Demography and Management of Willamette Daisy (*Erigeron decumbens*)

2015

Report to the U. S. Fish and Wildlife Service (Phase 3 Final Report)

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PREFACE

This report is the result of an agreement between the Institute for Applied Ecology (IAE) and a federal agency. IAE is a non-profit organization whose mission is 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. Our current activities are concentrated on rare and endangered plants and invasive species.

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Cover photograph: *Erigeron decumbens* at Finley National Wildlife Refuge, June 2015, by Denise Giles.

REFERENCE

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EXECUTIVE SUMMARY

Over the course of this study 6 populations of Willamette daisy were created (Big Spires, Kirk East, Applegate), or augmented (Atlantic Pacific, Finley Field 29, Finley Field 8N). A total of 3,416 were outplanted over the course of the study. As of the spring of 2015 1,308 are surviving and an additional 502 new recruits were noted in 2014 and 2015 collectively. For details on survivorship by site and recovery zone, see Table 1, Table 3, Table 4, and Table 5. In each year (2011 and 2013), two plots were outplanted in both the Eugene and Corvallis West Recovery Zones. Survivorship was measured for each population and plots then received a variety of management treatments to evaluate the response of both the daisy and the surrounding plant community to management treatments. Measurements of plant vigor, as well as the plant community were taken annually, and are reported here.

Willamette Daisy Response to Treatment:
Results indicate that treatments for plants outplanted in 2011 had no significant effect on survivorship; indicating that well timed (and even aggressive) management treatments may be an effective tool for managing Willamette daisy. There were however, significant effects on plant size, reproduction and recruitment which indicate that Burn + Glyphosate increased both plant size and reproductive effort. Additionally, the highest number of recruits were found in the Burn + Glyphosate plots at Field 29 (Finley, Corvallis West Recovery Zone.)

Plant Community Response to Treatment:
While the response of plant community varied by site (and starting condition), the most successful treatments for decreasing invasive forb, invasive graminoid and woody/shrubby species cover was the Burn + Glyphosate treatment (followed by mowing, glyphosate only and carbon addition). Carbon addition compared favorably to several herbicide treatment(s) for decreasing invasive forb cover and provides a potential non-chemical method for managers to consider.

INTRODUCTION

Figure 1. Flowering Willamette daisy planted at Finley National Wildlife Refuge in April 2011.

Willamette daisy (*Erigeron decumbens;* Figure 1) is listed as an endangered species under the Oregon and federal Endangered Species Acts (ORBIC 2010). Without direct intervention, its prospects for recovery are poor. The majority of populations are small, isolated, and found on unprotected lands. Further, natural recruitment is low due to competition with invasive weeds, altered disturbance regimes, and possible genetic issues (Thorpe and Kaye, *in press*). In the *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington* (USFWS 2010), both invasive species and improper prairie management were identified as important threats to Willamette daisy. Although management practices such as mowing, grazing, burning, thatch removal, and selective use of herbicides can be useful techniques to maintain prairie habitats and discourage invasive species (Pfeifer-Meister et al. 2007, Boyer 2008; Stanley et al. 2008; Stanley et al. 2010), applying these treatments in the wrong season and/or with the wrong frequency can have detrimental impacts on native prairie species. Unfortunately, we currently have little information on how Willamette daisy responds to various management activities. ***The goal of this project is to combine careful demographic studies with experimental habitat management treatments in order to provide information on effective management of this species.***

Management treatments

Mowing and prescribed fire are the two management techniques most commonly used to maintain habitat occupied by Willamette daisy. However, there is little data on the effects of these treatments on birth and death rates of the species. In a five-year study at Oxbow West, we found that compared to control plots, there tended to be fewer, but larger plants in plots that had been mowed every-other-year or burned (Thorpe and Kaye 2007). There also tended to be fewer capitula per plant in the mowed plots, suggesting that management techniques might not always have positive effects on the species. However, active management is required in most prairies to reduce the cover of invasive and woody plant species (Noss et al. 1995, Floberg et al. 2004). The focus of this study is to ***determine habitat management techniques that will reduce the cover of invasive and woody plant species while maintaining or enhancing the cover of native species, including Willamette daisy.***

We will test the effectiveness of mowing, prescribed fire + glyphosate, glyphosate only (Finley only), sheep grazing, grass-specific herbicide [Fusilade™ (Fluazifop)], and carbon addition

as habitat management techniques in habitat occupied by Willamette daisy. Thatch removal had originally been identified as a potential treatment; however thatch levels at the sites selected for this project were not sufficient to warrant this treatment. Several of these management techniques have previously been found to be effective in enhancing cover of native prairies species in the Willamette Valley/Puget Sound/Georgia Basin ecoregion (Kirkpatrick et al. 2006; Pfeifer-Meister et al. 2007; Boyer 2008; Stanley et al. 2008; Stanley et al. 2010).

Conducting these experiments in natural populations of Willamette daisy provides the best test of how Willamette daisy populations respond to management treatments. However, few populations are large enough to allow for a replicated study and agency regulations limit the scope of treatments that can be applied. For this study, we introduced populations of Willamette daisy in eight macroplots at six sites to test habitat management treatments: two sites at Finely National Wildlife Refuge, each with two macro plots (USFWS), 3 sites at Fern Ridge Natural Area (Army Corps of Engineers –ACOE)), and one site owned and managed by the City of Eugene.

Demographic monitoring

In order to improve our understanding of Willamette daisy population demography, we collected demographic data to determine the effects of habitat treatments on birth and death rates of Willamette daisy from 2011- 2015. In the introduced populations, we recorded the size (length, width, and height) and reproductive status of each individual. This protocol was followed to monitor the Willamette daisy population at Oxbow West in the West Eugene Wetlands for eight years (Thorpe and Kaye 2007). Each year, we also surveyed the area surrounding previously reproductive individuals to evaluate seedling establishment, and survivorship. All individuals were mapped and assigned unique numbers in order to track yearly changes in individual characteristics and estimate birth and death rates. The presence or absence of grazing for each individual was also noted.

In 2011, we also conducted monitoring at several introduced and natural populations throughout the Willamette Valley. The intent of this project was to determine (1) recruitment of new Willamette daisy individuals into introduced populations, and (2) factors impacting recruitment rates. This research was conducted as a MS thesis by Katie Gallagher, at Oregon State University (Gallagher 2012).

METHODS

Plugs for outplanting were produced in fall 2010 – spring 2011 using seed from two Recovery Zones, Corvallis West (Allen and Allen/Muddy Creek), and Eugene West (Balboa and Oxbow West populations). In September of 2010, seeds were placed in germination trays and then placed into 16 weeks of cold stratification at 6°C. Seeds were checked weekly and misted with distilled water to keep them moist. If any mold was present, damaged seeds were removed and a solution of distilled water and hydrogen peroxide was sprayed on the seeds. The seeds were removed from cold stratification and placed in a room with a 25 ^{o}C day / 15 ^{o}C night temperature cycle and 8 h day / 16 h night lighting cycle one week prior to planting into conetainers. Plants were planted into conetainers 3.81cm wide and 13.97cm deep in trays of 98 and kept at the OSU West Greenhouse. Pots were filled with Gardner's Gold potting soil and

placed in a greenhouse maintained at 21°C during the day and 13°C at night with 14 hour daily artificial light provided by Sun System 3 - 400 HPS bulbs. Pots were watered from the bottom 1-4 times per week as necessary. An 8-8-8 fertilizer was sprayed weekly on the plants and then rinsed off to prevent burnt leaves. At approximately eight weeks, the plants were inoculated with nematodes to prevent fungus gnats from attacking the young plants. One week prior to outplanting, all pots were placed outside to harden-off. This procedure was repeated for plants grown for the 2013 outplanting with little variation.

Outplanting

In April 2011, 900 plants were outplanted at Finley National Wildlife Refuge (Finley); 450 each in Field 29 and Field 8 North (Appendix A). Finley is located approximately 16 km south of Corvallis, Oregon, in the Benton West Recovery Zone (USFWS 2010). Historical records indicated that this Refuge once hosted a Willamette daisy population, but the population has not been observed in 20 years. In 2007 and 2008, Willamette daisy was introduced to four sites at Finley, including 174 at Field 29. Plots for this experiment were located approximately 30m from the 2007 and 2008 introductions. Field 29 and Field 8 North were selected because of their relatively low cover of exotic plants, general habitat suitability for Willamette daisy, and ease of access for management. Both sites have been under active restoration and management (including herbicide treatments, mowing, and seeding) by USFWS.

At each site three 14m x 22m blocks were marked with rebar pounded flush with the ground and topped with an orange cap. The three blocks are adjacent, and the NW corner of the 'metablock' was marked with a T-post. Within each block there were six 6m x 6m treatment plots, marked with 8" nails pushed flush with the soil surface and capped with marking whiskers. There is a two meter buffer between each treatment square. Willamette daisy plugs were planted along a 5m x 5m grid in the center of each 6m x 6m treatment plot (25 plants per plot).

In April 2011, 716 plants were outplanted at Fern Ridge Natural Area; 360 at Applegate and 356 at Kirk NE (Appendix B). Fern Ridge Natural Area is located approximately 60km south of Corvallis, Oregon in the Eugene West Recovery Zone (USFWS 2010), and is managed by the Army Corps of Engineers (ACOE). Applegate and Kirk East were selected because of habitat suitability for Willamette daisy and ease of access for management. Both sites have been under active restoration and management including mowing and invasive weed removal by the ACOE.

144 plants from the ACOE were used in the outplanting in addition to the plants grown by IAE. Four of these plants and 16 of the plants grown by IAE were planted per plot. Although the plants from the ACOE were smaller, they had robust root structure. At each site, three 14m x 38m blocks were marked with fiberglass poles at each corner. Within each block, there was six 6m x 6m treatment plots, marked with 8" nails topped with marking whiskers. Due to low germination and survival of Eugene West plants in the greenhouse, we had to reduce both the number of individuals planted in each plot and the number of treatments. Thus, one of the seven blocks was randomly excluded from planting. In the remaining treatment plots, Willamette daisy plugs were planted along a 5m x 5m grid in the center of each treatment plot, with the exception that one row or column was skipped so that 20 plants were in each square. Each block also contained a 14m x 14m grazing plot; within this plot, plugs were also planted

along a 5m x 5m grid in the center of each treatment plot, with the exception that a one row or column was skipped so that 20 plants were in each square.

In spring 2013, an additional four sites were selected for outplanting: A total of 450 plants were outplanted at each site in 2013. At Finley National Wildlife Refuge, in the Corvallis West Recovery Zone, plots were added adjacent to the existing blocks outplanted in 2011 at Field 8N and Field 29. In the Eugene West Recovery Zone, two additional sites were selected including Big Spires (ACOE) and Atlantic/Pacific, managed by the City of Eugene; 450 plants were outplanted at each site (a total of 900 plants) (Table 1). In 2013, we used the same plot design and outplanting procedures established in 2011.

Table 1. Sites outplanted with Willamette daisy in 2011 and 2013.

Recovery Zone	Land Manager	Site name		Year outplanted	Number outplanted	# surviving in 2015	# of recruits in 2014 and 2015
Corvallis West	USFWS	Finley	Field 8 N	2011	450	109	13
			Field 8 N	2013	450	138	0
			Field 29	2011	450	341	474
			Field 29	2013	450	262	0
Eugene West	ACOE	Kirk East		2011	356	85	4
		Applegate		2011	360	81	1
		Big Spires		2013	450	145	0
	City of Eugene	Atlantic/Pacific		2013	450	147	1

Table 2. Management treatments tested in the course of this study.

Treatment	Treatment Notes/Motivation
Control	-
Burn + Glyphosate	Previous work has shown that in a short window post-burn dormancy non-native species are green, while native species remain dormant, thus a broad spectrum herbicide can be used to target dominantly weedy species.
Glyphosate Only (Corvallis West only)	Glyphosate was applied in a 3% solution in the fall at the same time that the 'burn + glyphosate' treatment occurred.
Grass Specific Herbicide	Fusilade was used in this study and applied at the recommended application rate of 1 oz/acre.
Mowing	Treatment occurred in the fall with mowing to a height of 2-6". Mowing equipment utilized included tractors and weedwhackers.
Carbon Addition	Sucrose addition activates soil microbes which ultimately results in decreased availability of ammonium and nitrate in the soil. Preliminary work by IAE as well as other researchers has shown that these carbon treatments tend to have a greater negative impact on non-native species. Carbon was applied at a rate of 2 kg/m2 in Feb/March of 2012 and 2014.
Grazing (Eugene West only)	Up to 60 sheep were grazed for 12-36 hours in the 14m x 14m grazing blocks.

Treatments

The habitat management treatments tested include: mowing, prescribed fire + glyphosate, glyphosate only (Corvallis West Recovery Zone sites only), sheep grazing (Eugene West Recovery Zone sites only), grass-specific herbicide (Fusilade), and carbon addition. Thatch removal had originally been identified as a potential treatment; however thatch levels at the sites selected for this project were not sufficient to warrant this treatment. Several of these management techniques have previously been found to be effective in enhancing cover of native prairies species in the Willamette Valley/Puget Sound/Georgia Basin ecoregion (Kirkpatrick et al. 2006; Pfeifer-Meister et al. 2007; Boyer 2008; Stanley et al. 2008; Stanley et al. 2010).

Mowing

Mowing was performed in September 2011, 2012, 2013. The sites were evaluated in February 2012-2015 and it was determined that a second mowing treatment was not necessary. At Fern Ridge (Applegate, Big Spires and Kirk East), mowing was performed by ACOE staff with a tractor. At Finley, and Atlantic/Pacific, the plots were mowed with a weedeater. Fall mowing reduces thatch accumulation and cuts back fall-growing grasses. Mowing height was 2-6"; plant material was left on site (Figure 2).

Figure 2. Mow plots at Finley NWR, Field 29 (left) and Fern Ridge, Applegate (right). At both sites mowing occurred in mid-September.

Sheep Grazing (Eugene West Recovery Zone sites only)

Sheep grazing occurred in the 14m x 14m treatment plots in October 2011, on plots outplanted in 2011. The treatment was repeated in the fall of 2013. Plots outplanted in 2013 were grazed in the fall of 2013. While most native species are dormant in October, several exotic species are green this time of year, which potentially gives them a competitive advantage the following spring. Approximately 60 sheep were placed in each of the grazing plots until there was no longer suitable forage (12 to 36 hours).

Figure 3. Sheep grazing at Applegate. Sixty sheep were placed in each 14m x 14m grazing plot for 12-36 hours.

Grass-specific Herbicide

A grass-specific herbicide [Fusilade™, (Fluazifop)], was applied in early November (2011-2013) at a rate of 1 oz (28 grams)/acre to treatment plots at Fern Ridge, Finley and City of Eugene to reduce abundance of exotic grasses.

Figure 4. Glyphosate application to a burned plot at Finley NWR, Field 8 (left) and grass-specific herbicide at Finley NWR, Field 29 (right).

Burning + Glyphosate

Burning at Finley occurred on September 20th, 2011 (Figure 5) and the spray of glyphosate (Aquamaster™) occurred one month post-burn with a concentration of 3%. The sites were evaluated two weeks post-burn and there had not yet been significant resprout of invasive species. At the time of herbicide treatment, one month post-burn, vegetation was dominated by invasive species. Burning (and subsequent spraying) at Applegate and Kirk east occurred in the Fall of 2012, and in 2013 at Big Spires and Atlantic Pacific. Treatment plots at Finley were also burned and sprayed in the fall of 2013 (both the plots planted in 2011 and 2013). Fall burning reduces biomass and thatch accumulation and post-burn glyphosate (a broad-spectrum herbicide) application reduces abundance of broad-leaf weeds. This last treatment was developed based on observations that non-native species resprout more quickly after fire than do most native species.

Figure 5. Burned plot at Finley NWR Field 8, September 2011.

Glyphosate (Finley only)

A broad-spectrum herbicide treatment was implemented in late fall at the Finley sites in 2011, 2012, and 2013. Because most native plants are dormant at this time this spray is expected to target mostly non-native species. A 3% solution of glyphosate (Aquamaster™) was applied to selected treatment plots.

Carbon Addition

In March 2012 (4 sites) and March 2014 (8 sites), we spread 2 kg of carbon m^{-2} (in the form of sucrose) on selected test plots. Carbon addition limits the amount of soil nutrients available for plant growth (particularly nitrogen and phosphorus) by stimulating microbial activity. Several studies have indicated that native species are more capable of tolerating low nutrient conditions than exotic species (Morgan 1994, Reever Morghan and Seastedt 1999, Alpert and Maron 2000, Blumenthal et al. 2003, Kirkpatrick *et al. unpublished data*).

Survivorship and Vigor Monitoring

Survival and growth of all plants was monitored in June 2011-2015. For each individual, we measured the widest diameter (the outermost part of an individual, including flowers), the diameter perpendicular to the widest diameter, height, and number of capitula (flower heads). The shape of each plant was assumed to be oval, and the maximum diameter and perpendicular diameter were used to calculate the elliptical crown cover of each plant as per equation 1.

Equation 1. Elliptical crown cover = (0.5*widest diameter) * (0.5*perpendicular diameter) * π

Data Analysis

ANOVA procedures, using JMP Statistical software (SAS 2013), were conducted to determine the effect of each treatment on survivorship, flower number, and ellipse size of Willamette daisy. We tested for effects of site on treatment and when significant effects were found, individual ANOVAs were conducted for each site. We used Fisher's LSD multiple comparisons test to evaluate the differences among treatment means. Count data were log (x + 1) transformed and percent data were arcsine square root transformed (McCune and Grace 2002) to meet ANOVA assumptions prior to analysis. Nontransformed data are presented throughout the report.

RESULTS

Overall Trends

Survivorship in 2015 of all plants outplanted in 2011 (independent of treatment or site) was 40% (range 24% at Field 8N and Kirk East to 79% at Field 29). The survivorship of plants outplanted by treatment in 2011 are listed in Table 3 and ranged from 7%-94%.

Survivorship of all plants outplanted in 2013 was generally lower than those outplanted in 2011, with an average of 40% of plants surviving into 2015 (range of 32% at Big Spires to 60% at Field 29). Field 29 had the highest survivorship (for both 2011 and 2013 outplantings). Survivorship of plants outplanted in 2013 is listed in Table 4.

The areal cover of plants varied by site, particularly in the first year; plants were larger at the Finley sites than at Fern Ridge (Figure 9). This was not unexpected; in 2011, the Fern Ridge plants were smaller at the time of outplanting. In general plants from Field 29 were significantly larger than those from Finley Field 8N. An undergraduate student, Emily Day, from the OSU Honors College will be investigating potential soil effects with a greenhouse study underway as of spring 2014.

Table 3. Number of Willamette daisy plants, survivorship, number of flowers and ellipse size in 2015 for each site outplanted in 2011. Data were collected June/July 2011 (approximately 3 months after outplanting) for initial survivorship, and June 2012-2015 for post-treatment. Totals in this table reflect values only for treatments reported here, and do not necessarily match total values reported in Table 1. (At some sites, unplanned treatments occurred or treatments were misapplied. Survivorship data for those individuals are included in values reported in Table 1, but are not included here.)

