

Herbert Farm Restoration Summary July-December 2017-Web Version



3/21/2018

Report for the Willamette Wildlife Mitigation Program,
Oregon Department of Fish and Wildlife, and City of
Corvallis

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PREFACE

This report is the result of a Grant Agreement Number 222-17 between the Institute for Applied Ecology (IAE) and the Oregon Department of Fish and Wildlife. IAE is a non-profit organization whose mission is the conservation of native ecosystems through restoration, research and education. Our aim is to provide a service to public and private agencies and individuals by developing and communicating information on ecosystems, species, and effective management strategies and by conducting research, monitoring, and experiments. IAE offers educational opportunities through 3-4 month internships.



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Cover photograph: Bloom of farewell to spring, Hebert Farm, July 2017.

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Special Note: This report has been modified from its original format by removing maps and/or appendices that include information on the location of rare and sensitive species.

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REPORT FOR THE WILLAMETTE WILDLIFE MITIGATION PROGRAM,
OREGON DEPARTMENT OF FISH AND WILDLIFE

INTRODUCTION

The Willamette Valley spans 11,200 square miles and is home to some of Oregon’s most valuable wetland, riparian and biological resources. Large tracts of prairies and riparian habitat have been developed for rural and urban growth, agriculture, forestry and industry since European settlement in the ecoregion. Consequently, the small remnants that remain are isolated from each other and are impacted by invasive plant species.

Herbert Farm and Natural Area (HFNA), a 221 acre property south of Corvallis in Benton County (Figure 1), is owned by City of Corvallis (City) and has an Oregon Department of Fish and Wildlife (ODFW) conservation easement through the Willamette Wildlife Mitigation Program (WWMP) which is funded by the Bonneville Power Administration (BPA). Some areas in the southwest portion of the natural area have never been cultivated and retain diverse natural features, including upland prairie, oak savanna and forest plant communities (City of Corvallis 2011). Currently, approximately 59 acres of HFNA is in agricultural production; agricultural practices are gradually being phased out and areas restored to native habitats.

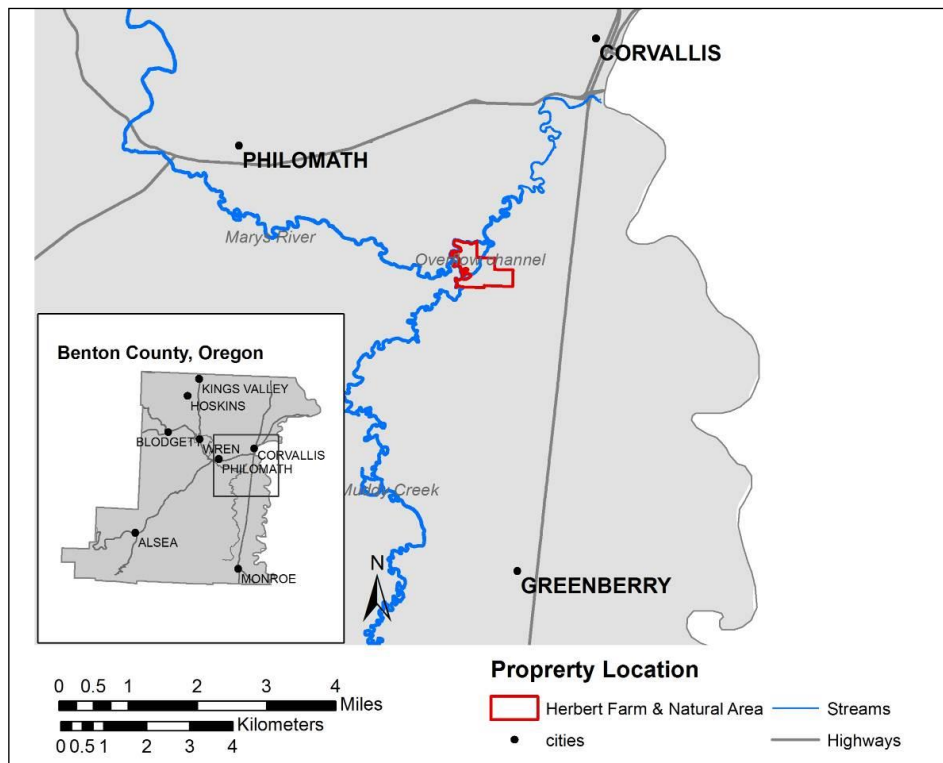


FIGURE 1. Herbert Farm and Natural area location, southwest of Corvallis, Benton County, Oregon.

