and manually removed Scotch broom
- Completed a census of the population of meadow checkermallow.
- An IAE subcontractor mowed the north section of the meadow with a skid-steer in November.
- A diverse seed mix was broadcast to exposed bare ground from weed cloth removal and disturbed ground from mowing.

2022 (planned)

- Monitor population of meadow checkermallow.
- Spot spray reed canarygrass, Himalayan blackberry, false brome, meadow knapweed, teasel, and non-native thistle with herbicide. Manually remove inflorescences if not treated prior to flowering.
- Hand pull Scotch broom and lop conifer seedlings and saplings within the meadow and along the meadow-forest edge.
- Mow the south section of the meadow
- Prepare the south section of the meadow for a prescribed burn:
 - Use a chainsaw to limb trees and remove shrubs and from meadow edge.
 - Grind stumps and removed woody debris from interior of the meadow.
- Complete a prescribed burn of the entire meadow. (BLM)
- Procure native plant materials (seed and plugs) to augment after herbicide treatment and the prescribed burn.