Site	Treatment	Initial Surviving (#)	Alive 2015	Survivorship (%)	Average ellipse (cm^2)	Average # flowers
Field 29						
	Control	70	66	94%	185.0	16.3
	Mow	70	61	87%	169.5	11.9
	Carbon 2x	71	45	63%	135.7	11.8
	Burn 2x	74	64	86%	714.8	42.9
	Fusilade 3x	72	57	79%	273.4	25.0
	Glyphosate 2x	71	48	68%	275.2	15.4
Field 8N						
	Control	69	25	36%	86.7	5.0
	Mow	72	18	25%	73.2	4.0
	Carbon 2x	72	5	7%	28.4	0.0
	Burn 2x	71	33	46%	115.1	9.0
	Fusilade 3x	70	19	27%	54.2	3.3
	Glyphosate 2x	72	9	13%	76.1	5.0
Applegate						
	Control	57	18	32%	100.4	9.3
	Mow	56	12	21%	76.3	6.0
	Carbon 2x	40	10	25%	115.0	11.3
	Burn 1x	57	14	25%	39.6	4.5
	Fusilade 3x	37	13	35%	104.5	18.4
	Grazing	58	14	24%	100.2	7.8
Kirk East						
	Control	54	18	33%	130.6	8.2
	Mow	57	19	33%	104.1	9.6
	Carbon 2x	37	4	11%	35.9	1.0
	Burn 1x	57	21	37%	63.2	14.7
	Fusilade 3x	53	15	28%	110.3	6.7
	Grazing	51	8	16%	45.5	4.3

In the Corvallis West Recovery Zone sites, plants at Field 29 had higher survivorship, were consistently larger, and produced more flowers than plants in Field 8N (independent of year outplanted). For plots planted in 2011, survivorship in 2015 at Field 8N was 36% in controls as compared to 94% in Field 29, four years after outplanting. Plants outplanted in the same sites in 2013 had lower survivorship, however site differences still remained, with 33% and 60% survivorship in Field 8N and Field 29, respectively. Work by Emily Day as part of a Undergraduate Honors Thesis with Oregon State University determined that while there were some physical differences between the soils at both sites, there were no differences in the plant size or vigor when grown in the greenhouse. However, plants grown in sterilized soil were smaller and had higher mortality, indicating that there is likely a biological component that contributes to the success of plants in Field 29 over Field 8N (Day 2014).

Survivorship of outplanted individuals was slightly lower in the Eugene West Recovery Zone (range 39-72%) in both 2011 and 2013 when compared to the Corvallis West Recovery Zone. Control plots from 2011 outplantings in the Eugene West Recovery Zone having 39%-56% survival, and 2013 control plots (53-72%).

Plants from the Corvallis West Recovery Zone were larger and produced more capitula than plants in the Eugene West Recovery Zone (Table 3, Table 4, Figure 11).

Table 4. Number of Willamette daisy plants, survivorship, number of flowers and ellipse size in 2015 for each site outplanted in 2013. Data were collected June/July 2013 (approximately 3 months after outplanting) for initial survivorship, and June 2012-2015 for post-treatment.

Site	Treatment	Initial Surviving(#)	Alive 2015	Survivorship (%)	Average ellipse (cm^2)	Average # flowers
Field 29						
	Control	72	53	74%	45.4	2.8
	Mow	74	49	66%	56.0	3.2
	Carbon 1x	74	46	62%	26.1	2.6
	Burn + Glyphosate	72	33	46%	93.9	5.7
	Fusilade	75	60	80%	52.5	5.6
	Glyphosate	70	21	30%	73.0	6.5
Field 8N						
	Control	72	30	42%	22.7	1.0
	Mow	72	28	39%	34.0	1.0
	Carbon 1x	69	20	29%	17.1	0.0
	Burn + Glyphosate	70	21	30%	47.2	1.3
	Fusilade	71	31	44%	21.4	1.3
	Glyphosate	65	8	12%	85.8	4.0
Atlantic-Pacific						
	Control	72	30	42%	81.5	7.3
	Mow	74	32	43%	37.7	2.8
	Carbon 1x	71	24	34%	49.8	3.9
	Burn + Glyphosate	72	19	26%	275.2	17.3
	Fusilade	72	31	43%	46.9	4.0
	Grazing	74	11	15%	22.3	0.0
Big Spires						
	Control	75	33	44%	24.2	1.4
	Mow	75	37	49%	43.6	3.7
	Carbon 1x	74	23	31%	39.0	2.2
	Burn + Glyphosate	74	11	15%	52.7	3.3
	Fusilade	75	30	40%	41.1	3.6
	Grazing	73	11	15%	32.4	4.0

Treatment Effects on Willamette Daisy

Survivorship

Both 2011 and 2013 plantings showed variability in survivorship, and site by treatment interactions were significant for both outplanting years (2011 P=0.0006 and 2013 P=0.0056). Due to this interaction, treatment data were analyzed separately among sites for each year. In plots outplanted in 2011 survivorship varied by site, however there were ***no statistically significant differences among treatments on the survivorship of Willamette daisy.*** In 2013 plots survivorship also varied by site, but Field 29 was the only plot to show significant differences between treatments (P=0.0124).

For the 2013 plantings at Field 29, survival was statistically similar in the Fusilade, Control, Mow, and Carbon treatments, and the Glyphosate and Burn + Glyphosate having the lowest survival (Table 4). Survival ranged from 30% in Glyphosate treatments to 80% in the Fusilade treatment, with 74% survival in the Control plots that received no treatment.

Survivorship of individuals outplanted in 2011 and monitored in 2015 ranged from 11-37% in treatment plots in the Eugene West Recovery Zone, and 7%-94% in the Corvallis West Recovery Zone. The lack of treatment effects on survival of Willamette daisy can be interpreted as an indication that though endangered, Willamette daisy can handle aggressive (but well-timed) management treatments without significant detrimental effects.

Average size of individuals outplanted in 2013 varied by site and treatment. The burn + glyphosate treatment at Field 29 and Applegate had significantly larger plants as compared to the other treatments. Treatment differences at Field 8 and Big Spires were more variable. Although not statistically significant at all sites, the carbon treatment resulted in smaller plants across sites.

Average size of individuals outplanted in 2011 varied among sites and treatments. The burn + glyphosate treatment at Field 8N and Field 29 were significantly larger when compared to the other treatments, including the control. The Fusilade treatment at Applegate resulted in significantly larger plants. Plants at Kirk East were not significantly different among treatments (Figure 9, Figure 10).

Figure 6. Plants at Field 29 were larger and had more flowers than at other sites.

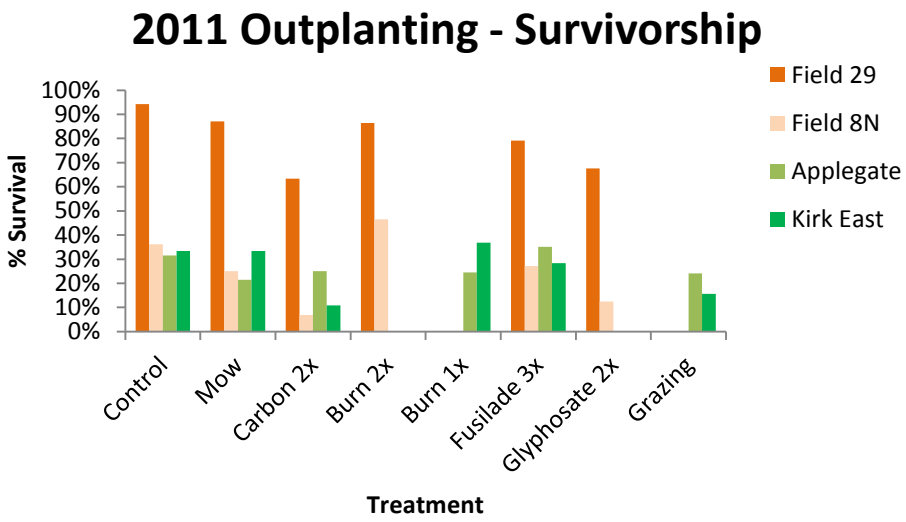


Figure 7. Percent survivorship in 2015 in response to management treatments of Willamette daisy plants outplanted in 2011. Note that several treatments vary by site.

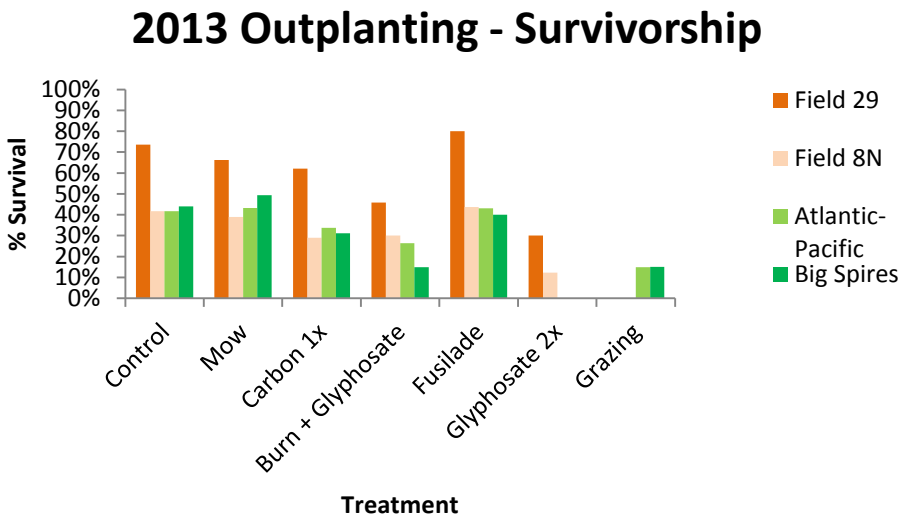


Figure 8. Percent survivorship in 2015 in response to management treatments of Willamette daisy plants outplanted in 2013. Note that several treatments vary by site.

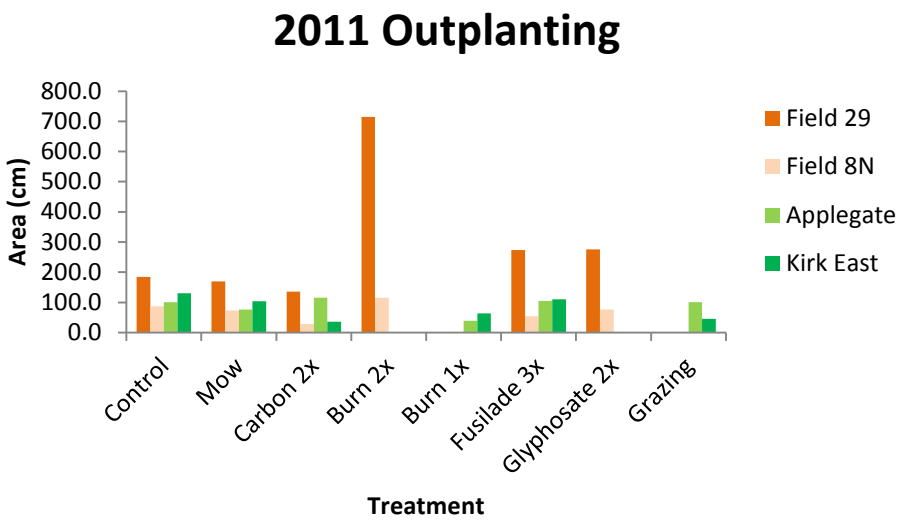


Figure 9. Average ellipse size by treatment in 2015 for Willamette daisy plants outplanted in 2011. Note that several treatments vary by site.

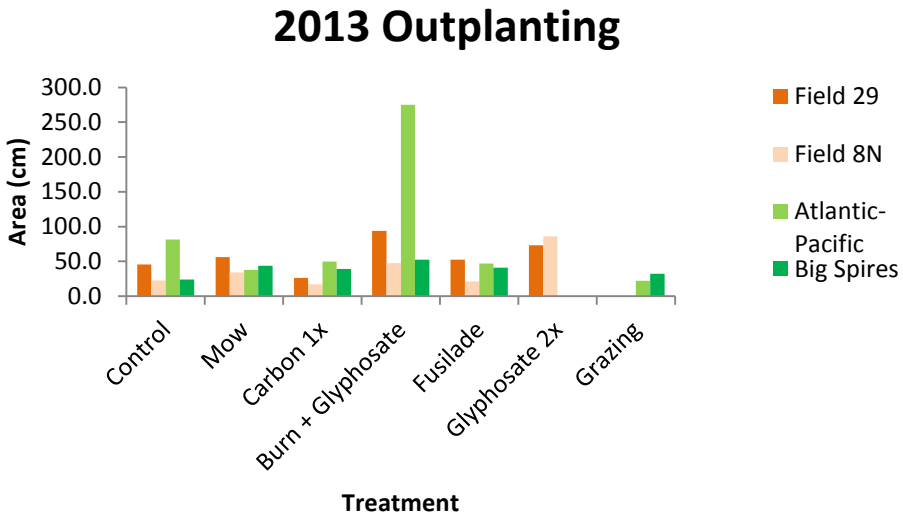


Figure 10. Average ellipse size by treatment in 2015 of Willamette daisy plants outplanted in 2013. Note that several treatments vary by site.

Reproductive Success

Number of Flowers

Monitoring of 2011 outplanted daisies in 2015 indicates that only one treatment at one site had a significant effect on the reproductive success of Willamette daisy; the Burn + Glyphosate treatment at Finley, Field 29 (Corvallis West Recovery Zone) had significantly more (p=0.0067) flowers than the control (Figure 6, Figure 11).

Monitoring of 2013 outplanted daisies in 2015 indicates that reproductive success was similar among sites and treatments.Burn + Glyphosate at Atlantic/Pacific was the only treatment to have significantly (p=0.0157) more flowers among the 2013 outplantings (Figure 11).

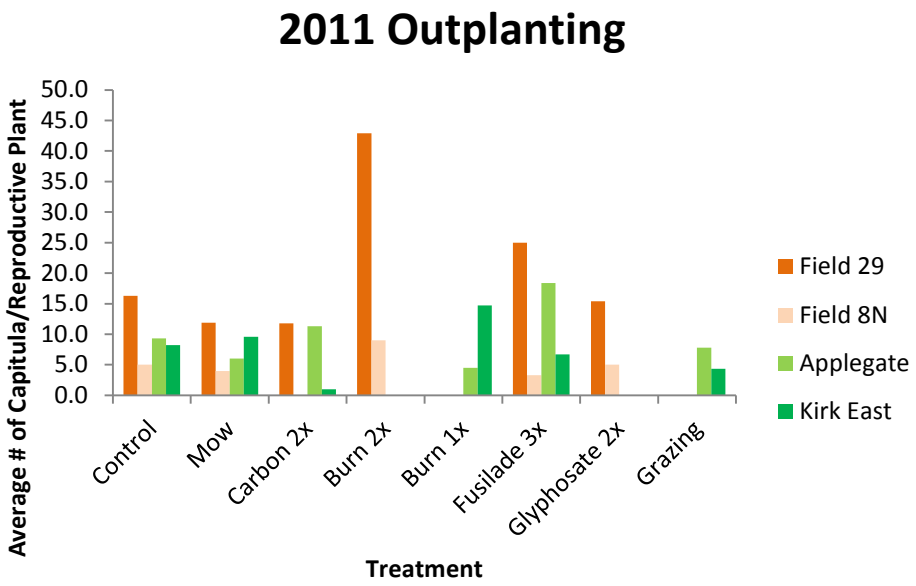


Figure 11. Average number of capitula per reproductive plant in 2015 for Willamette daisy plants outplanted in 2011 by treatment site.

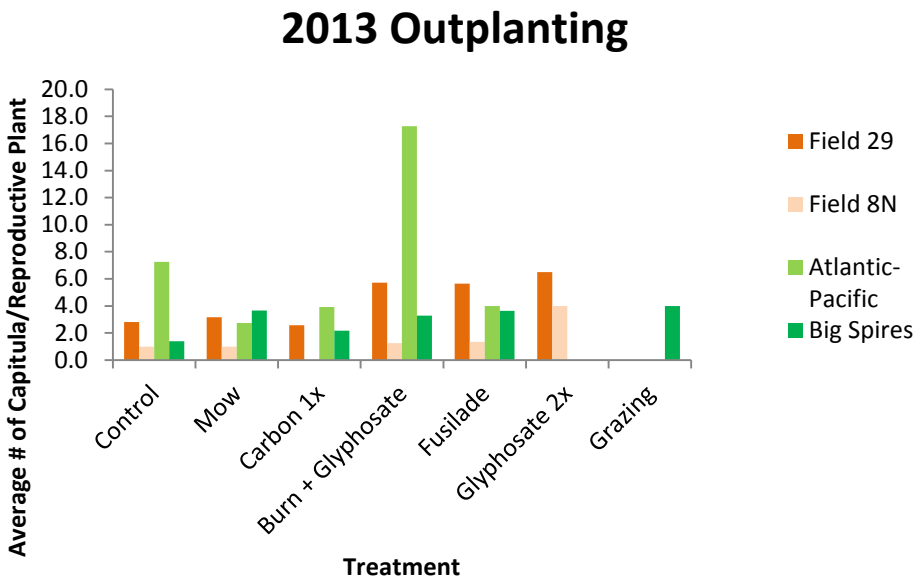


Figure 12. Average number of capitula per reproductive plant in 2015 for Willamette daisy plants outplanted in 2013 by treatment and site.

Recruitment and Demographics

In 2015, 58 'mother plants' were monitored, and all surrounding Willamette daisy mapped, measured (see previous section), and categorized by size class (Seedling, Vegetative and Reproductive) wherever new Willamette daisy recruits were noted (Table 5). Over the course of this study, 502 recruits have been noted, 396 in 2014 and 106 new recruits in 2015. A majority of these plants were from Field 29, where recruits were noted in all treatments except the controls. Burn + Glyphosate had the most recruits at Field 29 (338) followed by the Glyphosate only treatment (107 recruits). The Burn + Glyphosate treatment also had 11 recruited plants flower in 2015, and the Glyphosate only had two. In Field 8N, recruits were noted in the Burn + Glyphosate (12) and Glyphosate only (one plant) treatments, including three recruited plants that flowered (Table 5).

Kirk East and Applegate had only four and one recruits, respectively, counted in mowed plots (Table 5). Atlantic-Pacific was the only 2013 site that had recruitment in 2015, where ten recruits were counted in the Burn + Glyphosate treatment (Table 5).

Because recruitment was not noted until 2013, only 2 years of demographic data were collected as a part of this study. A longer-term dataset is necessary to perform detailed demographic analysis, however preliminary data indicates that there is high interannual seedling mortality. As an example, of the 396 recruits noted in 2014, 269 were not found again in 2015 (Table 5). Longer-term monitoring of demographic plots will be necessary to determine

factors influencing recruitment and survivorship, and understand the population dynamics of this species.

Table 5. Number of recruits, maternal plants, and number of flowers on recruited plants observed in 2015. The number of "mother plants" indicates the number of outplanted individuals around which new plants were observed.