The City developed a Management Plan for HFNA to guide restoration and management of the site over a 10 year period (2011-2021, City of Corvallis 2011). Despite previous agricultural use, the property retains areas of high quality native prairie, savanna and riparian ecosystems. These outstanding ecological values provide recreational, educational, and cultural resources. The Management Plan provides an opportunity for the City to protect and expand rare species populations, and to manage and restore rare habitats of the Willamette Valley. The plan proposed to transition areas out of farming over the course of many years and restore them to native habitat while retaining other areas where sustainable management practices would provide ecological benefits.

With the guidance of the overall Management Plan, Institute for Applied Ecology (IAE), in collaboration with restoration partners, including the City, ODFW, BPA, and the U.S. Fish and Wildlife Service (USFWS) has developed Habitat Restoration Plans (Menke et al. 2013, Moore 2017a) for two phases of habitat restoration at the site. Phase I, restoring the 84 acre area west of Matt Creek (Figure 2) began in 2013. Phase II, working in the area to the east of Matt Creek (Figure 2) began in 2015.

Phase I restoration has been conducted and coordinated by IAE using operations and maintenance funding from the WWMP, the Plants for People project, funded by the Oregon Watershed Enhancement Board, and contributing in-kind efforts from partners in the project, including USFWS, ODFW and the City. Phase I restoration activities included two years of site preparation that were followed by planting of prairie and riparian vegetation and ongoing maintenance (mowing, prescribed fire) and weed control.

Phase II restoration is funded by the WWMP, as well as a State Wildlife Grant (funded by USFWS). In addition, an Endangered Species Conservation Recovery Implementation grant (funded by USFWS) was implemented to compare restoration treatments for creating streaked horned lark (*Eremophila alpestris strigata*) habitat. In support, the USFWS Partners for Fish and Wildlife Program constructed berms in 2016 to flood swales with the intent to create bare ground and sparse vegetation for streaked horned lark habitat. A new project (funded by the City and the Federal Aviation Administration (FAA)) started in late 2017 and is following a 23 acre area of farmland to attract streaked horned larks and mitigate for impacts to the species during runway improvements at the Corvallis Municipal Airport.

Report Objectives

This report summarizes restoration work completed at HFNA which was supported with WWMP funds, and in-kind actions by partner agencies, from July 1 to December 31, 2017. The previous report (Moore 2017b) described work from July 2016 to June 2017. This is a shorter reporting period, because in following years there will be an annual report for the calendar year. Details of most other grants mentioned above are not given in the report but their actions are briefly summarized in the restoration schedules (Table 1, Table 2).

PROJECT SUMMARY FOR JULY-DECEMBER 2017

Work at HFNA included vegetation management, seeding and planting. Monitoring conducted in 2017 is also summarized below. The current stages of habitat at Herbert Farm are shown in Figure 3, with map codes provided for interpretation of tables and the text. The habitat restoration schedule at Herbert Farm is summarized in Table 1 and Table 2.

