

# Old Peak Meadow Habitat Enhancement Project: 2017 Annual Report



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Report to the City of Corvallis for  
agreement #PW 201-031-A2-250741

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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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## ACKNOWLEDGMENTS

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**Cover photographs:** Looking south over Old Peak Meadow. On the east side (left side of photo) are shrubs that were planted in 2015. Photo taken on September 18, 2017 by Andrew Esterson

## SUGGESTED CITATION

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# Old Peak Meadow Habitat Enhancement Project: 2017 Annual Report

## 1. EXECUTIVE SUMMARY

In 2017, the Institute for Applied Ecology (IAE) continued efforts to improve songbird habitat at Old Peak Meadow (Old Peak) by performing habitat restoration activities throughout the meadow. The primary focus of restoration was weed abatement. Oxeye daisy (*Leucanthemum vulgare*), Canadian thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), foxglove (*Digitalis purpurea*), fescue (*Vulpia sp.*) and false brome (*Brachypodium sylvaticum*) were targeted by herbicide applications and hand weeding. The meadow was mowed in early July to reduce seed-set of non-native species. Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*) trees in the northwest corner of the meadow were removed or limbed to release oaks and expand the meadow. Chocolate lily bulbs (*Fritillaria affinis*) were planted in the southern section of the meadow in December.

Members of the Oregon Hunter's Association (OHA) volunteered throughout the summer to water shrubs that were planted in 2015. These efforts, coupled with fencing around the shrubs have led to a 98% survival rate of shrubs planted in 2015.

Habitat restoration efforts by IAE are moving Old Peak closer to achieving project goals. Bird surveys in 2017 indicate that songbird diversity and meadow use has increased since 2011 (Vesely 2017). The plant community is still dominated by non-native species, but pockets of native species are present and provide structural diversity through the meadow. In 2018, IAE will continue to improve meadow habitat at Old Peak by managing non-native species and increasing native species richness and abundance by planting native species.

## 2. INTRODUCTION

Old Peak is a mid-elevation, remnant meadow located in the Corvallis Watershed and is owned by the City of Corvallis (City). Historically, Old Peak was part of a 160-acre homestead (personal communications with Ken McCall), but due to decades of conifer encroachment the meadow was reduced to approximately one acre in area. Between 2009 and 2013, the City removed 100 Douglas-fir trees, increasing the meadow area to approximately three acres. Songbird surveys completed between 2011 and 2013 indicated Old Peak was attracting fewer songbirds than expected, most likely a result of minimal floristic diversity and structure (Vesely 2013). Starting in 2014, IAE partnered with the City to perform habitat restoration to enhance site quality for songbirds. Since then, restoration actions by IAE have included:

- Controlling invasive species with herbicide, mowing and fire
- Increasing native species diversity and abundance via seeding and planting; and
- Creating structural diversity within the meadow and along the edges where the meadow transitions to forest by girdling and removing conifers, planting shrubs on the east edge of the meadow and seeding with a variety of native forbs and grasses