Site	# Mother Plants	# of New Recruits in 2014	# of New Recruits in 2015	Mortality from 2014-2015	# flowers on Recruited Plants in 2015
Applegate					
Mow	1	1	0	1	0
Finley#29					
Fusilade	2	2	7	2	0
Mow	5	4	11	3	0
Carbon 2x	3	3	2	0	0
Glyphosate 2x	12	84	23	62	2
Burn 2x+ Glyphosate	29	288	50	196	11
Finley#8					
Glyphosate 2x	1	1	0	1	2
Burn 2x + Glyphosate	2	9	3	1	1
Kirk East					
Mow	2	0	4	4	0
Atlantic Pacific					
Burn + Glyphosate	1	0	10	N/A	0
Total in 2015	**58**	**396**	**106**	**270**	**16**

Treatment Effects on Plant Community

Initial Site Conditions

The initial site conditions differed between the Corvallis and Eugene sites. Sites at Finley Wildlife Refuge were dominated by invasive forbs and tended to have more annual invasive grasses whereas two of the sites at Fern Ridge (Applegate and Kirk East) were dominated by invasive perennial grasses, the third (Big Spires) was a near monoculture of native (seeded) *Festuca roemeri*. Atlantic-Pacific was a diverse mix of both native and invasive forbs and grasses, and some shrubby species. Below we provide the average of site conditions in 2012 for plots outplanted in 2011, followed by similar descriptions of plots outplanted in 2013.

The dominant vegetation at Fern Ridge (Applegate and Kirk East, Eugene West Recovery Zone) was invasive grasses with an average cover of 61.6% and invasive forb cover of 10.4%. Dominant invasive grasses at Fern Ridge include the perennial species *Anthoxanthum odoratum* and *Agrostis stolonifera* each with an average of 30% cover, additional invasive species include *Festuca arundinacea* and *Panicum occidentale*. Annual invasive grasses at Fern Ridge have very low cover. In 2012, native grass cover was only 9.2% with 5.4% represented by *Danthonia californica.* Average native forb cover at Fern Ridge was 5.7% and was dominantly attributed to *Fragaria virginiana* and *Aster hallii*. Invasive forb cover has an average of 10.4% cover and is dominated by *Hypochaeris radicata* (4.5%), *Plantago lanceolata* (2%) and *Leucanthemum vulgare* (1%). Tree and shrub cover was relatively high at the Fern Ridge sites with an average cover of 13.3%; dominant species include *Rosa sp.* (8%), *Cytisus scoparius* (2.2%) and *Rubus armeniacus* (2.2%) (Figure 13).

At Finley National Wildlife Refuge (Corvallis West Recovery Zone), both Field 8N and Field 29 have high invasive forb cover with an average of 63.2% and 30.9% cover of invasive graminoids. Tree and shrub cover was relatively low with only 1.7% cover of mostly *Rubus armeniacus*. The dominant invasive forb species as at Finley was *Hypochaeris radicata*, with an average cover of 52.3%. Native forb cover was 15.8 % and was dominated by *Eriophyllum lanatum* (8.6%)*, Lupinus spp.* (3.9%), and *Potentilla gracilis* (2.0%). These trends are similar for the plots outplanted in 2013 with slightly higher values for *Lupinus* as the seeded species has matured (Figure 14, Figure 25).

At Big Spires the plant community was dominated by graminoids with dominant species being the native *Festuca roemeri (65%)* and the invasive *Agrostis stolonifera (50%)*. Native forb cover was low with only 3% cover (dominantly *Eriophyllum lanatum* and *Prunella vulgaris*), and invasive forbs make up 11% of plant cover (dominantly *Plantago lanceolata* and *Galium aparine*).

At Atlantic/Pacific, invasive graminoids make up 77% of the plant community and native graminoids 25% (Figure 14). *Danthonia californica* was the dominant native graminoid species, and dominant invasive graminoid species include (*Anthoxanthum odoratum* and *Schedonorus arundinaceus*). Cover of shrubby and woody species was 6%, and was dominantly *Rubus* and *Rosa spp.*

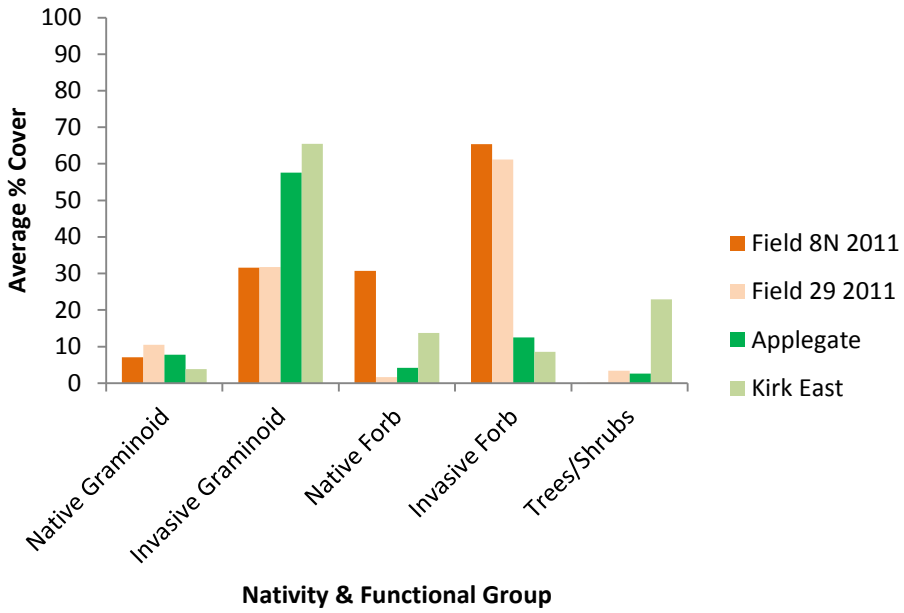


Figure 13. Average plant cover by functional group in 2012 for *Erigeron decumbens* sites outplanted in 2011 in the Corvallis West (orange) and Eugene West (green) Recovery Zones. Note that the initial site conditions vary in each Recovery Zone.

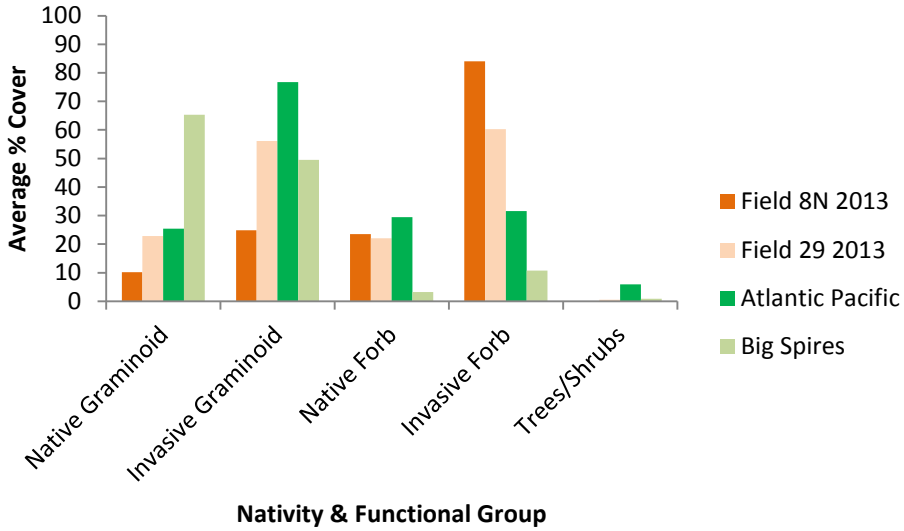


Figure 14. Average plant cover by functional group in 2013 for *Erigeron decumbens* sites outplanted in 2013 in the Corvallis West (orange) and Eugene West (green) Recovery Zones. Note that the initial site conditions vary in each Recovery Zone.

2015 Post-Treatment Site Conditions

Field 8N 2011

Native forb cover did not vary statistically and averaged >75% across all treatments (Figure 15). Invasive forbs ranged from 11 to 70%, and varied statistically among treatments (Figure 15). Burn + Glyphosate treatments had the lowest cover of invasive forbs and high native forb cover (83%), but were statistically similar to all treatments except Fusilade and Glyphosate (Figure 15). Both Fusilade and Glyphosate treatments had >65% invasive forb cover and were statistically higher than all other treatments.

Native graminoid cover did not vary statistically and was <10% across all treatments, including no native graminoid cover in Burn + Glyphosate treatment (Figure 16). Invasive graminoids ranged from 34% in the Glyphosate treatment to 120% in the Mow treatment. All treatments had high cover of invasive graminoids, with Glyphosate the only statistically significant treatment at 34% (Figure 16).

Tree/shrub cover was not recorded in any treatment in 2015.

Field 8N 2013

Native forb cover ranged from 55 to 103%, and was statistically similar across treatments (Figure 15). All plots had >55% native forb cover, with the Carbon and Control similar (55 and 57% respectively) and the other treatments having >72% cover (Figure 15). The Mow, Carbon, and Burn + Glyphosate treatments all had <29% invasive forb cover, but treatments did not vary statistically (Figure 15).

Native graminoid cover ranged from 1 to 25% (Figure 16). Fusilade, Carbon, and Mow treatments had similar native graminoid cover to the Control, but none of the treatments varied statistically (Figure 16). Invasive graminoid cover ranged from 55 to 97%, and did not vary statistically across treatments (Figure 16).

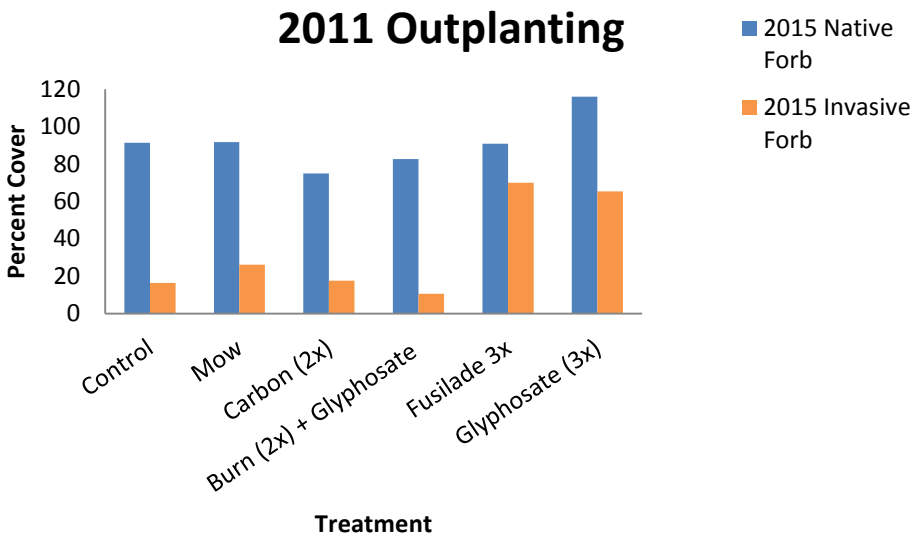
Tree/shrub cover was <1% across all treatments.

Field 29 2011

Native forb cover ranged from 4 to 21% in treatment plots, and did not vary statistically across treatments (Figure 17). Invasive forb cover ranged from 22 to 124% (Figure 17). Glyphosate treatment had the highest cover of invasive forbs, while all other treatments were statistically similar.

Native graminoid cover ranged from 0 to 26%, and did not vary statistically (Figure 18). Invasive graminoid cover was statistically similar across treatments. Invasive graminoid cover was >74% across all treatments, with the Control, Burn + Glyphosate, and Fusilade treatments all >95% (Figure 18).

Tree/shrub cover was <3% across all treatments.



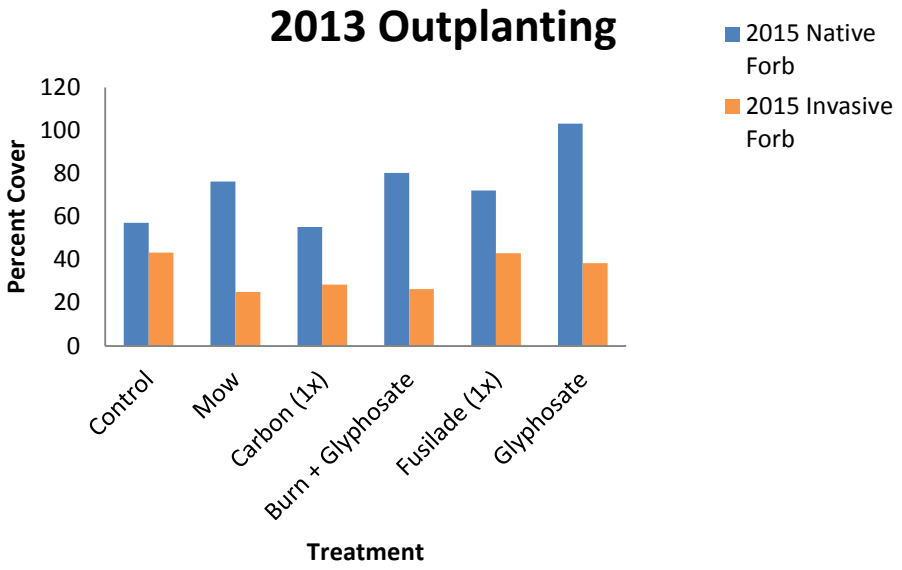
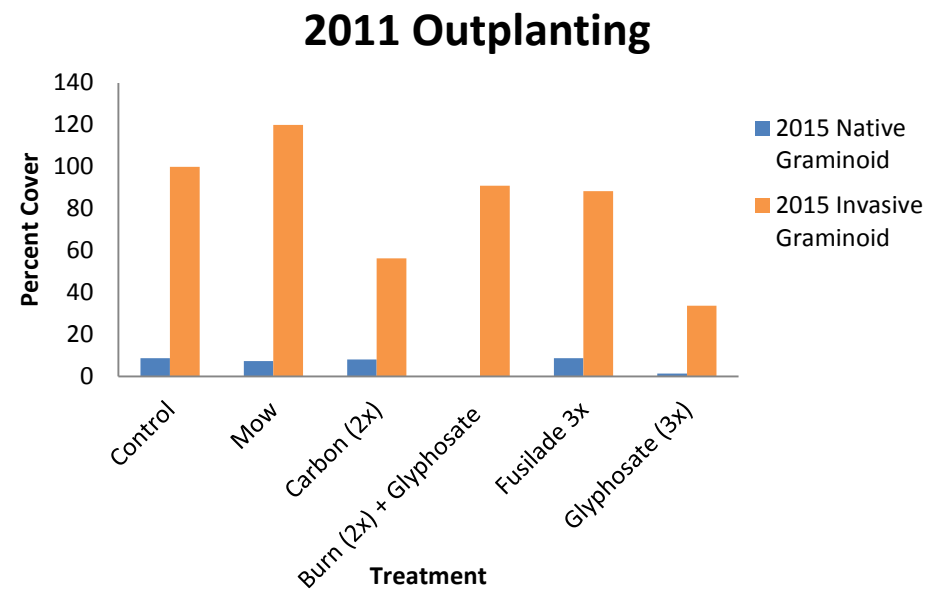


Figure 15. Percent cover of forbs species recorded in 2015 at Finley NWR, Field 8N.



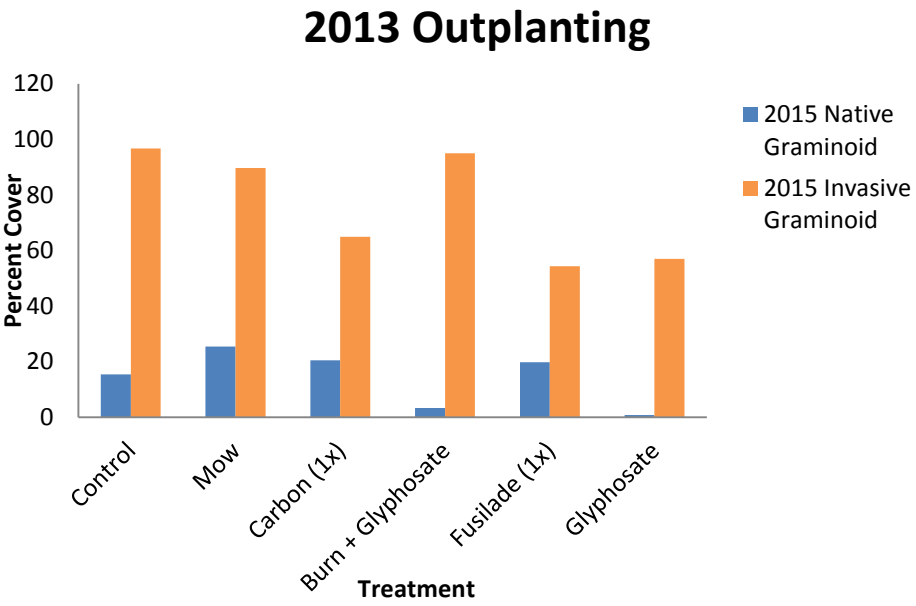
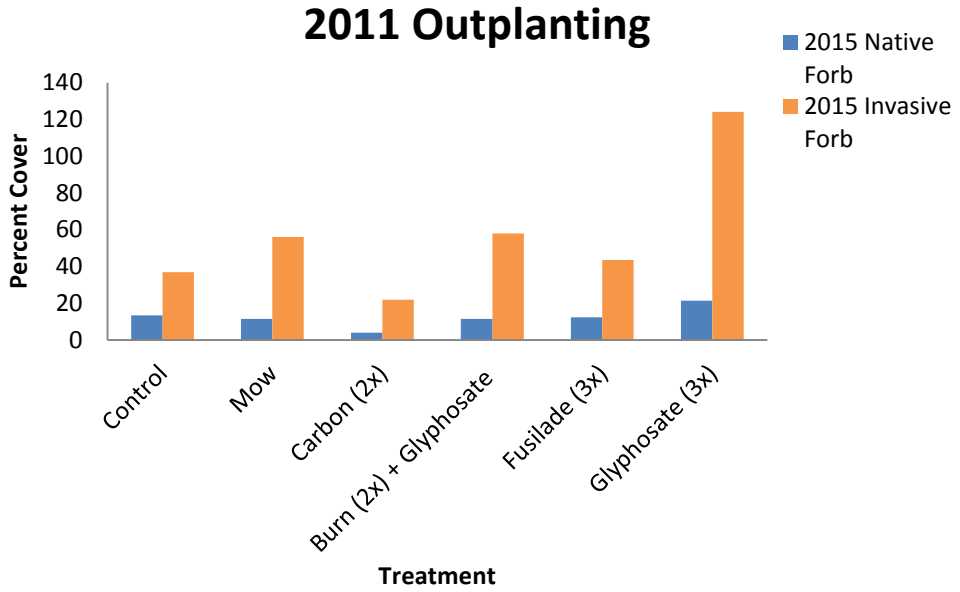


Figure 16. Percent cover of graminoid species recorded in 2015 at Finley NWR, Field 8N.