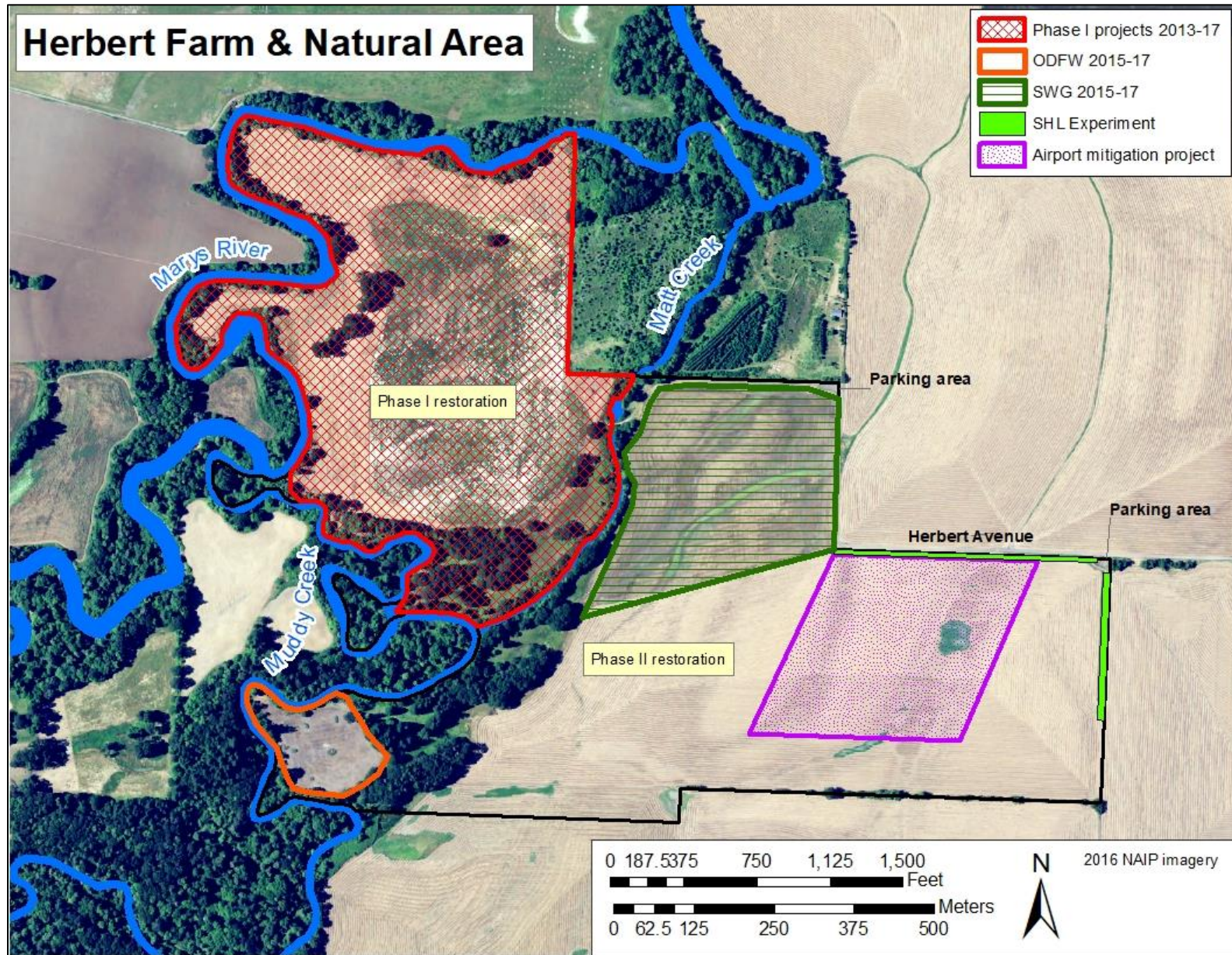


FIGURE 2. Restoration Areas of HFNA in 2017, Including Phase I projects (2013-17) And Phase II projects: ODFW (2015-17), State Wildlife Grant (SWG 2015-17) and streaked horned lark habitat experiment (2015-17).