### 3. 2017 RESTORATION ACTIVITIES

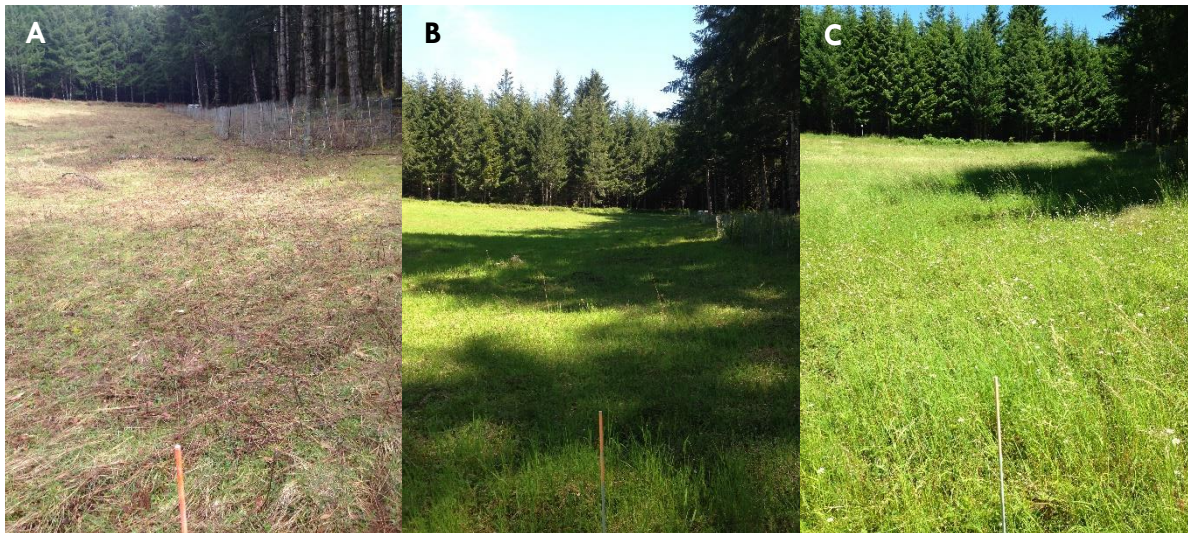
Management actions completed in 2017 aimed to reduce non-native species, increase planted shrub survival and growth and provide an updated inventory of the plant community (Table 1). Herbicide applications were used throughout the year to reduce cover of oxeye daisy, thistles, tall oatgrass, fescue and false brome. The City mowed Old Peak in July to prevent oxeye daisy from producing seed. The OHA watered shrubs along the east side of the meadow twice a month from July to September. Four photo points were established to observe changes in the meadow over time (Figure 1). In the northwest corner of the meadow, two Douglas-fir and five grand fir saplings were removed to release two oak trees (Figure 2). Conifers were cut into small segments and dragged into adjacent woods. In December, approximately 100 chocolate lily (*Fritillaria affinis*) bulbs were planted in the southern portion of the meadow. Bulbs were sourced from the Willamette Valley and donated from an OSU graduate student who was conducting experiments with *Fritillaria* species.



**Table 1.** Management actions completed at Old Peak in 2017.

Date	Action	Who
March 21	Established four photo points	IAE
May 1	Spot sprayed meadow to treat oxeye daisy and foxglove using clopyralid and glyphosate, respectively	IAE
May 10	Took photo point pictures	IAE
May 10	Plant community survey completed	IAE
May 15	Spot sprayed oxeye daisy with clopyralid	IAE
May 15	Spot sprayed fescue with glyphosate	IAE
June	Watered shrubs every other week	OHA
June	Spot sprayed false brome with glyphosate	IAE
June 20	Took photo point pictures	IAE
July	Watered shrubs every other week	OHA
July 1	Mowed meadow	City
August	Watered shrubs every other week	OHA
October 2	Spot sprayed oxeye daisy with clopyralid	IAE
December 6	Planted <i>Fritillaria affinis</i> (chocolate lily) bulbs	IAE

\*Institute for Applied Ecology (IAE), City of Corvallis (City), and the Oregon Hunter’s Association (OHA)



**Figure 1** 2017 photo point pictures showing seasonal changes to vegetation. Looking north from photo point 1 on A) March 21, B) May 10 and C) June 20.



**Figure 2.** Oak tree surrounded by conifers before tree removal (left); oak trees after conifer removal (right).

## 4. 2017 MONITORING

### 4.1. Methods

Plant community composition data at Old Peak was collected at ten randomly selected points in the meadow. At each point, a 1 m x 1 m sampling plot was used to identify and estimate percent cover of each plant species. Plant community surveys were completed on May 10, 2017 by IAE staff. Average percent cover was calculated by summing individual species cover from each plot and dividing by the total number of plots ( $n=10$ ).

Shrubs planted along the east side of the meadow in 2015 (Appendix B) were monitored on March 21, 2017 by IAE staff. The total number of shrubs in each enclosure was counted.

