



Upland Prairie WHIP Planting, Polk County, Oregon

Field Planting Case Study Report

October 2018

Objective: Wildlife habitat
County: Polk, OR
Average Annual Precipitation: 45 inches
MLRA: 2 – Willamette & Puget Sound Valleys
Dominant Soil Type: Jory silty clay loam
Slope: 10-20 %
Aspect: west
Elevation: 520 ft
Site Preparation: spray fall of 2012, spray three times in 2013
Seedbed Condition: lightly disked
Seeding Date: October 22, 2013
Seeding Rate: 30, 50, and 70 seeds per square foot
Seed Cost: donated by PMC
Seeding Method: drilled, cone seeder
Acres Seeded or Plot Design: 2.6 total acres split in 3 plots
Previous Site History: weedy pasture
Fertilizer: none
Irrigation: none
Grazing: none
Monitoring Date: June 20, 2018



Figure 1. Corvallis PMC staff members Tyler Ross, Amy Bartow, and Kathy Pendergrass use a precision cone-seeder to install a seeding rate study on an upland prairie WHIP project in Polk Co., Oregon, October 22, 2013.

Introduction:

The Corvallis, Oregon Plant Material Center's (PMC) assistance was requested for seeding experimental plots for a Wildlife Habitat Incentives Program project (WHIP) in Polk Co., Oregon. The overarching goal of work at the site has been to restore an abandoned orchard, pasture, and unmanaged woodland to oak savanna and upland prairie. The goal of the most recent demonstration seeding was to determine the best seeding rate for establishing a native upland prairie plant community. An additional benefit of this project will be to provide nectar and pollen food sources for insects. Insects provide high protein food for adult birds while rearing young in nearby nests in oak savannas and oak woodlands. Insects also provide food necessary to improve body condition for birds preparing to migrate in the fall.

In the fall of 2012, the site was treated with glyphosate to kill existing weedy vegetation. It was mowed in the spring to break up the thatch and encourage germination of weeds in the seed bank. Three more applications of glyphosate occurred in the summer of 2013. The site was lightly disked (with a cover crop disk) in late summer of 2013 to prepare the site (i.e. to help decompose the dead plant litter) for seeding. Heavy rain in September caused a lot of germination of weeds which were treated with glyphosate prior to seeding the trial plots in late October.

Plots were seeded on October 22, 2013 using the PMC's precision cone-seeder. This seed drill was chosen for its accuracy and consistency. Three un-replicated plots, each about an acre, were seeded

using rates of 30, 50, or 70 seeds per square foot. The same mix was used for all plots. The mix used contains 35% grasses and 65% forbs (based on number of seeds in the mix, Table 1). Rows were drilled less than a ¼" deep on 12" spacing.

Table 1. Species composition of upland prairie seeding rate study on a WHIP planting in Polk Co, Oregon planted at three different seeding rates.