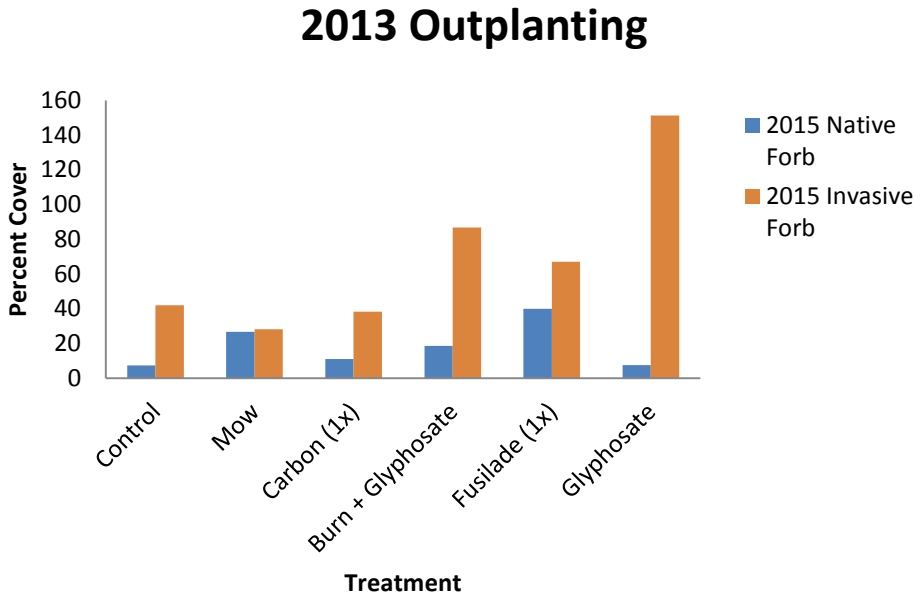


Figure 17. Percent cover of native and invasive forb species recorded in 2015 at Finley NWR, Field 29.

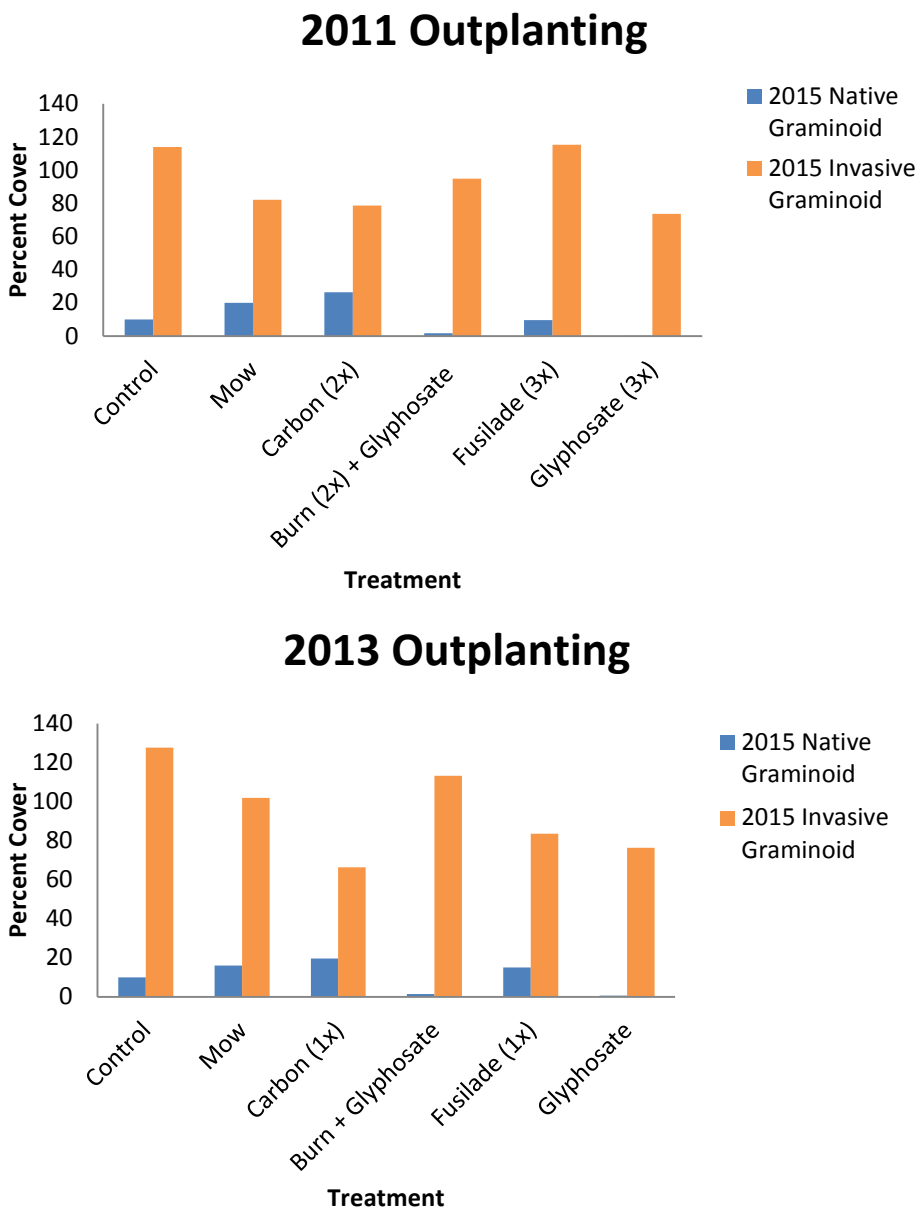


Figure 18. Percent cover of native and invasive graminoid species recorded in 2015 at Finley NWR, Field 29.

Field 29 2013

Native forb cover ranged from 7.5% to 40%, but did not vary statistically (Figure 17). Invasive forb cover ranged from 28% to 151% (Figure 17). The Glyphosate treatment had significantly higher invasive forb cover than all other treatments. The Burn + Glyphosate and Fusilade treatments were also statistically higher than the Carbon, Mow, or Control with respect to invasive forb cover.

Native graminoid cover was not statistically different, with a range from 1 to 20% (Figure 18). Invasive graminoid cover ranged from 66 to 128% (Figure 18). All treatments had >66% invasive graminoid cover, with several over 100% (Figure 18) with the Control, Burn + Glyphosate, and Mow treatments statistically higher.

Tree/shrub cover was <5% across all treatments.

Big Spires

Native forb cover ranged from 5% in Control plots to 32% in the Graze treatment, but did not vary statistically (Figure 19). Invasive forb cover ranged from 5 to 29%, and did not vary statistically across treatments (Figure 19).

Native graminoid cover ranged from 37 to 88% (Figure 20). Native graminoid cover was statistically similar across treatments. Invasive graminoid cover ranged from 21 to 90% (Figure 20). While the Graze and Mow treatments both had >88% invasive graminoid cover, treatments did not vary statistically.

Tree/shrub cover was statistically similar across all treatments (Figure 23).

Atlantic Pacific

Native forb cover ranged from 21% in the Control, to 51% in the Fusilade treatment (Figure 19). Native forb cover was statistically similar across treatments. Invasive forb cover ranged 25% in the Mow treatment, to 102% in the Burn + Glyphosate treatment (Figure 19). The Burn + Glyphosate treatment had significantly higher invasive forb cover than any other treatment.

Native graminoid cover ranged from 2% in the Burn + Glyphosate treatment, to 72% in the Mow treatment (Figure 20). The Burn + Glyphosate had significantly lower than all other treatments, and the Graze treatment had significantly lower native graminoid cover than all treatments except the Burn + Glyphosate. Invasive graminoid cover ranged from 1 to 17% and did not differ statistically across treatments (Figure 20).

Tree/shrub cover ranged from 2 to 40%, but did not vary statistically across treatments (Figure 23).

Applegate

Native forb cover ranged from 2 to 18%, and did not vary statistically across treatments (Figure 21). Invasive forb cover ranged from 12 to 47%, but did not vary statically across treatments (Figure 21).

Native graminoid cover ranged from 1 to 65% across treatments, but did not vary statistically across treatments (Figure 22). The lack of statistical significance could be due to the small sample sizes of the unplanned treatments that were included for comparison. Invasive graminoid cover ranged from 29 to 74% and did not vary statistically across treatments (Figure 22.

Tree/shrub cover ranged from <1 to 21%, but did not vary statically across treatments (Figure 24). As noted above for native graminoids, the lack of statistical significance could be due to the small sample sizes of the unplanned treatments that were included for comparison.

Kirk East

Native forb cover was statistically similar across treatments, ranging from 3 to 39% (Figure 21). Invasive forb cover was also statistically similar across treatments, ranging from 10 to 76% (Figure 21). The high variability found within treatments as well as the smaller sample size due to plot loss (invasive plant control efforts discussed in a later section) could explain the lack of significance.

Native graminoid cover was similar across treatments, ranging from 18 to 28% (Figure 22). Invasive graminoid cover was also statistically similar across treatments, ranging from 26 to 101% (Figure 22). The high variability found within treatments as well as the smaller sample size due to plot loss could explain the lack of significance of treatments at this site.

Trees/shrubs ranged from 2 to 42%, but did not vary statistically across treatments (Figure 24). The lack of statistical significance is likely due to the high variability found within each treatment, as well as the smaller sample size due to plot loss could explain the lack of significance.

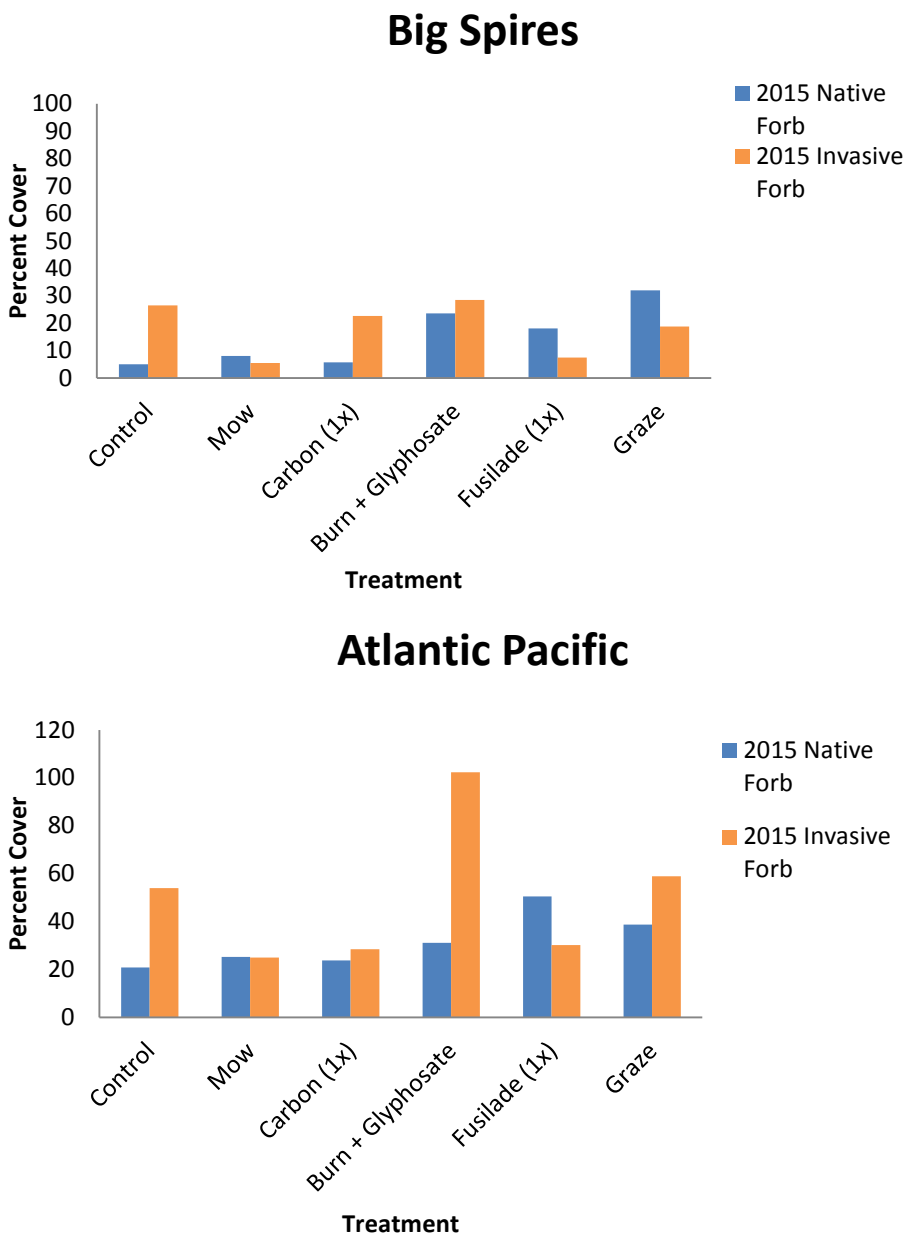


Figure 19. Percent cover of forbs in 2015 for plots outplanted in the Eugene West Recovery Zone in 2013.

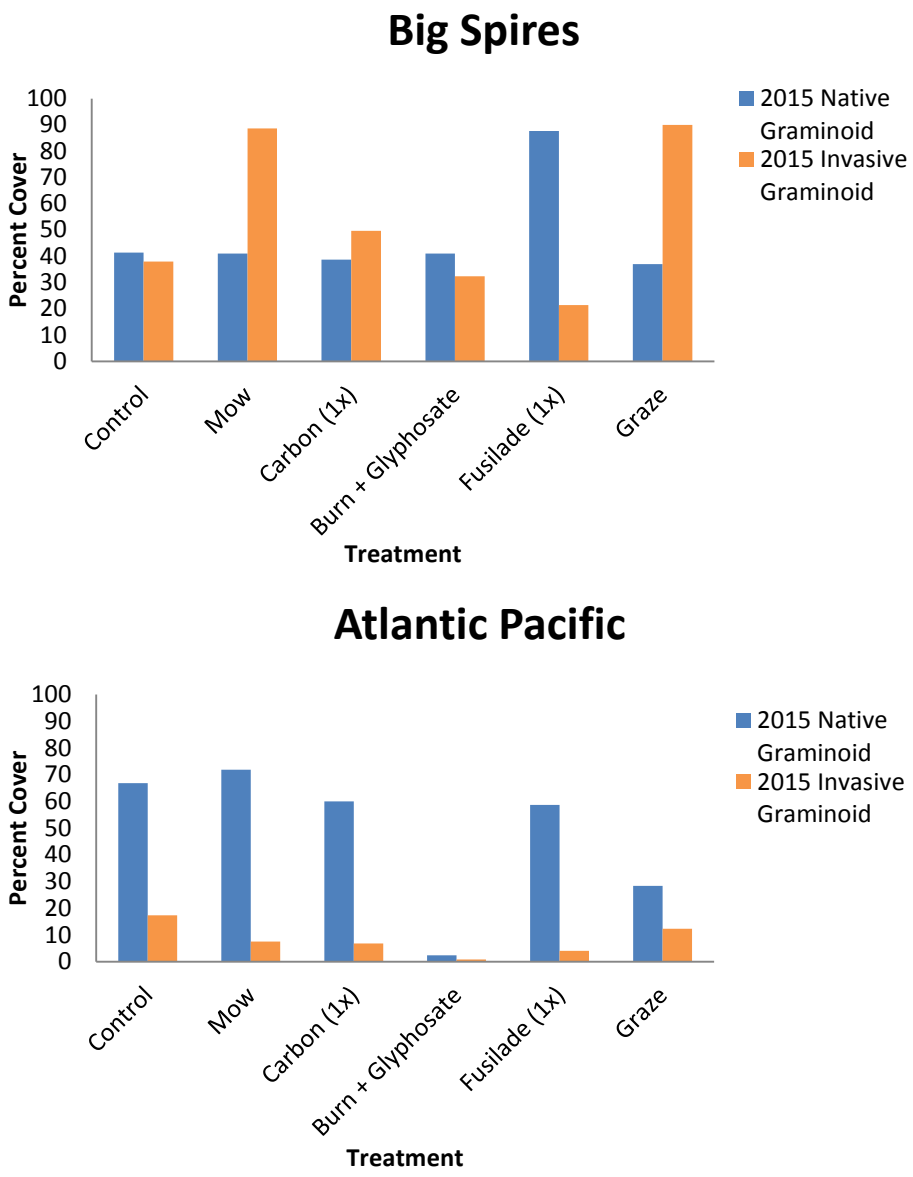


Figure 20. Percent cover of graminoids in 2015 for plots outplanted in the Eugene West Recovery Zone in 2013.

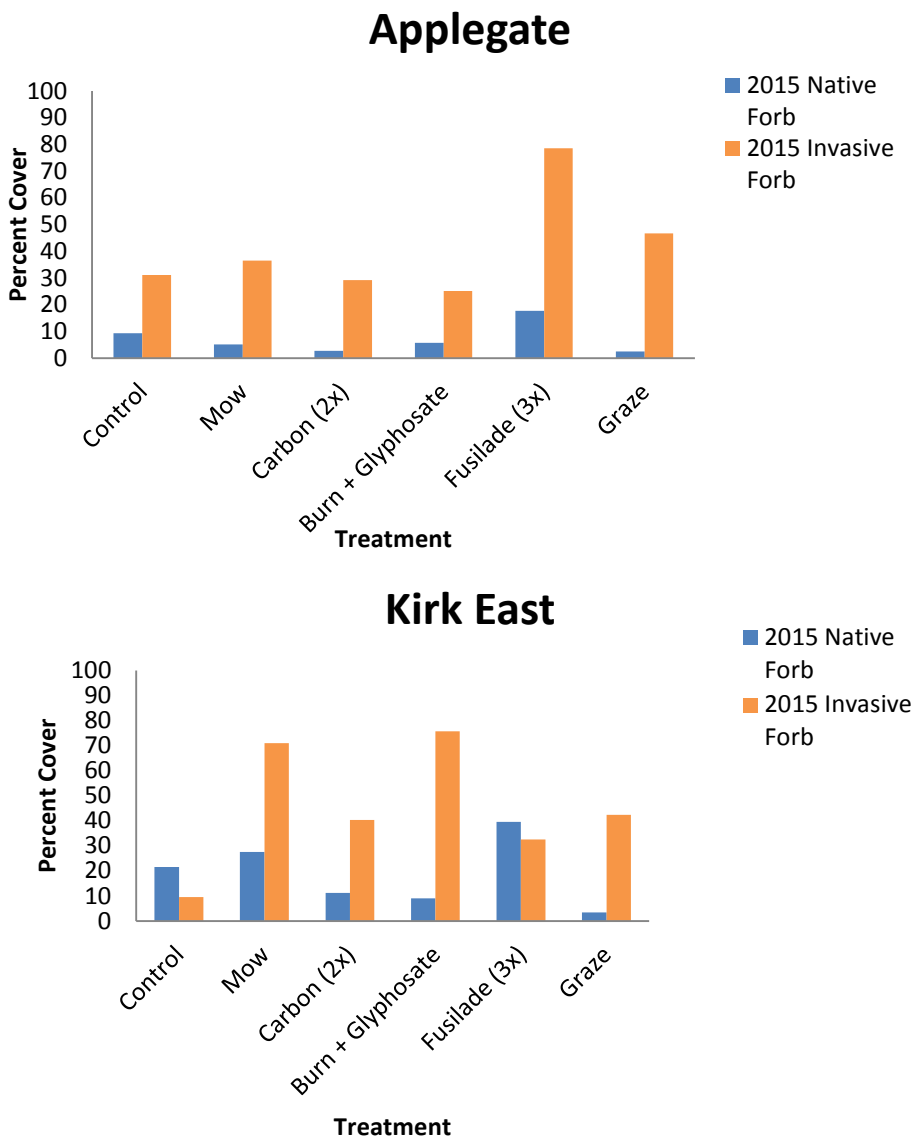


Figure 21. Percent cover of native and invasive forb species in 2015 for plants outplanted in the Eugene West Recovery Zone in 2011.