### 4.2. Results

2017 survey results indicate that the richness and abundance of non-native species is greater than native species (Table 2, Figure 3). The three most abundant species in 2017 were non-native and included tall oatgrass (*Arrhenatherum elatius*), squirreltail fescue (*Vulpia bromoides*) and oxeye daisy (*Leucanthemum*



*vulgare*). The most abundant native species were field woodrush (*Luzula campestris*), splitawn sedge (*Carex tumulicola*), and Virginia strawberry (*Fragaria virginiana*).

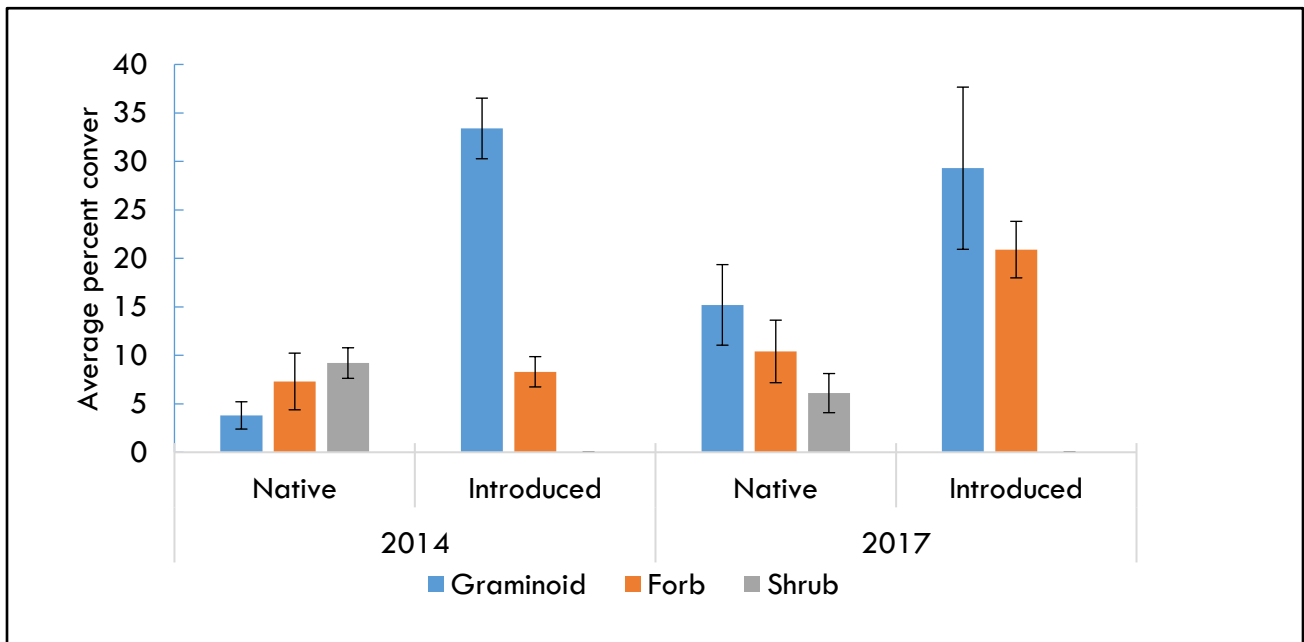
Of the 500 shrubs planted into 21 enclosures, 494 had survived as of March 2017. Oak trees planted outside the enclosures appeared healthy and unbrowsed.