Species	Common name	Percent of mix	Target bulk seeding rate					
			30 seeds/ft ²		50 seeds/ft ²		70 seeds/ft ²	
			seed/ft ²	lb/ac	seed/ft ²	lb/ac	seed/ft ²	lb/ac
Forbs								
<i>Achillea millefolium</i>	western yarrow	10.00%	3	0.06	5	0.10	7	0.15
<i>Asclepias speciosa</i>	showy milkweed	0.20%	0.05	0.03	0.1	0.04	0.1	0.06
<i>Camassia leichtlinii</i>	great camas	0.50%	0.15	0.08	0.3	0.14	0.4	0.19
<i>Clarkia amoena</i> ssp. <i>lindleyi</i>	farewell to spring	1.00%	0.3	0.01	0.5	0.02	0.7	0.03
<i>Eriophyllum lanatum</i>	Oregon sunshine	8.00%	2.4	0.09	4	0.15	5.6	0.21
<i>Grindelia integrifolia</i>	Puget Sound gumweed	2.00%	0.6	0.20	1	0.34	1.4	0.48
<i>Iris tenax</i>	Oregon iris	0.25%	0.08	0.07	0.1	0.12	0.2	0.17
<i>Lupinus rivularis</i>	riverbank lupine	2.00%	0.6	0.90	1	1.51	1.4	2.11
<i>Plectritis congesta</i>	rosy seablush	5.00%	1.5	0.07	2.5	0.12	3.5	0.17
<i>Potentilla gracilis</i>	slender cinquefoil	10.00%	3	0.09	5	0.15	7	0.22
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	lanceleaf selfheal	10.00%	3	0.24	5	0.41	7	0.57
<i>Ranunculus occidentalis</i>	western buttercup	4.00%	1.2	0.26	2	0.44	2.8	0.61
<i>Sidalcea campestris</i>	meadow checkermallow	3.00%	0.9	0.44	1.5	0.73	2.1	1.03
<i>Symphotrichum hallii</i>	Hall's aster	9.00%	2.7	0.07	4.5	0.12	6.3	0.17
<i>Wyethia angustifolia</i>	narrowleaf mule's ears	0.25%	0.08	0.09	0.1	0.16	0.2	0.22
Grasses								
<i>Danthonia californica</i>	California oatgrass	10.00%	3	0.93	5	1.56	7	2.18
<i>Elymus glaucus</i>	blue wildrye	2.00%	0.6	0.22	1	0.36	1.4	0.51
<i>Elymus trachycaulus</i>	slender wheatgrass	2.00%	0.6	0.19	1	0.32	1.4	0.45
<i>Festuca roemerii</i>	Roemer's fescue	15.00%	4.5	0.39	7.5	0.65	10.5	0.91
<i>Juncus occidentalis</i>	western rush	6.00%	1.8	0.00	3	0.01	4.2	0.01
Totals:		100%	30.05	4.47	50.1	7.45	70.1	10.44

Results:

NRCS staff visited the field planting on June 20, 2018 (4.5 years after seeding). Cover data were recorded at 1-ft intervals along a 100-ft transect in each of the plots, as well as the adjacent unseeded area as a control. Figure 2 shows the percent cover of weeds and planted native cover. The non-seeded control area, as expected, was dominated by non-native (weedy) herbaceous plants. Ninety-five percent of the data points had a weed present, and only two points had riverbank lupine (which most likely moved into the control area from the seeded area). The most common weeds were annuals grasses (rattail, bromes), velvetgrass, tall fescue, and oxeye daisy.

From a distance, the 30 seeds/ft² plot didn't look very different from the non-seeded area, but up close, it was very easy to see that a native plant community had been established within the existing weeds. The most common native species were California oatgrass, Roemer's fescue, yarrow, and seablush. California oatgrass was the dominant native species (found at 35% of data points). This plot had the highest native species richness recorded on the cover data (11 total native species, including 4 grasses

and 7 forbs). However, weed cover still totaled over 70%, with the most common weeds being weedy annual grasses (rattail, bromes, etc.), velvetgrass, tall fescue, wild carrot, and oxeye daisy. Even though the 30 seeds/ft² rate added less than half as much seed as the highest rate, it still did a very good job of ADDING native plants to the site.

When walking across the site, the 30 and 50 seeds/ft² plots didn't look very different from each other, except there was much less California oatgrass in the 50 seeds/ft² plot. The most common natives in the 50 seeds/ft² plot were yarrow, seablush, and meadow checkermallow, and the dominant weeds were tall fescue and velvet grass.



Figure 2. Oregon sunshine, selfheal, yarrow, and checkermallow dominated the cover in the 70 seeds/ft plot on an upland prairie WHIP project in Polk Co., Oregon, June 20, 2013.

The highest seeding rate plot (70 seeds/ft²), however, was incredibly different from the other plots. It was dominated by native forbs, especially yarrow, and there were very few weeds, which was drastically different from all the other areas. Weeds were only recorded at 21% of the data points and natives were recorded at 82%! .. The only recorded weeds were oxeye daisy and velvetgrass. There were eight native species recorded in the cover data (3 grasses and 5 forbs), with the most common being yarrow, California oatgrass, selfheal, and meadow checkermallow. Yarrow had the highest cover (found at 56% of the points).

Many species were added to the mix at low percentages. Species that comprised 2% or less (of the number of seeds) were observed at the site, but did not show up on the cover data. Halls' aster, mules ears, gumweed, buttercup and blue wild rye were seen in the 50 and 70 seeds/ft² plots.