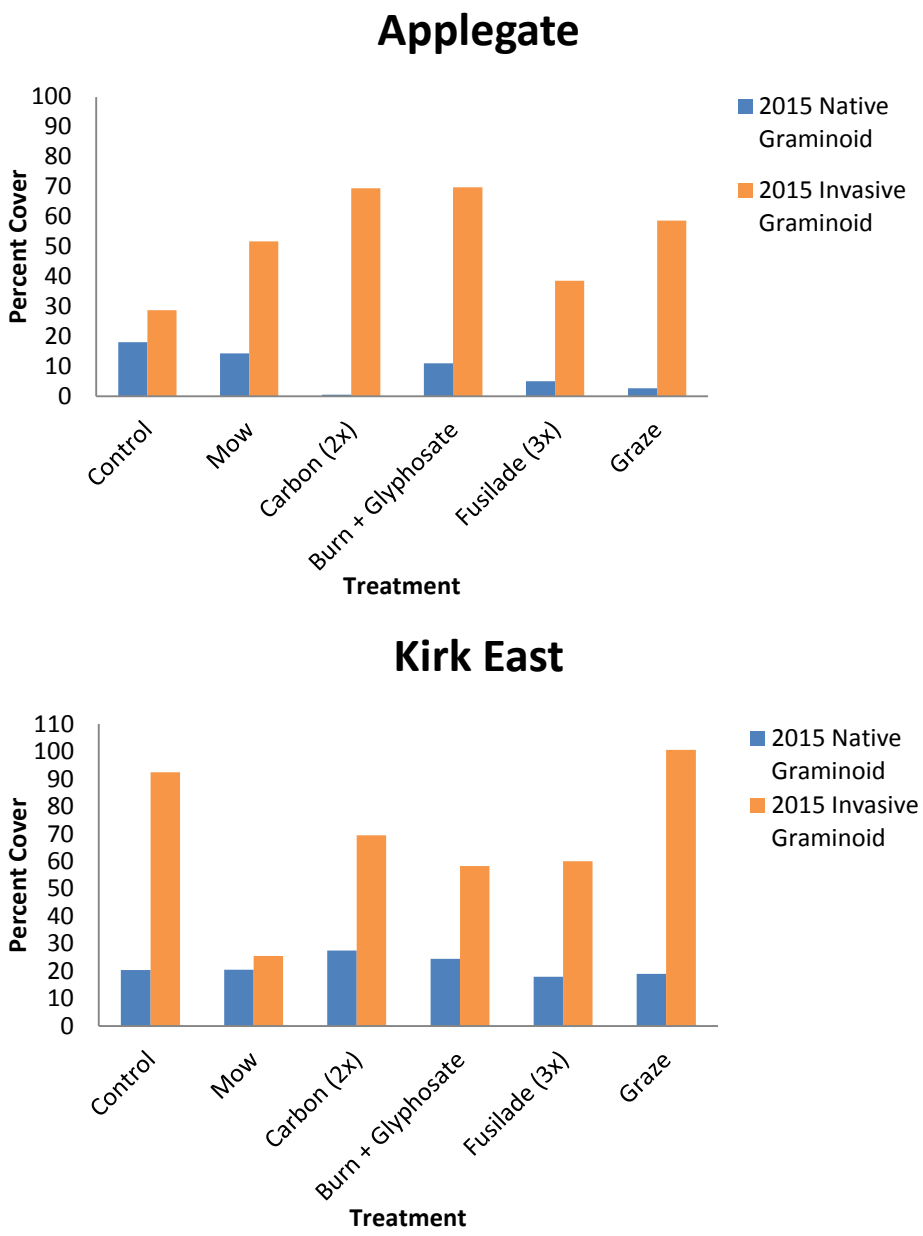


Figure 22. Percent cover of native and invasive graminoid species in 2015 for plants outplanted in the Eugene West Recovery Zone in 2011.

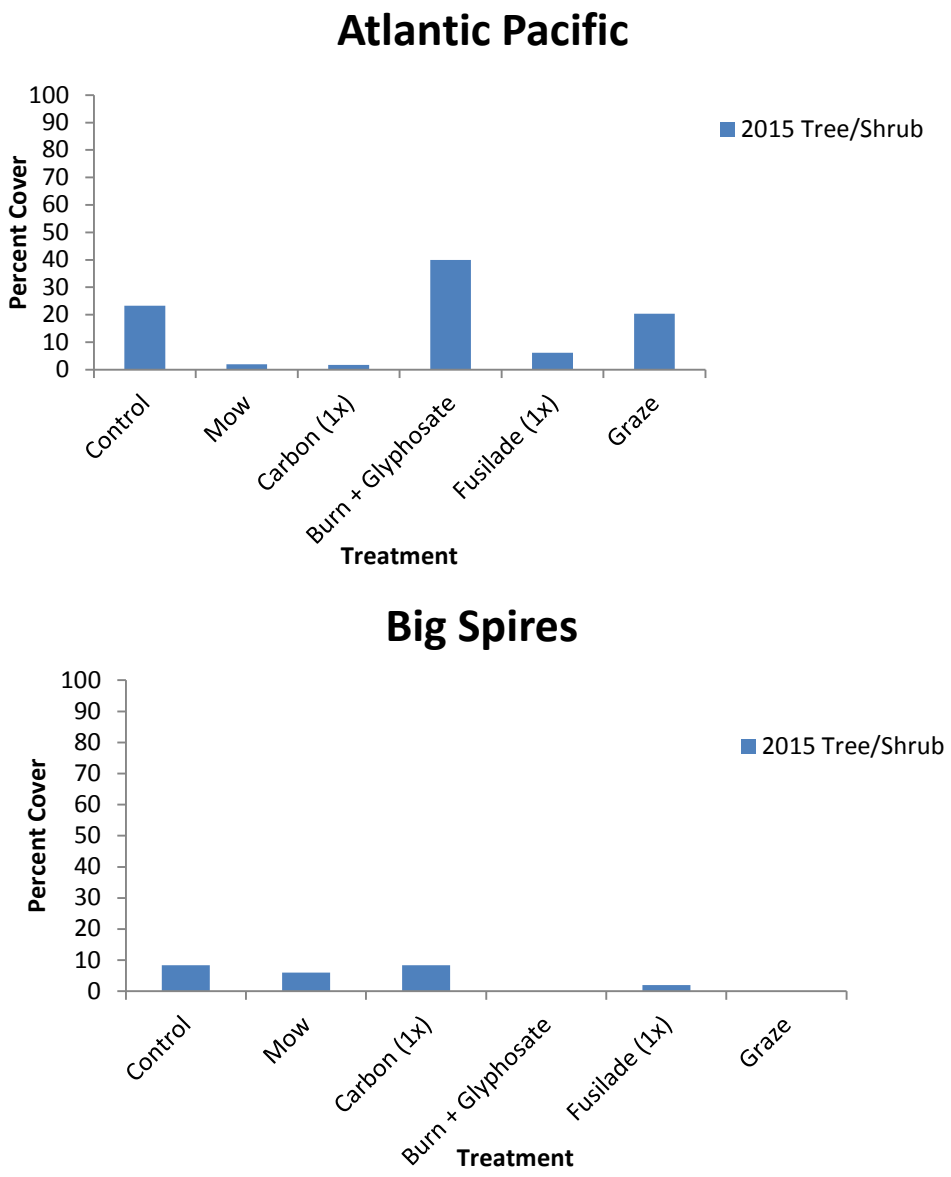


Figure 23. Percent cover of shrubby and woody species at the 2013 outplanting sites in the Eugene West Recovery Zone in 2015.

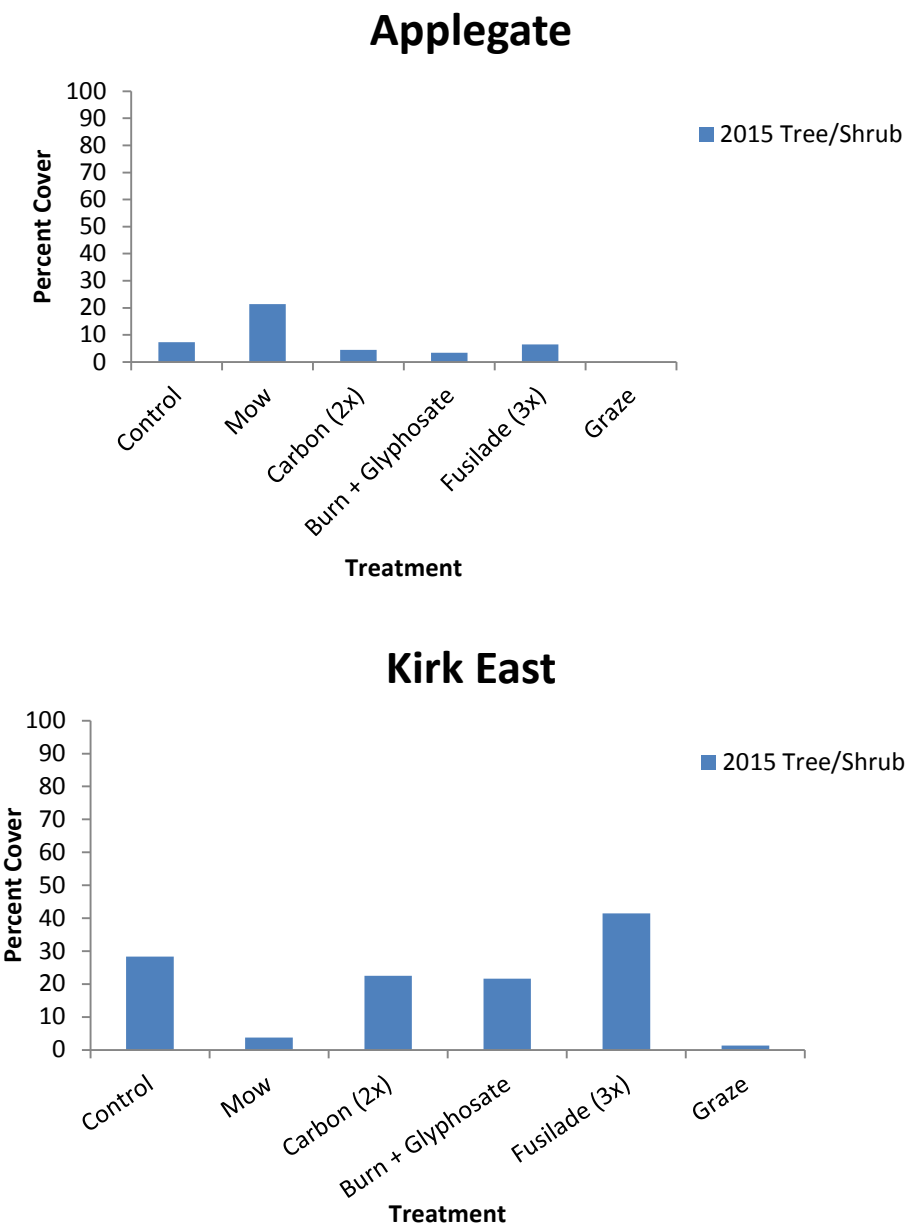


Figure 24. Percent cover of shrub and tree species at the 2011 outplanting sites in the Eugene West Recovery Zone in 2015.

Treatment Specific Effects on Plant Community

Mowing

Mowing did not have a significant effect on graminoid or forb cover (native or invasive) in either Recovery Zone. Shrub cover in the Eugene West Recovery Zone decreased with mowing. At Kirk East, recruitment of daisies was noted only in mowed plots.

Grazing (Eugene Sites Only)

Grazing by sheep in the Eugene West Recovery did not have a significant effect on graminoid or forb cover (native or invasive). Shrub cover tended to be lower in grazed sites, but there was high variability among sites and treatments and no statistically significant differences were found. The initial decrease in plant biomass was short-lived and was ineffective for reducing non-desirable species or increasing bare ground.

Grass-Specific Herbicide

The application of a grass specific herbicide decreased cover of invasive graminoid species in both Recovery Zones; native graminoid cover was not significantly affected or increased. The application of grass-specific herbicide increased shrub cover in the Eugene West Recovery Zone. The grass specific herbicide used in this study, does not target fine-leaved annual grasses such as *Vulpia* spp. and increases in these annual species were noted in particular at Finley Field 8N.

Burning + Glyphosate

The application of a broad-spectrum herbicide after the first flush of green-up post-burn decreased cover of invasive grasses and invasive forbs in the Corvallis West Recovery Zone; native graminoids and forbs were not affected. Burning occurred in the fall of 2012 at Eugene West sites, and decreased invasive graminoids (but increased invasive forbs). This treatment produced the most recruits as well as the largest and most reproductive individuals.

Glyphosate (Corvallis Sites Only)

The application of glyphosate in the fall had no significant effect on the cover of native or invasive species, however there were 84 recruits noted in the Glyphosate only plots at Finley field 29.

Carbon Addition

The effects of carbon addition varied by site often providing similar or better control than herbicide treatments on invasive forb species and graminoid species (especially *Hypochaeris radicata,* and *Vulpia* spp.). In the Corvallis West Recovery Zone, carbon addition did tend to decrease cover of native graminoids, particularly after the second application of carbon. This treatment does provide a non-chemical herbicide alternative for reducing cover of non-desirable species.

Figure 25. Carbon addition can provide an alternate control method for undesirable species. The quantity above was used to treat eight carbon addition plots in the early spring of 2014.

SITE RECOMMENDATIONS

The following site-specific recommendations consider the effects of treatments on Willamette Daisy as well as the surrounding plant community at each site. While there was not a universally 'successful' treatment across all sites that resulted in decreasing cover of non-native species, while increasing cover of native species, and simultaneously increasing vigor and recruitment of Willamette daisy, recommendations can be made on a site by site basis based on our observations.

Finley Field 8N (Corvallis West Recovery Zone) (USFWS- National Wildlife Refuge)

Over the course of this study, this site has seen significant increases in cover of the native (but aggressive) *Lupinus albicaulis* (sickle-keel lupine)(Figure 28). This species can provide nectar for native pollinators including the Fenders blue butterfly which was released at the site in 2015. The increase in lupine has however been accompanied by decreases in cover and diversity of other native species, as well as an increase in the cover of the difficult to manage *Vulpia myuros* (Rattail fescue). Carbon addition, Burn + Glyphosate and Glyphosate only were most effective at decreasing cover of *Vulpia*; mowing resulted in increased cover of the non-native annual species (Figure 25, Figure 26). Decreasing lupine cover was seen in Burn + Glyphosate, Carbon and less so in Glyphosate and Fusilade plots.

Other problematic non-native species at this site include *Hypochaeris radicata,* which forms a dense mat, and prevents seed from making soil contact. Decreased cover of this mat forming species was seen in the Carbon addition and Burn + Glyphosate treatments (Figure 27).

It is unlikely that both the Willamette daisy and the lupine can be successful. While daisy plants below the lupine are relatively large, reproductive effort is low (particularly in plots with high lupine cover), and pollinator access would likely be difficult (recruitment at Field 8N was only noted in treatments which decreased cover of lupine- while it is not clear exactly which environmental factor favored recruitment, both pollinator access as well as presence of bare-ground are likely contributing factors to recruitment success.)

If it is desired for Field 8N to be maintained for Willamette daisy, at least a portion of the field should have lupine kept at bay (either through manual removal, targeted herbicide treatments, carbon addition, or strategically timed mowing.) With these considerations, Burn + Glyphosate and Carbon addition are the most effective at this site for decreasing cover of undesirable species (Figure 26, Figure 27). Seeding of native graminoid and forb species would be recommended post treatment to encourage species diversity.

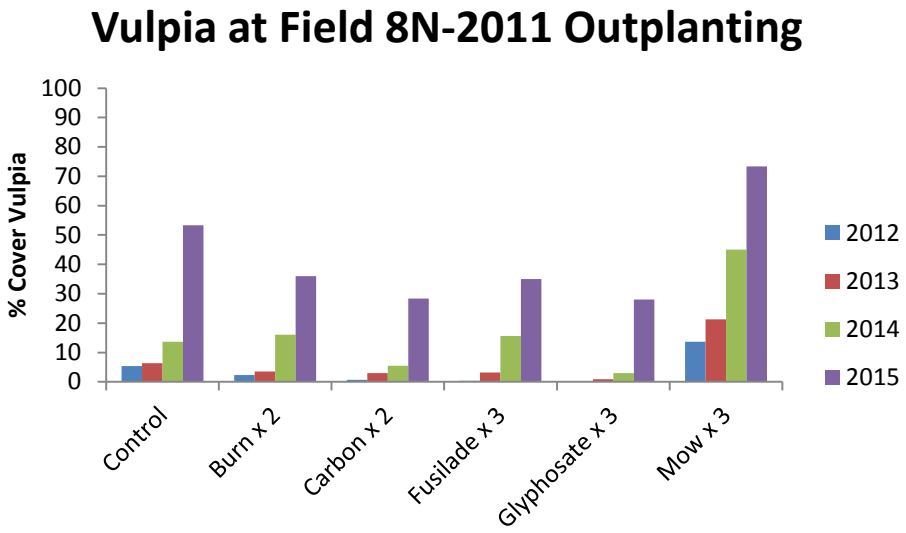


Figure 26. Percent cover of Vulpia at Field 8N has increased over the course of this study independent of treatment.

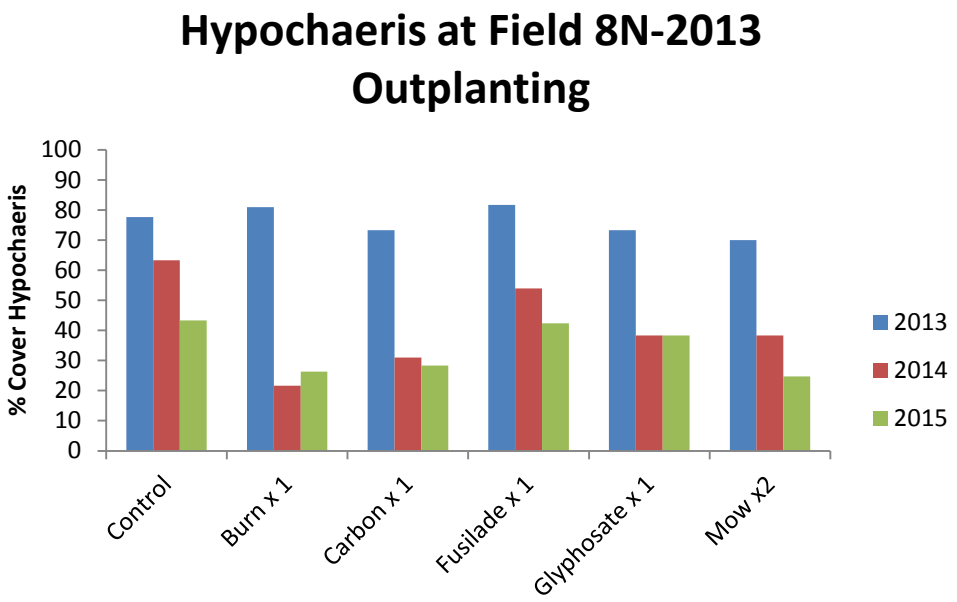


Figure 27. Cover of Hypochaeris radicata at Field 8N, 2013 outplanting.

Figure 28. Increase in lupine cover at Field 8N Finley Wildlife Refuge. The photo on the left was taken in June 2011, the photo on the right was taken in June 2013.