**Table 2.** 2017 community composition at Old Peak meadow.

Scientific Name	Common Name	Native Status	Growth Habit	Average percent cover
<i>Arrhenatherum elatius</i>	tall oatgrass	Introduced	Graminoid	12.7
<i>Vulpia bromoides</i>	squirreltail fescue	Introduced	Graminoid	12.5
<i>Leucanthemum vulgare</i>	oxeye daisy	Introduced	Forb	9.3
<i>Rubus ursinus</i>	California blackberry	Native	Shrub	6.1
<i>Luzula campestris</i>	field woodrush	Native	Graminoid	5.9
<i>Carex tumulicola</i>	splitawn sedge	Native	Graminoid	5.5
<i>Fragaria virginiana</i>	Virginia strawberry	Native	Forb	3.6
<i>Trifolium dubium</i>	suckling clover	Introduced	Forb	3.0
<i>Cerastium glomeratum</i>	sticky chickweed	Introduced	Forb	2.8
<i>Festuca roemerii</i>	Roemer's fescue	Native	Graminoid	2.7
<i>Agrostis capillaris</i>	colonial bentgrass	Introduced	Graminoid	2.7
<i>Myosotis discolor</i>	changing forget-me-not	Introduced	Forb	2.1
<i>Geranium dissectum</i>	cutleaf geranium	Introduced	Forb	1.6
<i>Rumex acetosella</i>	common sheep sorrel	Introduced	Forb	1.4
<i>Elymus glaucus</i>	blue wildrye	Native	Graminoid	1.2
<i>Plectritis congesta</i>	shortspur seablush	Native	Forb	1.2
<i>Sherardia arvensis</i>	blue fieldmadder	Introduced	Forb	1.2
<i>Grindelia integrifolia</i>	Puget Sound gumweed	Native	Forb	1.0
<i>Hypochaeris radicata</i>	hairy cat's ear	Introduced	Forb	0.8
<i>Poa pratensis</i>	Kentucky bluegrass	Introduced	Graminoid	0.7
<i>Festuca arundinacea</i>	tall fescue	Introduced	Graminoid	0.5
<i>Achillea millefolium</i>	common yarrow	Native	Forb	0.4
<i>Acmispon micranthus</i>	small flowered lotus	Native	Forb	0.4
<i>Prunella vulgaris</i>	common selfheal	Native	Forb	0.4
<i>Ranunculus occidentalis</i>	western buttercup	Native	Forb	0.3
<i>Cardamine hirsute</i>	hairy bittercress	Introduced	Forb	0.3
<i>Cirsium arvense</i>	Canada thistle	Introduced	Forb	0.3
<i>Taraxacum officinale</i>	common dandelion	Introduced	Forb	0.3

Scientific Name	Common Name	Native Status	Growth Habit	Average percent cover
<i>Eriophyllum lanatum</i>	common woolly sunflower	Native	Forb	0.2
<i>Sidalcea malviflora ssp. Virgata</i>	dwarf checkerbloom	Native	Forb	0.2
<i>Brachypodium sylvaticum</i>	false brome	Introduced	Graminoid	0.1
<i>Vicia sativa</i>	garden vetch	Introduced	Forb	0.1

\* Average percent cover was calculated by summing individual species cover from each plot and dividing by the number of plots (10).



**Figure 3.** Average percent cover of native and introduced graminoids, forbs and shrubs at Old Peak in 2014 and 2017.

## 5. DISCUSSION

Between 2014 and 2017, restoration efforts conducted by IAE aimed to improve the plant community composition at Old Peak by increasing native species richness and abundance using a variety of management techniques (Appendix 1). This has proven to be a difficult task as non-native species are still the most abundant. However, small shifts in the native plant community, such as a doubling in Roemer’s fescue abundance and newly established pockets of yarrow (*Achillea millefolia*), Virginia strawberry

(*Fragaria virginiana*) and self-heal (*Prunella vulgaris*) indicate that native species augmentation is possible and can be successful with persistent weed management and native plantings.

One of the most problematic weeds to treat has been oxeye daisy. Previously, clopyralid has been the herbicide of choice to manage oxeye daisy. Clopyralid was used because it primarily targets species in the Asteraceae family and has little impact on other broadleaf and graminoid species. However, it does not appear to be entirely effective at controlling oxeye daisy at Old Peak. After clopyralid application, some oxeye daisy vegetation appears yellow (a positive sign that the herbicide is working), but new leaves have been observed growing from the same plant, indicating the treatment did not kill the plant. A recent study suggested that other chemicals such as aminopyralid, metsulfuron, picloram and glyphosate can be more effective at controlling oxeye daisy than clopyralid (Mangold et al. 2017). Some of these chemicals can persist in the soil for months (aminopyralid) which can affect germination, while others have been shown to leech through soils and infiltrate ground water (picloram). Glyphosate, a broad-spectrum herbicide, may be a good alternative to clopyralid at Old Peak. Glyphosate has proven to be effective at killing oxeye daisy. Glyphosate applications targeting oxeye daisy could be combined with applications targeting other non-natives with this chemical, ultimately reducing the amount of time needed to spray (because of tank cleaning between different chemicals).