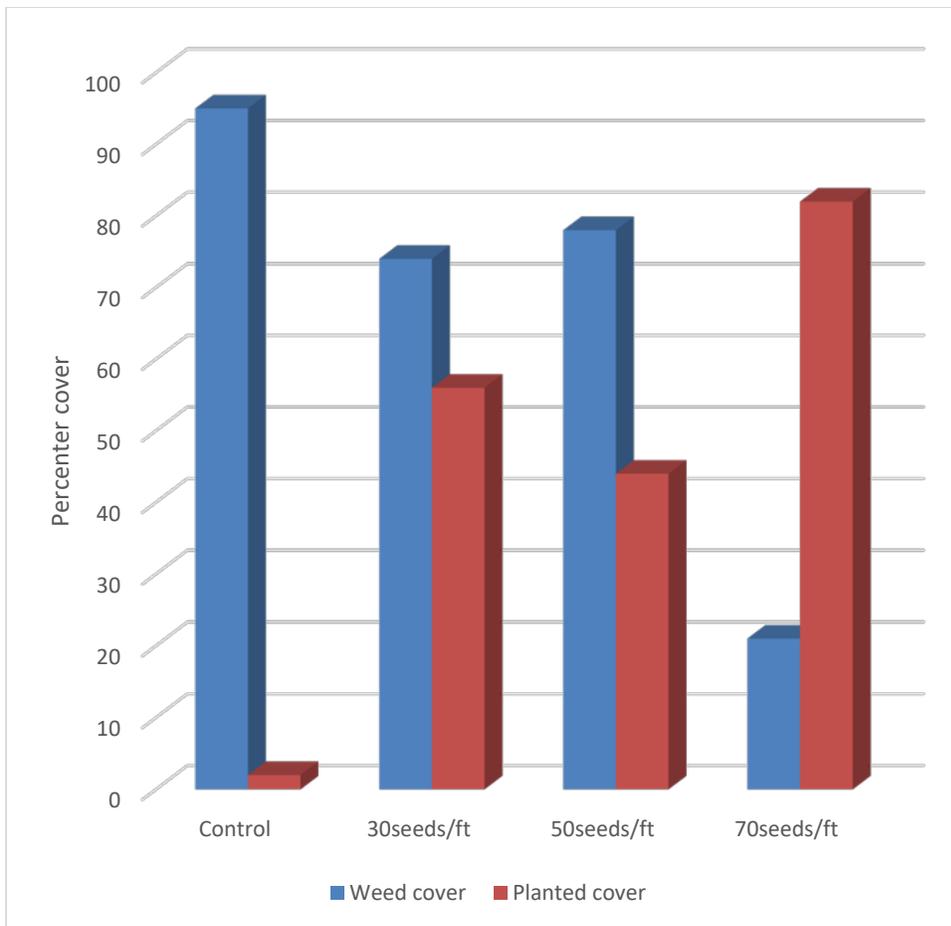


Figure 3. Percent native planted and weedy cover 4.5 years post-seeding on an upland prairie in Polk Co., Oregon planted at three different seeding rates (30, 50, and 70 seeds per square foot).

Summary and Discussion:

This planting scenario is a very common one on upland habitats in the Willamette Valley. These abandoned pasture areas have decades of non-native plants raining seed into the soil. One year of site prep is not enough to reduce the weed seed bank. Seeding natives into the site at low levels added native plants to the site, but did not reduce the amount of weed cover. However, at the highest seeding rate, the weed cover was reduced, and the native plants appeared to be outcompeting the weeds. The native species with the most consistent establishment at this site were California oatgrass, Roemer’s fescue, yarrow, lanceleaf selfheal, and meadow checkermallow. This site luckily did not have a lot of rhizomatous perennial weeds like bentgrass or white clover, which can often take over a native planting. The site does not receive annual mowing. Usually, sites like this become covered with weedy shrubs if left un-mowed, however, the landowner is very diligent about spot-spraying scotch broom and blackberries multiple times per year. Establishing future field trials with replicated plots on a few different sites would be helpful for determining the minimum seeding rate needed to create the tipping point between natives and weeds.

USDA is an equal opportunity provider, employer, and lender.