Finley Field 29 (Corvallis West Recovery Zone) (USFWS- National Wildlife Refuge)

Field 29 has consistently been the 'most successful' of the sites in this study: Survivorship and recruitment are highest at this site; plants are also the largest with the most capitula. Burn + Glyphosate as well as Glyphosate only resulted in highest recruitment, however these plots also had slightly higher shrub cover *(Rubus armeniacus*). Targeted grubbing or herbicide treatment of shrub species and seeding to increase diversity are recommended for the site.

Applegate (Eugene West Recovery Zone) (Army Corps of Engineers)

Dominated by *Anthoxanthum odoratum*, and with tree and shrub species including ash and rose, a regular mowing regime (and occasional hand-pull of the shrubby species) is recommended. One time treatment of carbon decreased cover of the non-native *Anthoxanthum odoratum* with concurrent positive effects on the native *Danthonia californica.* Plots treated twice with carbon showed decreases in both native and non-native grass species. This is consistent with other work by IAE which has shown that after one or two carbon treatments, there was minimal effect on native graminoids with concomitant negative effects on invasive graminoid and invasive forb species, however after three carbon treatments there were negative impacts on native graminoids (Gray 2013).

Kirk East (Eugene West Recovery Zone) (Army Corps of Engineers)

In order to achieve habitat requirements for daisies, this site needs control of shrubby species including *Cytisus scoparius* and *Rubus armeniacus*. There are a handful of *Centaurea pratensis* near the plots that have been repeatedly grubbed and treated with herbicide, but have persisted since at least 2012. Control of woody species and noxious weeds are recommended. Mowing was one of the more effective treatments for daisies at this site, and should be continued on at least an annual basis.

Atlantic Pacific (Eugene West Recovery Zone) (City of Eugene)

This site is only 0.3 miles from Oxbow West (managed by the Eugene BLM), has the largest extant population of Willamette daisy in the Eugene West Recovery Zone, and could thus be considered a sub-population of the larger Oxbow West population. In addition to the plants outplanted in 2013, this site is home to a singular extant plant as well as a small transplanted population of Willamette daisy. Other sensitive species at the site include *Sericocarpus rigidus*, and robust populations of *Wyethia angustifolia, Danthonia californica, Camassia quamash* and *Saxifraga oregana.* Cover of *Leucanthemum vulgare* at this site is often more than 50% absolute cover, and control of this non-native forb species will be necessary to meet prairie habitat requirements (Figure 28, Table 7). Maintenance of this remnant wet prairie could include targeted carbon addition, continued control of shrubby species (*Rubus armeniacus*), as well as handpulling or spraying of target weeds including *Dipsacus fullonum* and *Leucanthemum vulgare* (Figure 29).

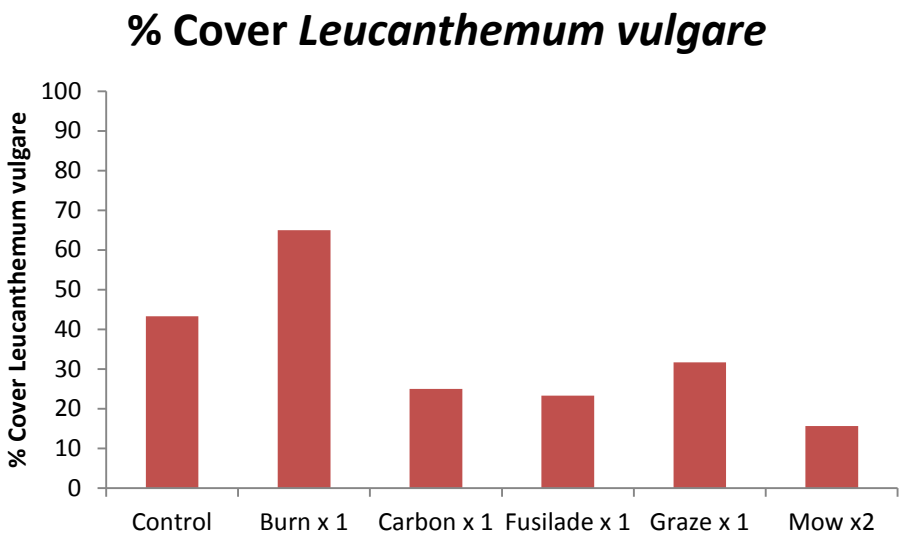


Figure 29. Percent cover Leucanthemum vulgare at Atlantic/Pacific in 2015.

Big Spires (Eugene West Recovery Zone) (Army Corps of Engineers)

This site has been seeded heavily with *Festuca roemeri* and while native cover is high, both species richness and diversity are low. The Army Corps is working to increase diversity at the site and maintain weeds, through seeding of native species and weed control activities. This site generally meets habitat requirements for recovery with the exception of native plant diversity. Seeding at the site of native species (perhaps in conjunction with treatments to increase bare ground- and subsequent seed/soil contact) would be recommended at this site.

Table 6. Timeline of activities to determine effects of management on Willamette daisy.

Project Element	Timeframe	Description
Phase 1/2		
Complete site selection and experimental design	Spring '10, ***Complete***	Fern Ridge Natural Area (ACOE) and Finley National Wildlife Refuge (USFWS) selected for introductions and experiments.
Seed collection and cleaning	July – Aug '10, ***Complete*** July – Aug '11, ***Complete***	As needed, we will collect seed from natural populations to augment seed currently in production.
Growout	Oct '10 – April '11, ***Complete*** Oct '12 – April '13[1], Complete	Willamette daisy grow-out will include four months of cold stratification, then propagation of seedlings in our greenhouse located at Oregon State University.
Introduce Willamette daisy	April '11, ***Complete***	Outplant seedlings.

	April '13[1], ***Complete***	
Demographic, population, and community monitoring	May - June '11, ***Complete*** May - June '12, ***Introductions only***	Monitoring will include demographic and population monitoring of Willamette daisy and cover estimate of all species.
Implement management treatments	Fall '11 – Spring '12 ***Complete*** Fall '12 - Spring '13 ***Complete***	Mowing, thatch removal, grazing, and herbicide treatments will occur during the growing season, but before Willamette daisy is susceptible to damage. Fall burning will be implemented using propane torches. Each treatment will occur twice.
Project and fiscal oversight	***Complete***	On-going through-out project.
Status reporting	'13 –'14	Prepare reports and communicate results through the IAE webpage and meetings.
Phase 3		
Adapt and implement methods at new sites	Spring '13, '14, ***Complete***	We will use the information obtained from Phase 1 of this project to guide implementation of management treatments at existing populations and new introduction sites.
Demographic, population, and community monitoring	May - June '13, '14, '15, ***Complete***	Monitoring will include demographic and population monitoring of Willamette daisy and cover estimate of all species.
Project and fiscal oversight	Ongoing through end of contract	On-going through-out project.
Post-Implementation status reporting	'15 – '16, ***Complete (and scheduled)***	We will prepare reports and communicate results through the IAE webpage, meetings, and conferences. Final report sent to project partners and made available at appliedeco.org/reports. Project results will be presented in April 2016 at the Society for Ecological Restoration-Northwest meeting.

[1]Dates altered relative to original proposal.

FUTURE STEPS

The 2009 Recovery Plan for Willamette daisy includes minimum population requirements as well as requirements for habitat quality; Table 7 shows how these introduced (or augmented) portions of these populations are meeting some of the listed requirements, and areas where the sites are deficient. As progress is made towards reaching recommended population numbers, habitat quality should also be considered. Habitat management of occupied prairies will be a necessary component of recovery.

Although none of our treatments met all of the desired conditions for recovery, we were able to show that multiple management options are available for land managers of Willamette daisy, and the tested management options can continue to be utilized to develop methods to meet habitat quality requirements. Understanding that the presence of Willamette daisy does not preclude the use of (well-timed) management treatments allows land managers more flexibility when dealing with this endangered prairie species.

Continued monitoring of demographic plots across the range of the species is recommended to provide a better understanding of the factors influencing recruitment and survival; reproductive success (and not just transplant survival) will be necessary for recovery of the species. Not surprisingly, work by Gallagher (2012) indicated that plants that had most recruitment also had the highest seedset. Pollinator communities and interactions with Willamette daisy are not well studied. Past population declines, fragmentation of current populations, invasion of non-native plants and animals, and other anthropogenic disturbances are known to cause declines in native pollinators (Kearns et al. 1998). Further research is necessary to understand how pollinator species interact with Willamette daisy in the current fragmented populations to understand the impact of these interactions on reproduction and persistence.

Figure 30. Pollinator services are poorly understood for Willamette daisy.

Table 7. Status of Willamette daisy populations with respect to the 2009 Recovery Plan for Willamatte Valley Prairie Species.

		Pollinator Services	**Habitat requirements**			
Recovery Zone	Site	Distance to adjacent populations (recommended maximum of 2 miles (3km))	Cover of Native Vegetation >50%	Cover of Woody Vegetation (no more than 15% absolute cover)	Prairie Diversity Reported as: Native Diversity(Total Diversity)**	Non-native vegetation***
Corvallis West	Finley Field 8N	1.3 miles to Field 29	34-46%	<1%	5.6 (9.3)	*Hypochaeris radicata Agrostis spp.*
	Finley Field 29	1.3 miles to Field 8N	9-13%	<1% (Minor Rubus spp.)	4.6 (14.6)	*Agrostis spp.*
Eugene West	Kirk East	1.75 miles to Big Spires	26%	17% (Cytisus and Fraxinus, Rosa)	5.6 (10.6)	*Cytisus, Rosa*
	Big Spires	1.75 miles to Kirk East	67%	3% (Minor Rubus spp.)	3.3 (11.0)	*Agrostis spp.*
	Applegate	(on West side of reservoir, no nearby populations- closest population is Big Spires- 4.5 miles across reservoir, or 8.3 miles to Oxbow/Atlantic/Pacific)	30%	8% (Fraxinus)	6.6 (16.3)	*Rosa, Fraxinus Agrostis spp. ,*
	Atlantic Pacific	0.3 miles to Oxbow West (5 miles to Big Spires)	55%	8% (Rubus, Rosa)	7.6 (17.6)	*Leucanthemum vulgare*

**** Plant totals reported here are only for those in the treatment plots- At Finley and Atlantic/Pacific there are additional extant or augmented populations not considered.***

***** At least 10 native species. Minimum, 7 forbs and at least one bunch grass.***

****** No single non-native species to have more than 50% absolute cover.***

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Field 29, USFWS, Finley National Wildlife Refuge
From Corvallis drive south to Finley National Wildlife Refuge.
Park at the Woodpecker Loop Trailhead
Walk south, uphill, to series of t-posts and plots. (There are lots of other plots in the area, including CALE and other ERDE plots.) The 2011 plot is marked with a t-post in the NE corner and the remaining plot corners are marked with square concrete markers flush with the ground. Treatment squares are marked with nail/whisker combinations.

ERDE Management plot locations at Field 29, Finley National Wildlife Refuge

Field 8N, USFWS, Finley National Wildlife Refuge
From Corvallis Drive South on Hwy 99.

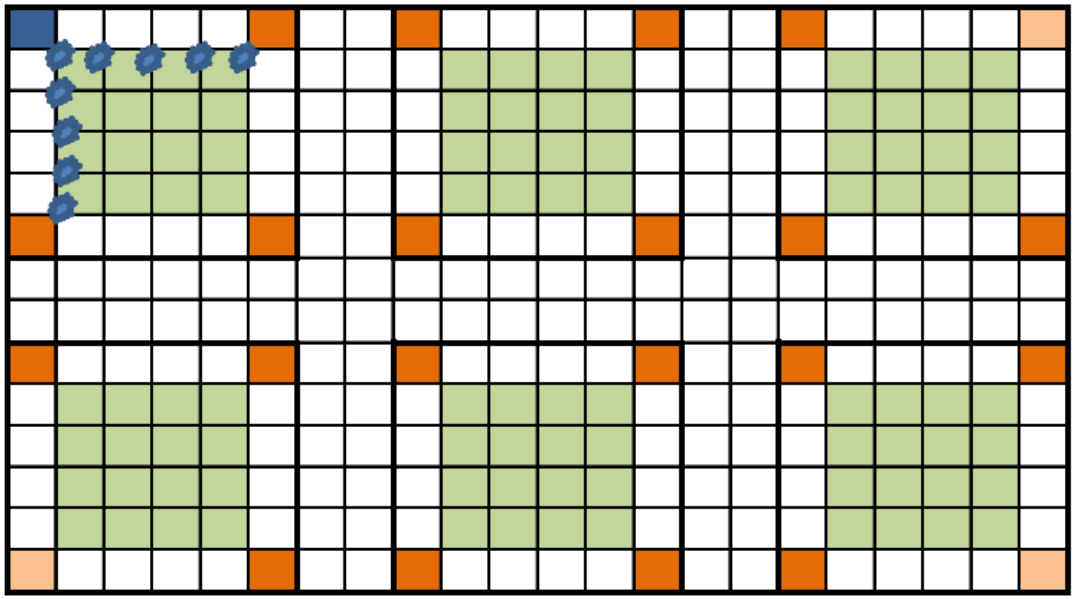
Turn Right (west) onto Bruce Rd.

After 1.1 miles take gated road on right (unmarked)- this is across the street from an overview/lookout.

Continue along road 0.3 miles and park on roadside, walk to site.

The NW corner of the 2011 plot is marked with a t-post.

General schematic of a treatment blocks and squares at Finley National Wildlife Refuge.



= T post and Whisker

= Orange capped rebar

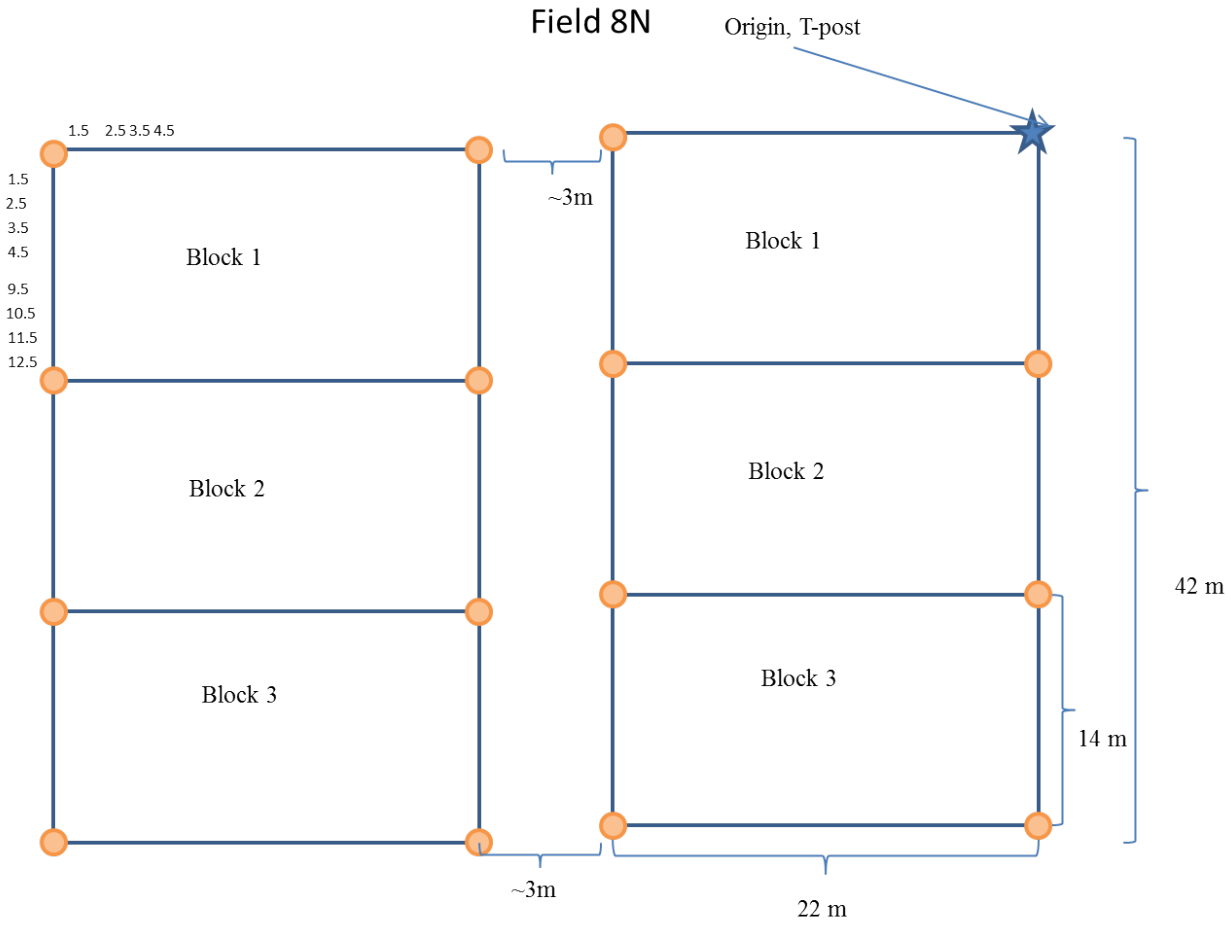
= whisker with spike

= planting area. Start planting at meter 1 to meter 5
Planted block will be 5m x 5m

= 1m x 1m

= ERDE

General Schematic of Plots at Field 8N



Treatment Map of Plots at Field 8N

2013 Plot
Field 8

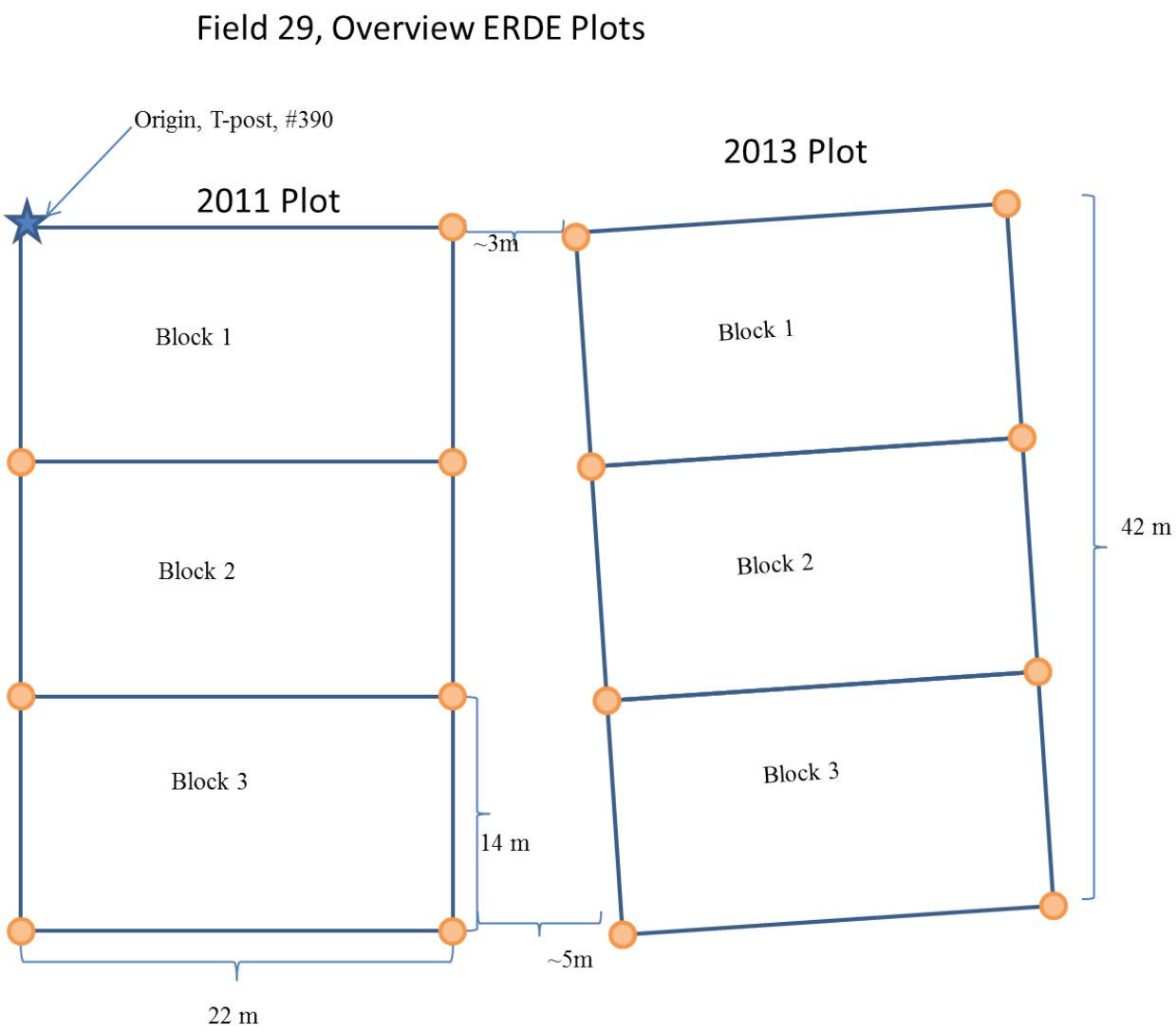
Block 1	1	2 Sugar	3 Glyphosate
	4 Fire	5 Fusilade	6
Block 2	1 Sugar	2 Fire	3 Glyphosate
	4	5 Fusilade	6
Block 3	1 Glyphosate	2 Fusilade	3 Sugar
	4	5 Fire	6

2011 Plot
Field 8

Block 1	1 Glyph	2 Mow	3 Sugar
	4 Fusilade	5 Fire	6 Control
Block 2	1 Glyph	2 Mow	3 Sugar
	4 Fire	5 Fusilade	6 Control
Block 3	1 Fusilade	2 Mow	3 Glyph
	4 Sugar	5 Control	6 Fire

* The whole field was mowed (and sprayed with Fusilade) in the fall of 2013.