In addition, to reduce non-native grass cover, grass specific herbicide applications need to be more frequent. Typically, there has been one grass specific herbicide treatment in the spring (Appendix 1). If an additional grass specific herbicide treatment is applied in the fall and again in early March, we expect to be more successful at reducing non-native grasses. Mowing may have contributed to the slight reduction in non-native grass cover between 2014 and 2017, but overall, non-native grasses still occupy a large portion of the meadow. If the current grass specific herbicide treatment continues (once a year), we are concerned that the non-native grasses will slowly expand and occupy more space, resulting in an increase in their contribution to the seed bank, an alteration to the fire regime, and a reduction of native species cover.

The 2015 shrub planting along the east side of the meadow has been successful. Watering conducted by the OHA during the summer provided adequate resources for shrub survival and growth. The enclosures have reduced herbivory to nearly zero. Based on the high survival rate and the strong stature of individual plants, the City, IAE and the OHA agreed that summer watering in 2018 was not needed. However, enclosures will remain in place for the foreseeable future.

## 6. NEXT STEPS

Management efforts in 2018 should focus on reducing non-native species cover, increasing native species abundance and diversity, and continue monitoring the plant community composition (Table 3). Specifically, the meadow at Old Peak should receive two spot spray herbicide treatments in the spring. The first treatment will use glyphosate or clopyralid and will target oxeye daisy and other non-native broad-leaf species, and the second will use Poast (sethoxydim) to target non-native grasses. Follow up spot spraying treatments using glyphosate will be used as needed on non-natives that survived initial treatments. For species that do not appear to be affected by herbicides, flame weeding will be used to reduce vegetation cover and expose bare ground. Once bare ground is exposed (from herbicide application

and flame weeding) a native seed mix will be broadcast and a variety of native species’ plugs and bulbs will be planted in the fall.

A primary goal of this project is to create structural diversity in the shrub and herbaceous layers of the meadow that contribute to songbird habitat. On the eastern edge of the site this has been accomplished by adding shrubs and girdling large conifers, two methods that are visually easy to see structural changes. However, in the meadow, it is difficult to see if management actions have generated structural diversity. In the spring of 2018 (while conducting the plant community surveys), we propose to survey community structure using the Robel pole method (Robel et al. 1970). This method is quick and easily performed, and provides surveyors a way to collect empirical data that can then be used in a statistical analysis to determine if the meadow is structurally diverse.

Finally, we recommend the development of a longer-termed site management plan to provide guidance for future restoration and management efforts. This plan will document site history, past management, and lay out recommended future management actions, including methodology and timing.

**Table 3.** Proposed 2018 management actions at Old Peak meadow.

Month	Action	Who
March	Take photo point pictures	IAE
April	Spot spray oxeye daisy with glyphosate or clopyralid	IAE
April	Spot spray non-native grasses with Poast (sethoxydim)	IAE
May	Take photo point pictures	IAE
May	Plant community and Robel pole surveys	IAE
May	Flame weed patches of non-native grasses if necessary	IAE
June	Mow if needed to prevent oxeye from going to seed	City
October	Spot spray non-native species with glyphosate	IAE
October	Broadcast native seed mix if site is prepared	IAE
October	Plant plugs if site is prepared	IAE
October – December	Write site management plan	IAE

\*Institute for Applied Ecology (IAE) and the City of Corvallis (City)

## 7. REFERENCES

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Mangold, J., R. Sheley, and M. Brown. 2017. Oxeye Daisy: Identification, Biology, and Integrated Management. MontGuide. Montana State University Extension Service. Bozeman, MT.