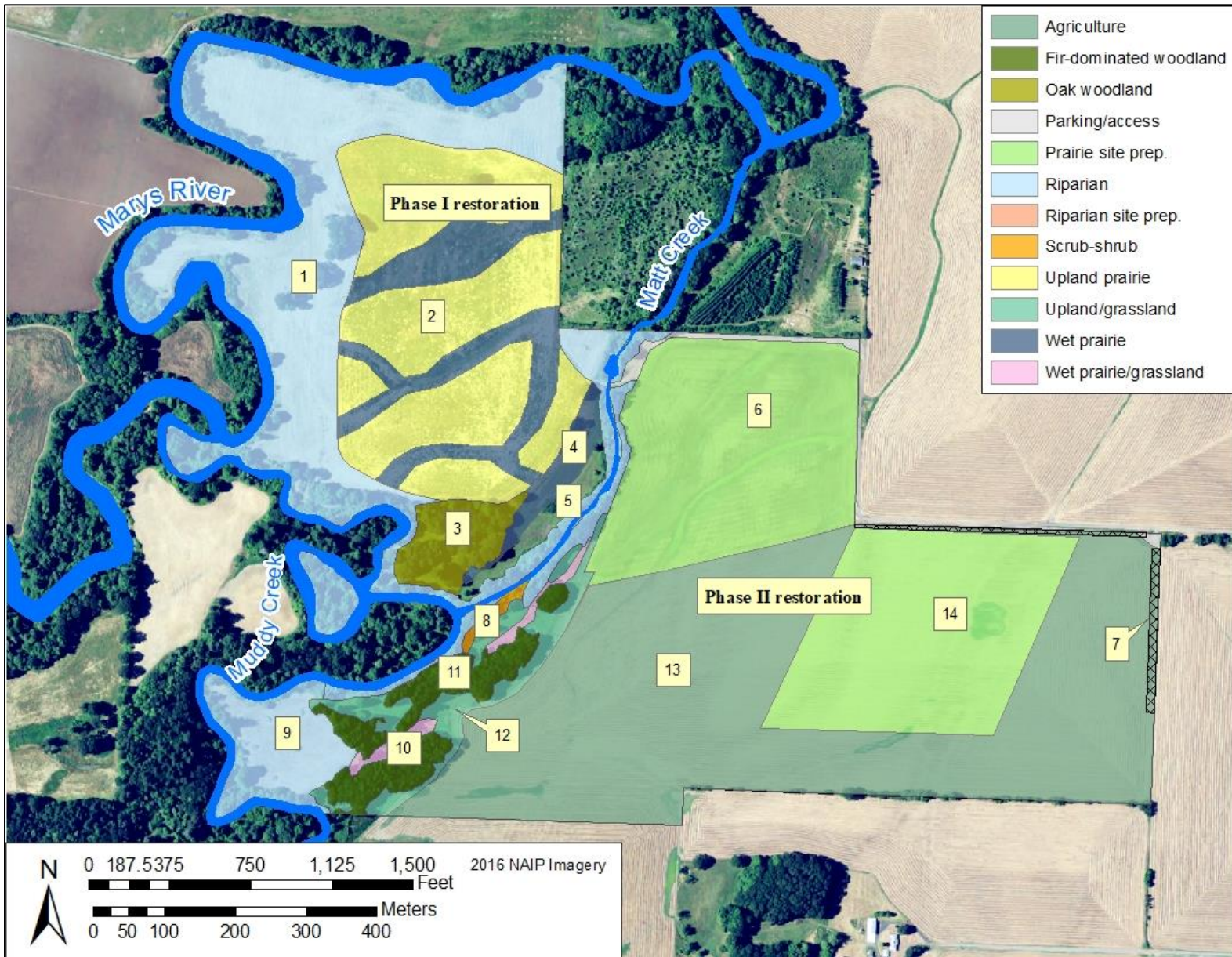


FIGURE 3. Current habitats at HFNA in 2017, with map codes for individual areas that are referred to in the tables and text.

TABLE 1. Restoration schedule in Phase I restoration areas of HFNA in July-December 2017, including map codes of restoration areas (see Figure 3).

Year		Riparian forest	Upland prairie + wet swales	Woodland	Wet prairie	Upland prairie
	Map code	1	2	3	4	5
	Acres	28	37	4	2	2
	Funder	ODFW	ODFW OWEB (P4People)	ODFW	ODFW	ODFW
2017	July	Spot spray, Photopoints	Planning for burn, Photopoints			
	August		Spot spray, City mow fire line ODFW mow prairie	City: mow	City: mow	City: mow
	September	Spot spray	City Fire Dept.: Prescribed burn			Spot spray
	October	Spot spray	USFWS: drill seed, incl. Kincaid's lupine & Golden paintbrush; hand seed wet swales & Kincaid's lupine			
	November		Plant bare root materials, incl. camas, yampah, milkweed			
	December					

TABLE 2. Restoration schedule in Phase II restoration areas of HFNA in July-December 2017, including map codes of restoration areas (Figure 3).

Year		Streaked horned lark habitat experiment	Prairie restoration incl. SHLA habitat	Fallow farmed field	Riparian restoration
	Map code	7	6	14	8, 9
	Acres	1	24	23	4.5
	Funder	USFWS	USFWS (SWG & Partners Program)	Airport mitigation (City/FAA)	ODFW
2017	July	Photopoints, Monitor larks			Spot spray
	August	Monitor larks, City: mow			
	September		Spot spray		Hand mow rows, Spot spray
	October	Photopoints	Broadcast spray	23 acres removed from farm agreement	
	November		Hand seed berms		Partial hand mow
	December				

Project Management

IAE staff provided reports and updates at partner meetings, assessed weed treatment needs, prepared treatment schedules, engaged subcontractors, planning and ordering seed and plant materials, preparing and delivering seed mixes, purchasing other supplies, installing and retrieving herbicide signs, marking and mapping treatment areas, and meeting contractors and partners to orient them to the site and discuss treatments.