General Schematic of Plots at Field 29



Treatment Map of Plots at Field 29

2011 PLOT

Field 29

Block 1	1 Sugar	2 Fire	3 Mow
	4 Control	5 Glyph	6 Fusilade
Block 2	1 Control	2 Sugar	3 Fusilade
	4 Fire	5 Glyph	6 Mow
Block 3	1 Fire	2 Mow	3 Glyph
	4 Control	5 Sugar	6 Fusilade

2013 PLOT

Field 29

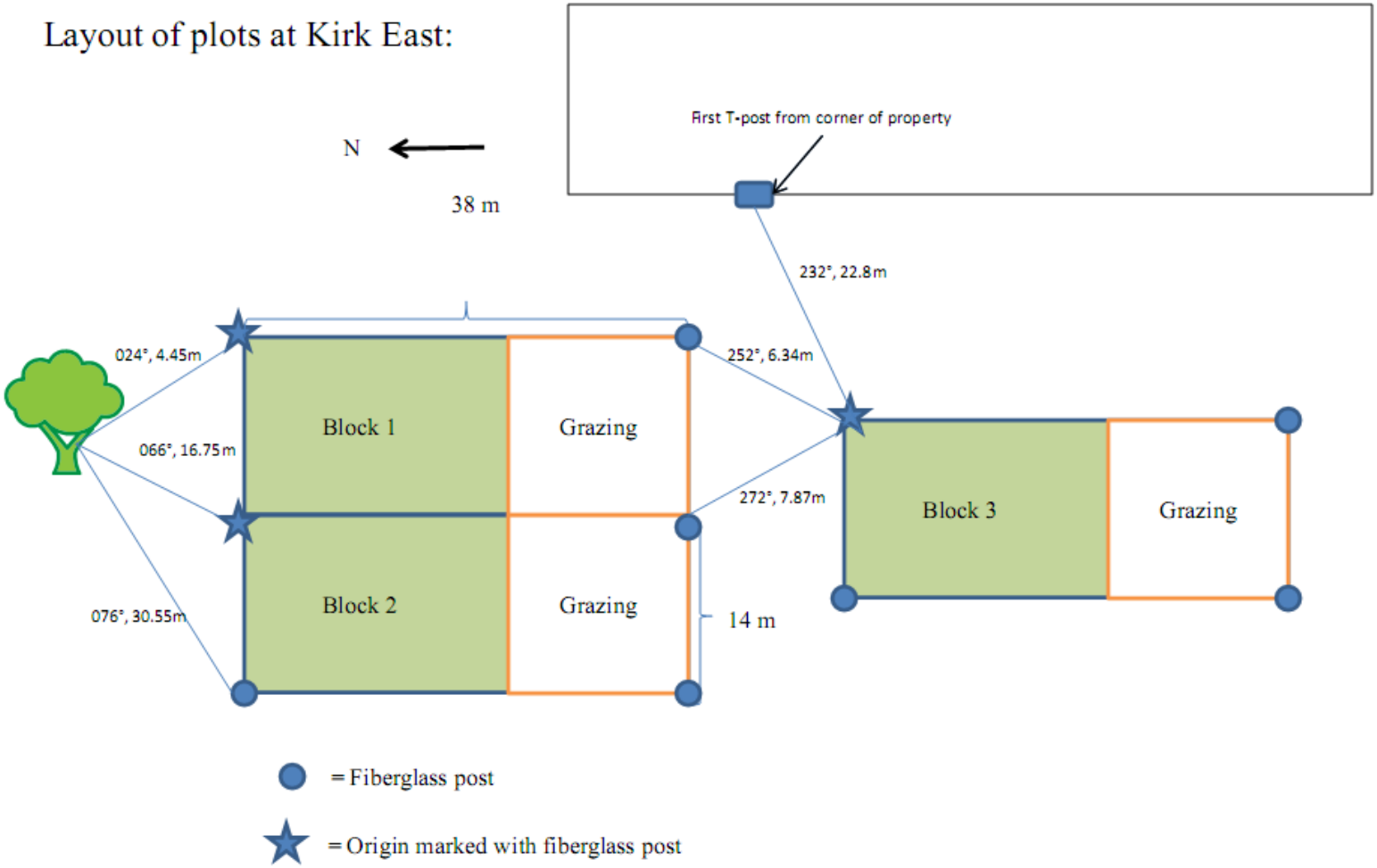
Block 1	1 Burn	2 Control	3 Glyphosate
	4 Mow	5 Sugar	6 Fusilade
Block 2	1 Mow	2 Control	3 Burn
	4 Fusilade	5 Sugar	6 Glyphosate
Block 3	1 Glyphosate	2 Burn	3 Fusilade
	4 Sugar	5 Mow	6 Control

missed in 2013 mowing cycle also mowed prior to fusilade application

Kirk East, Army Corps of Engineers

From Corvallis Drive south on HWY 99.
Just north of Beltline turn right (west) onto Clear Lake Road.
Turn right onto Orchard Rd, and immediately pull into parking lot for Kirk Pond.
Follow path to site.

Kirk East


Layout of plots at Kirk East:
First T-post from corner of property
N
38 m
232°, 22.8m
024°, 4.45m
252°, 6.34m
066°, 16.75m
272°, 7.87m
076°, 30.55m
14 m
Block 1
Grazing
Block 2
Grazing
Block 3
Grazing
= Fiberglass post
= Origin marked with fiberglass post

Generalized Plot Layout for Plots at Kirk East, ACOE, Eugene Recovery Zone:

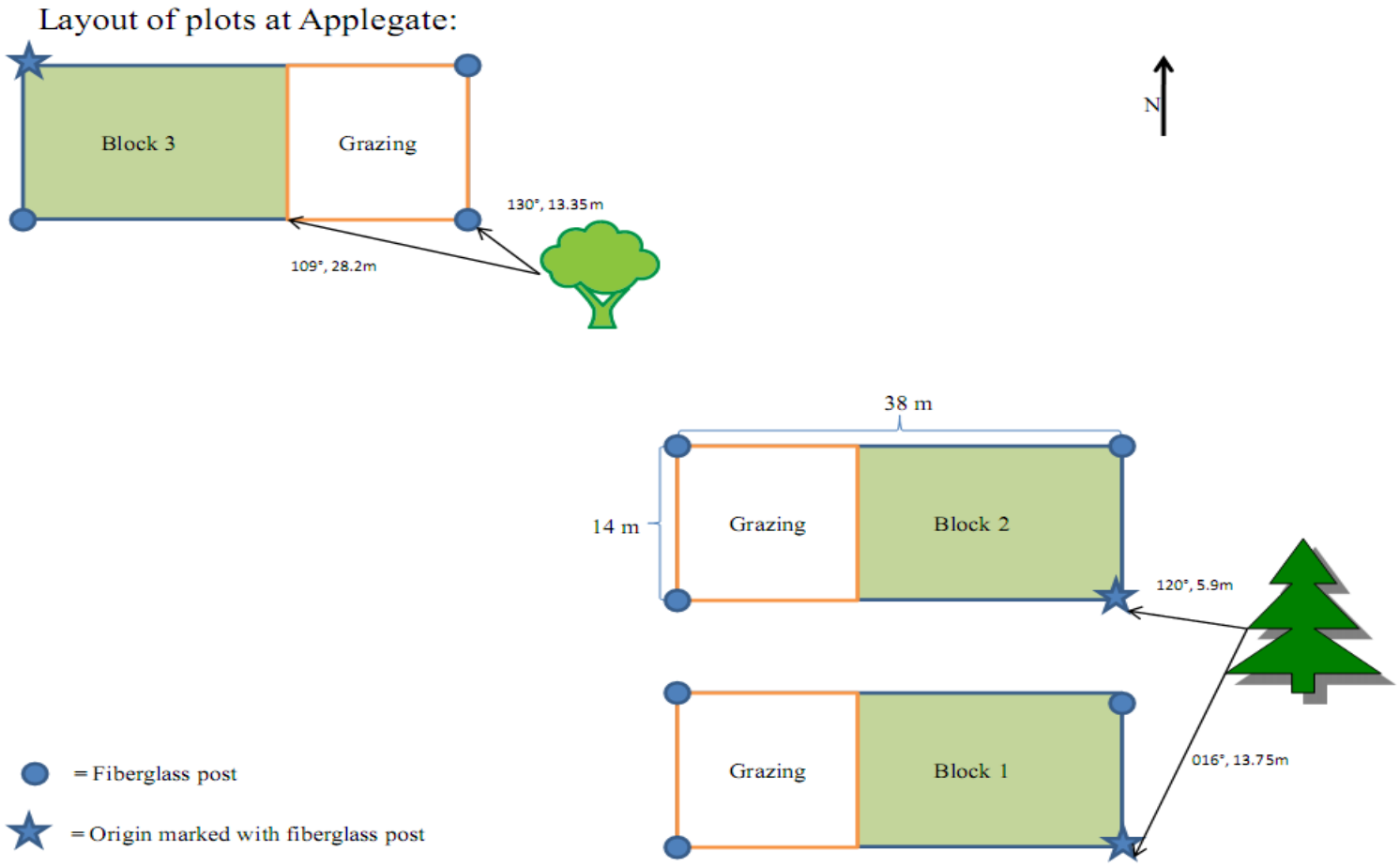
1 Burn	2 empty	3 Fusilade	Grazing
4 Mow	5 Control	6 Sugar	

1 Mow	2 Sugar	3 Empty	Grazing
4 Burn	5 Control	6 Fusilade	

1 Fusilade	2 Mow	3 Burn	Grazing
4 Sugar	5 empty	6 Control	

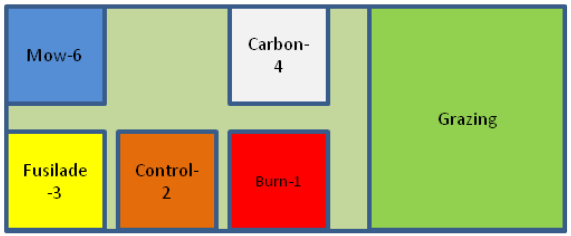
Applegate, Army Corps of Engineers
From Corvallis Drive south on Hwy 99.
Turn right onto Clear Lake Drive
Turn left onto the Territorial Highway (or take Territorial from Monroe)
5.7 miles after Clear Lake/ Territorial Junction, turn left into ACOE pull-out. This parking lot/pullout is just north of Fir Grove Ln. – If you enter town, you have gone too far.

Applegate



Macroplot design at Applegate, Fern Ridge Natural Area.
During set-up and treatments, the origin of each block is marked with a T-post and the remaining corners are marked with rebar topped with orange caps pounded flush with the ground. In the intervening times, plots are only marked with 8 inch nails and colored whiskers in order to minimize visibility. Map not to scale; there is greater distance between Block 3 and the remaining blocks than indicated on the map.

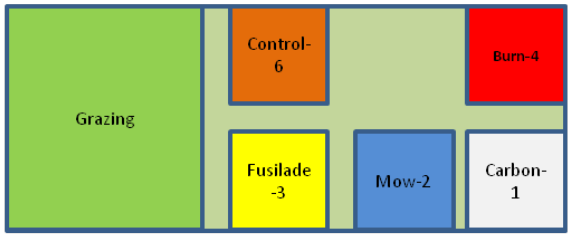
Block 3

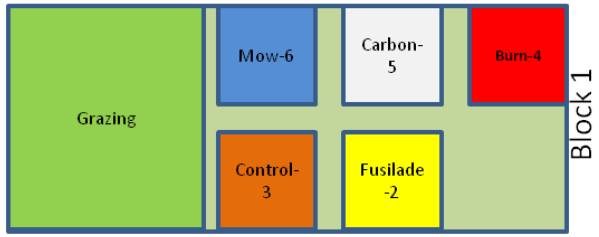


Applegate

N

Block 2

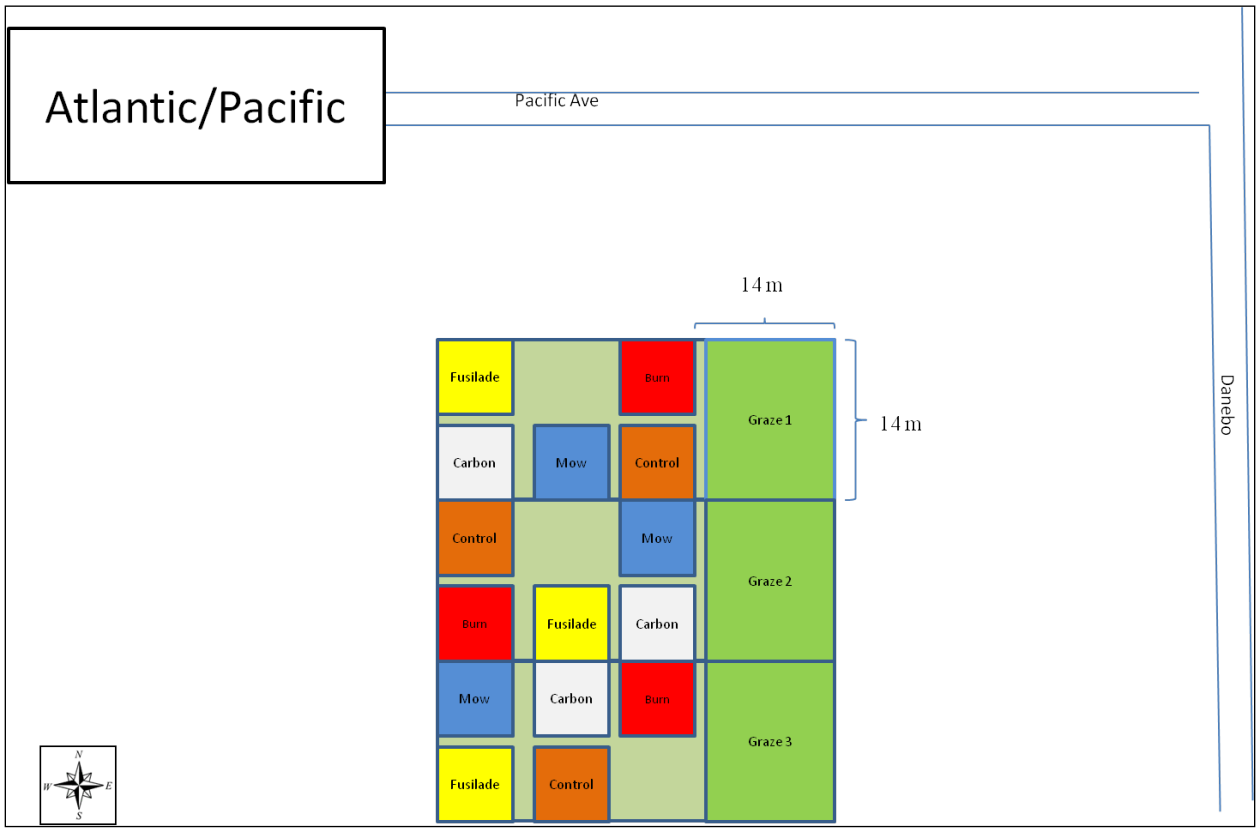




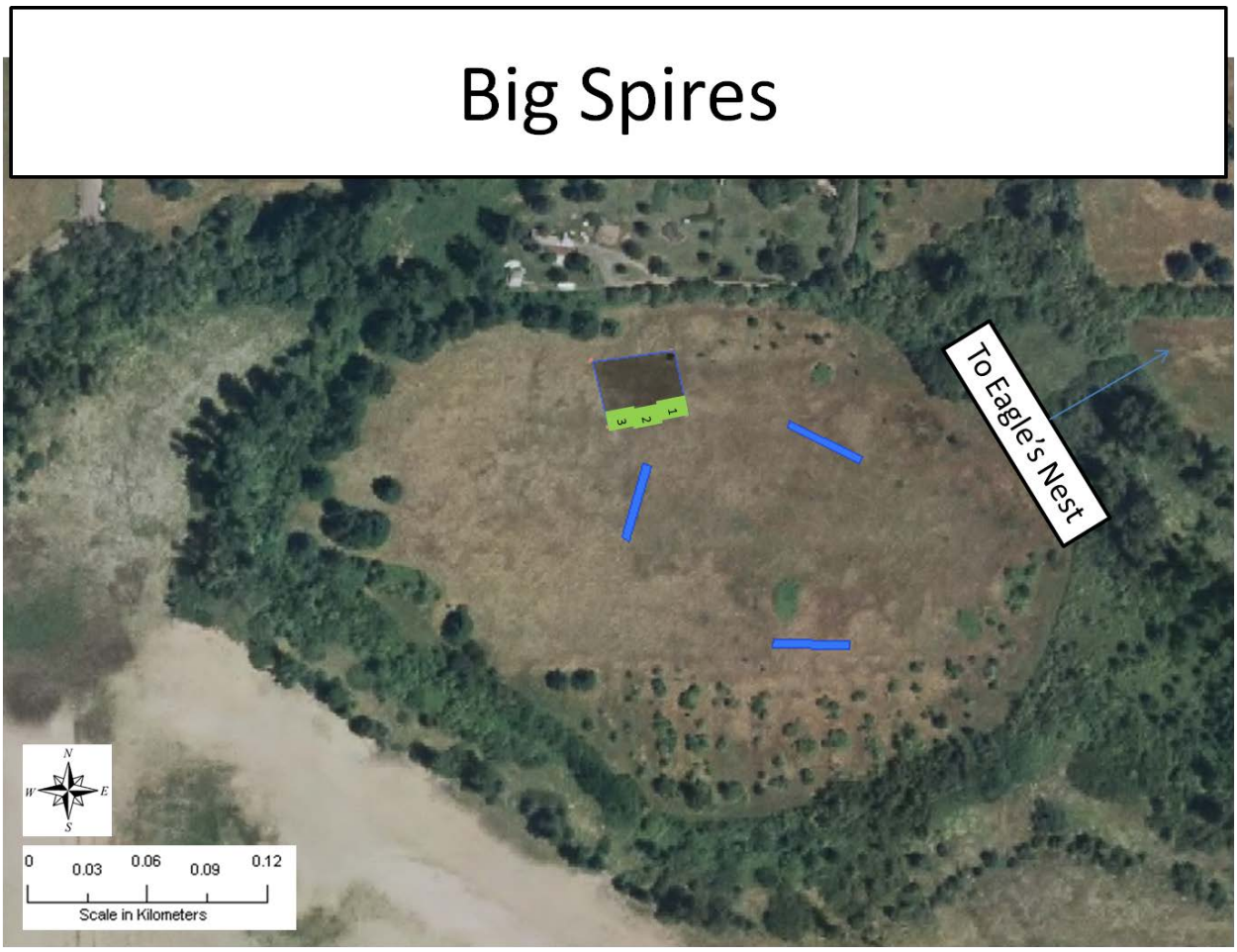
Atlantic/Pacific, City of Eugene

From 126/West 11th Turn North onto Danebo.
Pass the red house (on the right-WEW office)
Turn left onto Pacfic Ave.
Park at junction of Atlantic/Pacific and walk to site.