APPENDICES

**Appendix A. Old Peak Management History**

<b>Year</b>	<b>Date</b>	<b>Action</b>	<b>Who</b>
2009-2013	Unknown	Removed over 100 Douglas-fir from meadow	City/Contractor
2009-2013	Unknown	Removed lower limbs of conifers along east edge of site	City/Contractor
2009-2013	Unknown	Placed some of the felled Douglas-fir along the eastern edge for wildlife habitat	City/Contractor
2009-2013	Unknown	Mowed meadow to reduce tall oatgrass seed production	City
2009-2013	Unknown	Spot sprayed false brome using?	City
2009-2013	Unknown	Snag creation around heritage trees in the surrounding conifer stand	City
2011-2012	Unknown	Planted 120 trees and shrubs along eastern edge	City
2012	Unknown	Plastic weed barrier put around planted shrubs	IAE
2012	Unknown	Seedlings watered 2-3 times	IAE
2011-2013	Unknown	Songbird surveys completed	OWI
2014	Unknown	Snag creation	City
2014	Unknown	Planted community survey	IAE
2014	Unknown	Prescribed burn	ODF
2014	Unknown	Grass specific herbicide application to control non-native grasses	IAE
2014	Unknown	Native seeding	IAE
2014	Unknown	Spot spray glyphosate to control thistles, false brome, fescue and false dandelion	IAE
2015	Unknown	Planted 500 shrubs and 20 oak trees	IAE
2015	Unknown	Built enclosures around shrubs	IAE/City
2015	Unknown	Planted bulbs, runners and plugs (dwarf checkerbloom, onion, strawberry and iris)	IAE
2015	Unknown	Seeded meadow with native seed mix	IAE

Year	Date	Action	Who
2015	Unknown	Spot sprayed glyphosate to control thistles, false brome, rattail fescue and false dandelion	IAE
2016	16-Apr	Spot sprayed Poast to control non-native grasses	IAE
2016	Summer Months	Watered planted shrubs	OHA
2016	Unknown	Spot sprayed glyphosate to control thistles, false brome, rattail fescue and false dandelion	IAE
2017	21-Mar	Established four photo points; take photo point pictures	IAE
2017	1-May	Spot sprayed oxeye daisy and foxglove using clopyralid and glyphosate, respectively	IAE
2017	10-May	Took photo point pictures	IAE
2017	10-May	Community data survey	IAE
2017	15-May	Treated portions of meadow to control oxeye daisy with clopyralid	IAE
2017	15-May	Spot sprayed glyphosate to control rattail fescue	IAE
2017	June	Watered planted shrubs	OHA
2017	June	Spot sprayed false brome using glyphosate	IAE
2017	20-Jun	Took photo point pictures	IAE
2017	July	Watered planted shrubs	OHA
2017	1-Jul	Mowed entire site	City
2017	August	Watered planted shrubs	OHA
2017	2-Oct	Spot sprayed oxeye daisy with clopyralid	IAE
2017	6-Dec	Planted <i>Fritillaria affinis</i> (chocolate lily) bulbs	IAE

\*City of Corvallis (CITY), Institute for Applied Ecology (IAE), Oregon Hunter's Association (OHA)

**Appendix B. 2015 Shrub planting list**

<b>Scientific name</b>	<b>Common name</b>	<b>Quantity</b>
<i>Acer circinatum</i>	Pacific fire vine maple	50
<i>Amelanchier alnifolia</i>	Pacific serviceberry	50
<i>Corylus cornuta ssp. californica</i>	California hazelnut	40
<i>Holodiscus discolor</i>	ocean spray	50
<i>Mahonia aquifolium</i>	Oregon grape	50
<i>Oemleria cerasiformis</i>	Indian plum	50
<i>Quercus garryana</i>	Oregon white oak	20
<i>Rosa nutkana</i>	bristly rose	50
<i>Rubus leucodermis</i>	whitebark raspberry	50
<i>Rubus parviflorus</i>	thimbleberry	50
<i>Symphoricarpos albus</i>	snowberry	60