Vegetation management

IAE staff conducted spot spray herbicide treatments and mowing in prairie and riparian habitat at Herbert Farm. These actions helped manage broadleaf weeds and pasture grasses. Partners, including the City and ODFW, also conducted mowing and a prescribed burn (Table 1, Table 2).

Detail of actions for each restoration area is provided below. Refer to Figure 3 for map codes.

Riparian Forest Restoration (Phase I: 28 acres, map code 1)

IAE staff spot sprayed thistles, particularly Canada thistle (*Cirsium arvense*), and other broadleaf weeds with Element 3A (triclopyr) on July 12, 2017.

Blackberries (*Rubus armeniacus*) around the whole perimeter of the riparian area, and Canada thistle and Bull thistles (*Cirsium vulgare*) were spot sprayed with Garlon 3A (triclopyr) in the northern 10 acres of high density riparian plantings on September 29, 2017. Thistles and reed canarygrass (*Phalaris arundinacea*) were spot sprayed with Stinger (clopyralid) and Rodeo (glyphosate) in the remaining parts of the high density and low density riparian plantings on October 16, 2017.

It was not necessary to mow between the planting rows in late summer, as grass and weed growth since the first mowing in June was minimal.

Upland prairie and wet swales (Phase I: 37 acres, map code 2)

IAE staff spot sprayed thistles, particularly Canada thistle, and other broadleaf weeds with Garlon 3A (triclopyr) on August 1, 2017.

A combination of mowing and a prescribed burn reduced the amount of thatch that had built up over the previous two growing season (Figure 4). On-site meetings were held with Corvallis Fire Department, City Parks and Recreation Department and USFWS during July and August to plan for the mowing and the prescribed burn.

The City of Corvallis mowed a fire line around the prairie in August 2017.

ODFW, with assistance from IAE, mowed most of the upland areas and wet swales on August 29-30, 2017 (Figure 4). Some patches of Puget Sound gumweed (*Grindelia integrifolia*) were not mowed, as they were still in flower. The mowing deck was set as high as possible (approximately 12 inches) in order to cut and dry the prominent seed heads of common madia (*Madia elegans*) and leave sufficient standing material to carry a fire during the planned prescribed burn.

The City Fire Department, with assistance from Oregon Department of Forestry and Philomath Fire and Rescue, conducted a prescribed burn over the entire prairie on October 4, 2017 (Figure 5). Most of the vegetation was consumed by the fire in the upland areas, but burning was less complete in the wet swales.

Woodland (Phase I: 4 acres, map code 3)

The City mowed the woodland understory in August 2017 as part of the annual maintenance program for the areas adjacent to Matt and Muddy Creeks.

Wet prairie (Phase I: 2 acres, map code 4)

The City mowed the wet prairie in August 2017.

Upland prairie (Phase I: 2 acres, map code 5)

The City mowed the upland prairie in August 2017. Blackberries along the perimeter were spot sprayed on September 29, 2017.



FIGURE 4. Left: Standing thatch that had built up in the Phase I restoration prairie of HFNA over three growing seasons, July 2017; Right: Ann Kreager of ODFW mowing the prairie, August 29, 2017.



FIGURE 5. Left: Prescribed burn conducted by Corvallis Fire Dept. at HFNA, October 4, 2017 (photo: Michel Wiman); Right: Drill lines in the prairie three weeks after USFWS seeded with a no-till drill, October 30, 2017.

Riparian restoration (Phase II: 4.5 acres, map codes 8, 9)

IAE staff spot sprayed thistles, particularly Canada thistle, and other broadleaf weeds with Element 3A (triclopyr) on July 11, 2017.

IAE staff hand mowed between the planting rows, to reduce competition from grasses and weeds, on September 19, 2017. This was the second mowing for the season in this area. An additional small part of the restoration area that has not yet been planted with trees and shrubs, was mowed on November 16, 2017.

Blackberries and Canada thistles were spot sprayed with Garlon 3A (triclopyr) around the perimeter of the planting area on September 29, 2017.

Prairie restoration (Phase II: 24 acres, map code 6)

Management activities of this prairie are mostly conducted under the auspices of the State Wildlife Grant. The seeding which occurred in fall 2016 was unsuccessful due to flooding during winter, so site preparation continued through 2017.

The City mowed the northern field edge in August 2017.

IAE staff spot sprayed a scattered patch of field bindweed (*Convolvulus arvensis*) with Garlon 3A (triclopyr) along the access road on the eastern side of the field on September 29, 2017.

Seeding and Planting

Plant materials purchased for 2018

Kincaid's lupine (*Lupinus oreganus*), Nelson's checkermallow (*Sidalcea nelsoniana*) and peacock larkspur (*Delphinium parvonaceum*) seed was sown into "conetainers" and put into cold stratification in a cooler at Kiger Island Blues in November 2017. Lupine will be grown through the winter at the Oregon State University greenhouse and planted in the Phase I upland prairies in April 2018. The other two species will be grown through 2018 and planted in November 2018.

Approximately 71 pounds of seed was purchased with grant funds in 2017 and stored at Finley National Wildlife Refuge. This will be sown in the Phase II prairie (map code 6) in October 2018. Seed mixes are generally not finalized until early October, because some species are harvested by growers late in the season. This limits the window of opportunity for drilling seed before the rainy season sets in and increases the chance of seed being washed away before it settles into the soil or germinates. The plan is to sow the seed earlier than usual in 2018, relatively early in the planting season, to improve establishment success in this flood-prone area.

Upland prairie and wet swales (Phase I: 37 acres, map code 2)

295 pound of native forb and graminoid seed was purchased with grant funds for seeding after the prescribed burn. Separate mixes were created for upland and wet swales (Table 3). The upland areas (29 acres) were seeded with a no-till drill by USFW on October 9, 2017 (Figure 5, Figure 6), and remaining forb seed was broadcast by IAE staff on October 16, 2017. Wet swales (8 acres) were broadcast by IAE staff using a hand-crank belly seeder on October 18, 2017 (Figure 6).

Golden paintbrush (*Castilleja levisecta*)(1.69 pounds), and one pound of Kincaid's lupine, was sown in 3.75 acres of the southern parts of the upland prairie on October 9, 2017 (Table 3). These species were made available by USFWS-funded projects at no cost to the grant. An additional one pound of Kincaid's lupine was purchased and broadcast in the southern prairie on October 18, 2017 (Figure 6).

The Plants for People project held a volunteer planting day on November 3, 2017 and 1120 great camas (*Camassia leichtlinii*), 250 other bulbs, 200 Gairdner's yampah (*Perideridia gairdneri*), and 394 showy milkweed (*Asclepias speciosum*) were planted.

FIGURE 6. Areas sown with native seed, including threatened species, at HFNA in October 2017. **(Figure has been removed from this web version of the report).**

TABLE 3. Native seed, including threatened species, sown in the 37 acre Phase I restoration prairie (map code 2) at HFNA in October 2017.

Species	Scientific name	Growth form	Upland prairie 29 acres	Wet swales 8 acres
Common yarrow	<i>Achillea millefolium</i>	Forb	0.00	0.02
Blue-eyed Mary	<i>Collinsia grandiflora</i>	Forb	0.21	0.00
Grand collomia	<i>Collomia grandiflora</i>	Forb	0.77	0.00
Eligant calicoflower	<i>Downingia elegans</i>	Forb	0.00	0.11
Denseflower willowherb	<i>Epilobium densiflorum</i>	Forb	0.00	0.26
Oregon sunshine	<i>Eriophyllum lanatum</i>	Forb	0.37	0.19
Varileaf phacelia	<i>Phacelia heterophyllia</i>	Forb	0.18	0.00
Fragrant popcornflower	<i>Plagiobothrys figuratus</i>	Forb	0.00	0.15
Shortspur seablush	<i>Plectritis congesta</i>	Forb	0.07	0.00
Slender cinquefoil	<i>Potentilla gracilis</i>	Forb	0.15	0.23
Common selfheal	<i>Prunella vulgaris</i>	Forb	0.87	0.54
Dwarf checkermallow	<i>Sidalcea virgata</i>	Forb	0.33	0.00
Total pounds per acre of forbs			2.95	1.49
Spike bentgrass	<i>Agrostis exarata</i>	Grass		0.04
American sloughgrass	<i>Beckmannia syzigachne</i>	Grass		0.56
California brome	<i>Bromus carinatus</i>	Grass		
Alaska brome	<i>Bromus sitchensis</i>	Grass	0.69	
Dense sedge	<i>Carex densa</i>	Sedge		0.16
Splitawn sedge	<i>Carex tumulicola</i>	Sedge	0.09	
Lateral sedge	<i>Carex unilateralis</i>	Sedge		0.32
California oatgrass	<i>Danthonia californica</i>	Grass	1.87	2.49
Tufted hairgrass	<i>Deschampsia cespitosa</i>	Grass		0.23
Blue wildrye	<i>Elymus glaucus</i>	Grass	2.18	
Roemer's fescue	<i>Festuca roemerii</i>	Grass	0.52	
Poverty rush	<i>Juncus tenuis</i>	Rush		0.02
Prairie junegrass	<i>Koeleria macrantha</i>	Grass	0.11	
Pine bluegrass	<i>Poa secunda</i>	Grass	0.30	
Total pounds per acre of graminoids			5.76	3.8
Total pounds per acre			8.7	5.3
Total pounds sown			252.7	42.5
Threatened species	Scientific name	Growth form	Upland prairie 3.75 acres	
Golden paintbrush	<i>Castilleja levisecta</i>	Forb	0.45	
Total pounds sown in 3.75 acres*			1.69	
Kincaid's lupine	<i>Lupinus oreganus</i>	Forb	0.53	
Total pounds sown in 3.75 acres			2.0	

* An additional 1.97 lbs of Oregon sunshine was mixed with the golden paintbrush.

Monitoring and habitat observations

Informal monitoring of invasive plants occurred on a regular basis to help guide restoration treatments. Prairie monitoring was conducted in June 2017 for the City to comply with its obligations under the Benton County Prairie Species Habitat Conservation Plan (Menke 2017). A total of 25 plots (2m x 2m) were sampled for community composition and cover in Phase I prairies (map codes 2, 4 and 5). This data provides a comparison with pre-project monitoring that was conducted in 2013 (Menke and Moore 2013)(Table 4). Findings are summarized here to provide perspective on the progress of restoration of the Phase I prairies. Monitoring of riparian plots (Moore *et al.* 2017) was summarized in the previous annual report (Moore 2017b).

TABLE 4. Vegetation cover in monitored plots in Phase I prairies at HFNA in 2013 and 2017.

Area	Map code	# of plots	Percent (%) Vegetative Cover (Absolute)							
			2013				2017			
			Native	Exotic	Shrub/ tree	Thatch /litter	Native	Exotic	Shrub/ tree	Thatch/ litter
Upland (2 acres)	5	5	33.4	51.6	9.4	9.8	21.5	66.7	16.1	17
Wet prairie (2 acres)	4	5	15.3	79.7	1.6	8	47.9	57.1	0	5.6
Upland prairie and wet swales (37 acres)	2	15*	0	89.7	0	1	83.2	10.4	0	13.4

*Field was a monoculture of annual ryegrass in 2013, so only 3 of the 15 plots were sampled.

Upland prairie (Phase I: 2 acres, map code 5)

There was a decrease in native cover in the upland prairie (map code 5) between 2013 and 2017 (Table 4). Principal weed species include oxeye daisy (*Leucanthemum vulgare*), Queen Anne's lace (*Daucus carota*), narrowleaf plantain (*Plantago lanceolata*), colonial bentgrass (*Agrostis capillaris*), and tall fescue (*Schedonorus arundinacea*), and there is encroachment by native shrubs, such as poison oak (*Toxicodendron diversilobum*) and common snowberry (*Symphoricarpos albus*), and introduced sweetbriar rose (*Rosa eglanteria*). Increases in exotic species may be a result of annual mowing being too late in the season to limit seeding, and the relative limited herbicide control, due to presence of threatened species. It is possible that native composition may improve over the next 2-3 years, as seed sown subsequent to the prescribed burn in fall 2016 becomes established. The annual native plant farewell to spring (*Clarkia amoena*) became more evident during July (Figure 7), and perennials may become more evident next year. Augmentation of the populations of Nelson's checkermallow, Kincaid's lupine and peacock larkspur (Figure 8) has expanded their distribution, and this is most evident for Nelson's checkermallow along the bank between the upland and adjacent wet prairie.

Wet prairie (Phase I: 2 acres, map code 4)

The wet prairie (map code 5) increased in native cover from 15% to almost 50% over four years (Table 4). This area was sprayed out in 2014-2015 and seeded with native species in fall 2015. The main native components are tufted hairgrass (*Deschampsia cespitosa*) and meadow barley (*Hordeum brachyantherum*), and introduced species included bird's-foot trefoil (*Lotus corniculatus*), colonial bentgrass and reed canarygrass.



FIGURE 7. Left: Flowers of Queen Anne's lace and farewell to spring mixed with introduced grasses in the upland prairie (map code 5), HFNA, July 2017; Right: Farewell to spring mixed with poison oak in upland prairie (map code 5), HFNA, July 2017 (photo: Andy Neill).



FIGURE 8. Nelson's checkermallow, peacock larkspur and Kincaid's lupine in the upland prairie (map code 5), HFNA, June 2017.

Upland prairie and wet swales (Phase I: 37 acres, map code 2)

The new restored prairie (map code 2) increased from 0-83% native cover in four years, since the former agriculture field was sprayed out in 2013-2014, and seeded with native species in 2014, 2015 and 2016. Common native forbs include tarweed (*Madia* sp.), Oregon sunshine (*Eriophyllum lanatum*), Puget Sound gumweed (*Grindelia integrifolia*)(Figure 9), and Scouler’s popcornflower (*Plagiobothrys scouleri*), and common native grasses include tufted hairgrass, Roemer’s fescue (*Festuca roemerii*), and meadow barley. Introduced grasses are patchy in distribution but include annual (Italian) ryegrass (*Lolium perenne* ssp. *multiflorum*), colonial bentgrass and creeping bentgrass (*Agrostis stolonifera*).



FIGURE 9. Common madia (left) in upland and Puget Sound gumweed (right) in wet prairie swales in the restored Phase I prairie (map code 2), HFNA, July 2017.

Counts of riparian trees and shrubs

Trees and shrubs were planted in 28 acres (Phase I, map code 1) in March 2015 and inter-planted in February 2016. In subsequent years a subsample of surviving trees and shrubs have been counted on 17 non-random transects (Table 5). The additional planting in 2016, coupled with higher survival, has resulted in some recovery in numbers by August 2017, compared to the low point in November 2015 after a drought (Table 5). The resulting density at two transects in August 2017 was 268 stems per acre in low density areas and 1249 stems per acre in high density plantings (Figure 10). As plants establish they growing above the competing grasses and bushing out, particularly in the lower elevation areas which retain more moisture during the summer than the drier uplands. A small sample of trees and shrubs that were planted in February 2017 in the new Phase II riparian area were evaluated in August 2017. The survival during the first growing season was double that observed in the Phase I riparian plantings during 2015 (Table 5). This may reflect higher than average rainfall in spring 2017.

TABLE 5. Total counts of trees and shrubs on 17 transects in riparian planting areas at HFNA, 2015-2017.

Date	Live stems counted (subsample) per planting density category			First year survival	Comment
	Phase I		Phase II		
	Low density (7 acres)	High density (21 acres)	High density (4.5 acres)		
March 2015	264	691			Original number planted
November 2015	145	263		43%	Number survived first growing season
February 2016					Approximately 25% additional trees were inter-planted into the Phase I areas
August 2016	200	490			Total counted from 2 cohorts
February 2017			195		Original number planted
August 2017*	222	407	176	90%	*Total counted from 2 cohorts in the Phase I areas; first year survival in the Phase II area.



FIGURE 10. High density (left) and low density (right) riparian plantings (map code 1) at HFNA, July 2017.

OUTREACH

Jeremy Ojua from Confederated Tribes of Grand Ronde and six volunteers attended the planting event at Herbert Farm on November 3, 2017. The event was promoted in a Facebook post (<https://www.facebook.com/Applied.Ecology/>) in November and in a web story “Tribal nursery raises plants and awareness” (<https://appliedeco.org/tribal-nursery-raises-plants-and-awareness/>).

CONCLUSIONS

Continued work is needed to maintain the progress of restoration efforts, prevent infestations of new invasive species, and continue reducing existing invasive species cover.

Prairie vegetation and riparian tree and shrub establishment is progressing well. We are extremely grateful for the leadership of the Corvallis Fire Department in completing the prescribed burn, and hope to repeat this success in the future. Rare plant populations are expanding with habitat improvements and active introductions and augmentations.

Restoration work in the Phase I and Phase II areas of Herbert Farm will continue, as described in the overall Management Plan and the respective restoration plans for each area.

A key to the overall success at Herbert Farm has been the collaboration between IAE, the City, ODFW and USFWS, with each agency contributing important on-the-ground actions and project support.

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