Alternatively, take Beltline (Hwy 569, Randy Pape Beltline) and take the Roosevelt St. Exit.
Left onto Danebo and then Right onto Pacific Ave
(If you see the red house on your left you have gone too far.)

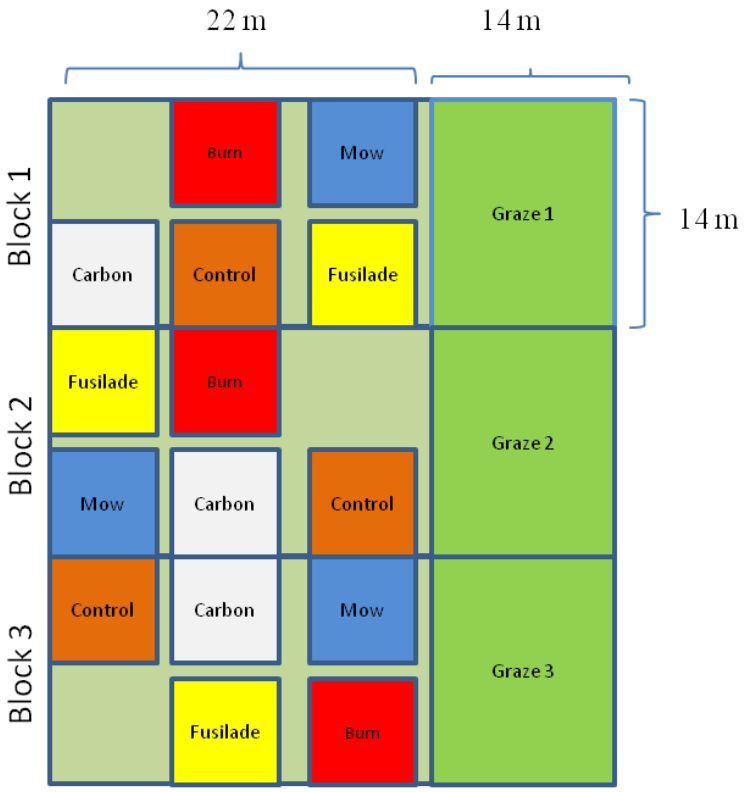


Big Spires, Army Corps of Engineers
From Corvallis drive south on Hwy 99W
Turn west onto Clear Lake Drive. (Just North of Beltline)
After 4.6 miles turn left onto Spires Lane (along sweeping S-curve)
Park at pull-out near mailboxes at 0.4 miles. (Do not block gate or adjacent roads.)
There is a bald eagle nest at the site.



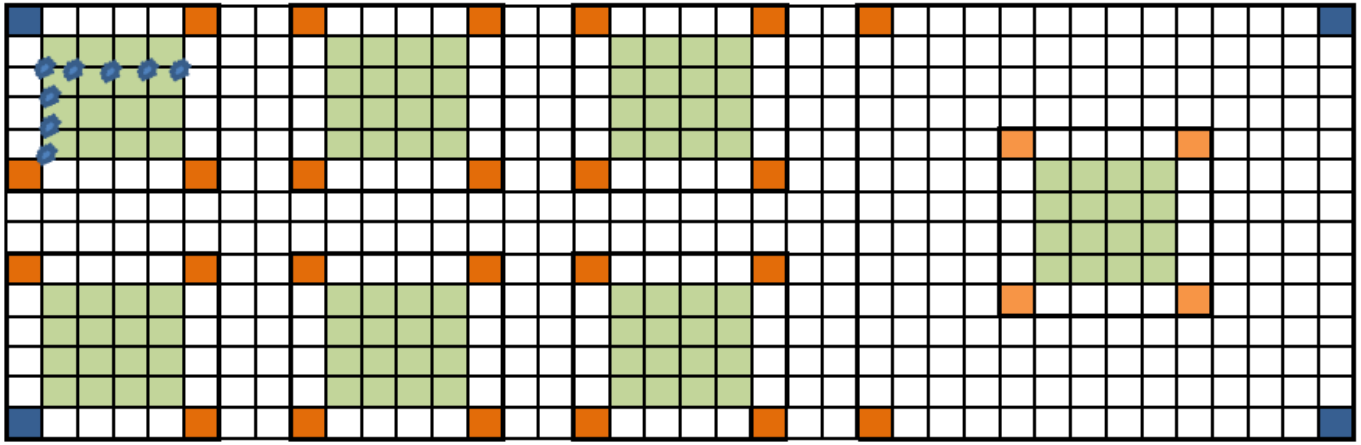
Big Spires Plot Layout:

House



General schematic of blocks and treatment plots in the Eugene Recovery Zone

One small treatment plot was randomly excluded from planting; in 2011 one planting row or column within each square was skipped due to limitations of plant materials.



= Fiberglass post and Whisker

= whisker with spike

= planting area. Start planting at meter 1 to meter 5
Planted block will be 5m x 5m. One row or column will be skipped in each square

= 1m x 1m

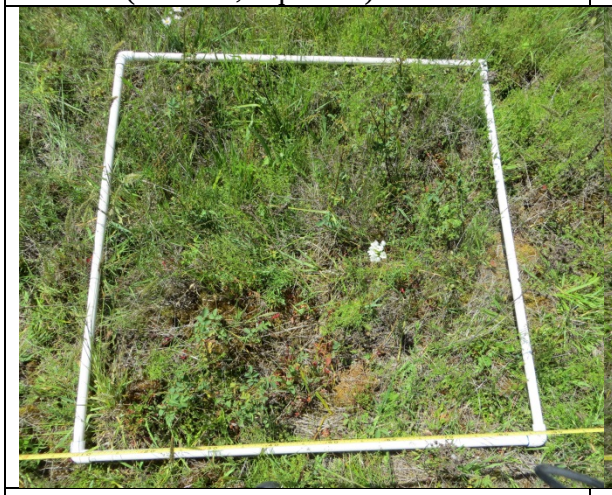
= ERDE

APPENDIX C. PHOTOPOINTS FROM 2015

Photopoints from representative blocks at each site in 2015, with 2014 photos from Big Spires (2013 outplanting) and Field 8N (2011 outplanting) also included. Photos were taken at the time of plant community monitoring in June of 2015.

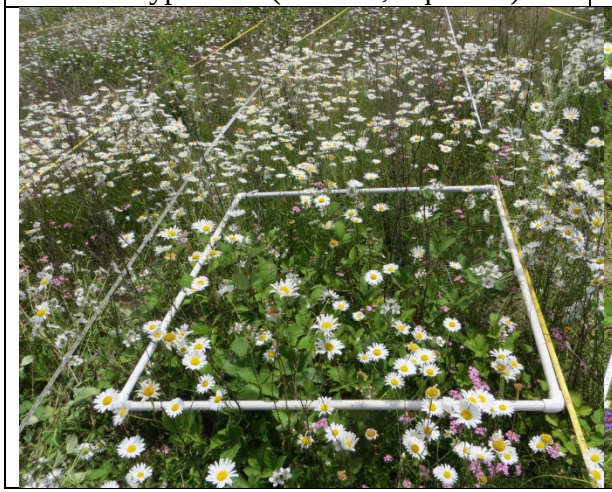
Applegate, Eugene West Recovery Zone (2011 Outplanting)

2015 Photographs

Control (Block 2, Square 6)	Mow (Block 2, Square 2)	Carbon (Block 2, Square 1)
		
Burn + Glyphosate (Block 2, Square 4)	**Fusilade (Block 2, Square 3)**	**Grazing (Block 2, Square 7)**
		

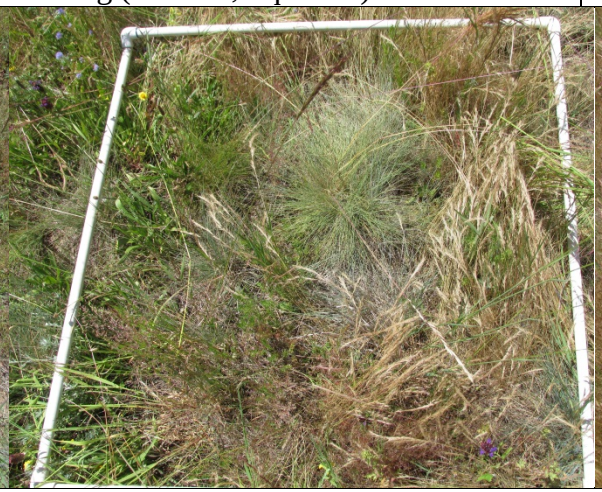
Atlantic/Pacific, Eugene West Recovery Zone, (2013 Outplanting)

2015 Photographs

Control (Block 2, Square 1)	Mow (Block 2, Square 3)	Carbon (Block 2, Square 6)
		
Burn + Glyphosate (Block 2, Square 4)	**Fusilade (Block 2, Square 5)**	**Grazing (Block 2, Square 7)**
		

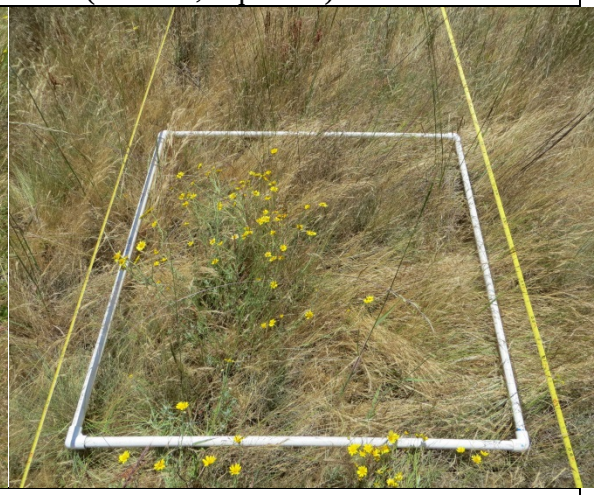
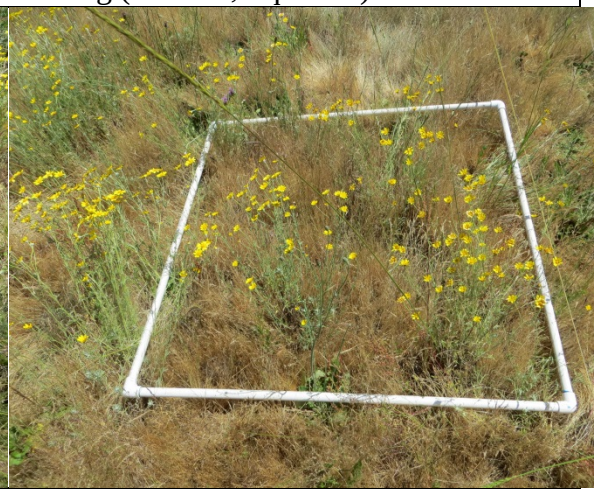
Big Spires, Eugene West Recovery Zone, (2013 Outplanting)

2014 Photographs

Control (Block 3, Square 1)	Mow (Block 3, Square 3)	Carbon (Block 3, Square 2)
		
Burn + Glyphosate (Block 3, Square 6)	**Grazing (Block 3, Square 7)**	**Fusilade (Block 3, Square 5)**
		

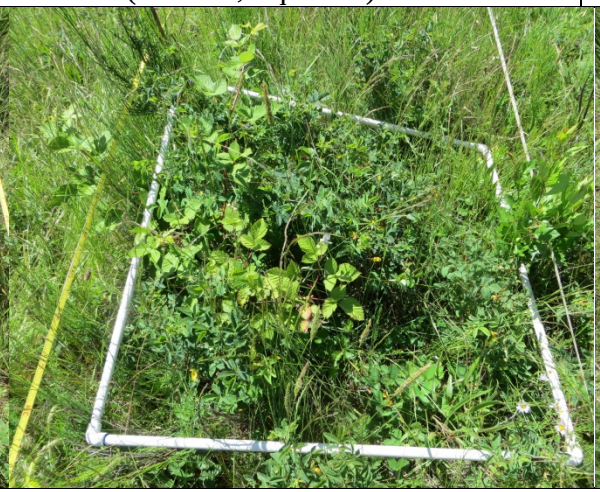
Big Spires, Eugene West Recovery Zone, (2013 Outplanting)

2015 Photographs

Control (Block 3, Square 1)	Carbon (Block 3, Square 2)	Mow (Block 3, Square 3)
		
Fusilade (Block 3, Square 5)	**Burn + Glyphosate (Block 3, Square 6)**	**Grazing (Block 3, Square 7)**
		

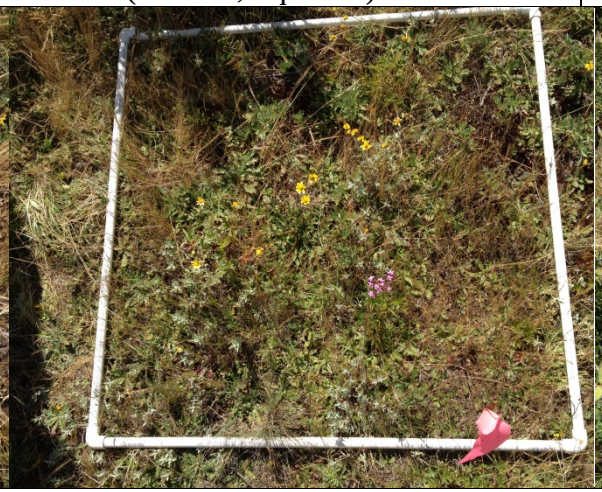
Kirk East, Eugene West Recovery Zone, (2011 Outplanting)

2015 Photographs

Control (Block 2, Square 6)	Mow (Block 2, Square 2)	Carbon (Block 2, Square 4)
		
Burn + Glyphosate (Block 2, Square 4)	**Fusilade (Block 2, Square 1)**	**Grazing (Block 2, Square 7)**
		

Finley Field 8N, Corvallis West Recovery Zone, (2011 Outplanting)

2014 Photographs

Control (Block 1, Square 6)	Mow (Block 1, Square 1)	Carbon (Block 1, Square 2)
		
Burn + Glyphosate (Block 1, Square 4)	**Fusilade (Block 1, Square 5)**	**Glyphosate (Block 1, Square 3)**
		

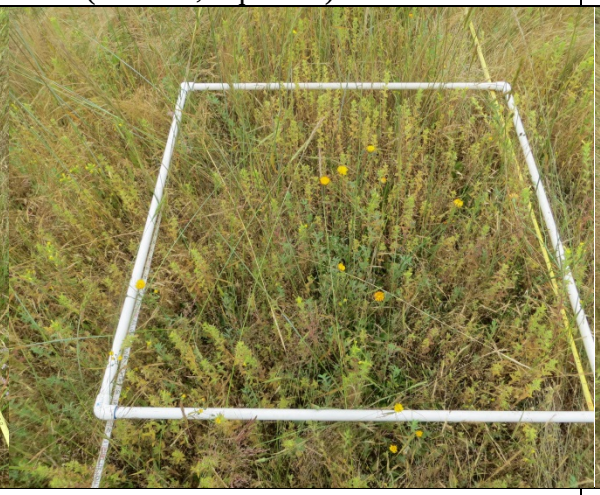
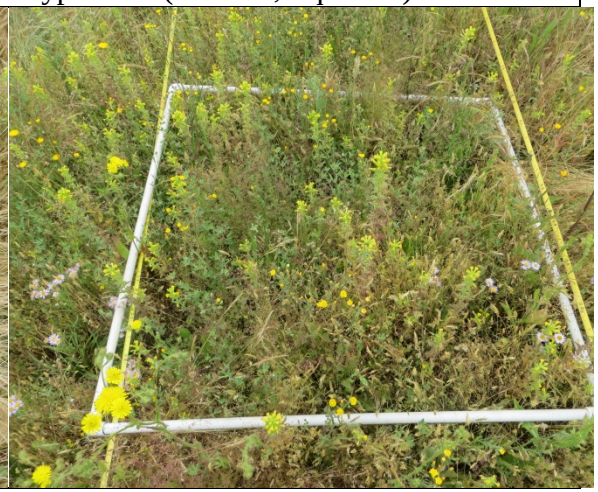
Finley Field 8N, Corvallis West Recovery Zone, (2011 Outplanting)

2015 Photographs

Control (Block 1, Square 6)	Mow (Block 1, Square 1)	Carbon (Block 1, Square 2)
		
Burn + Glyphosate (Block 1, Square 4)	**Fusilade (Block 1, Square 5)**	**Glyphosate (Block 1, Square 3)**
		

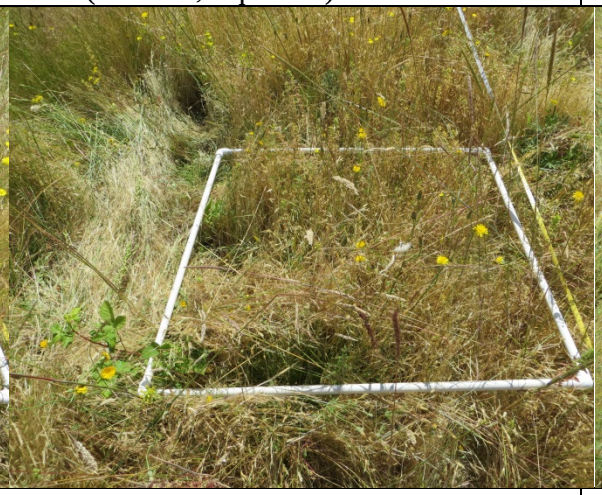
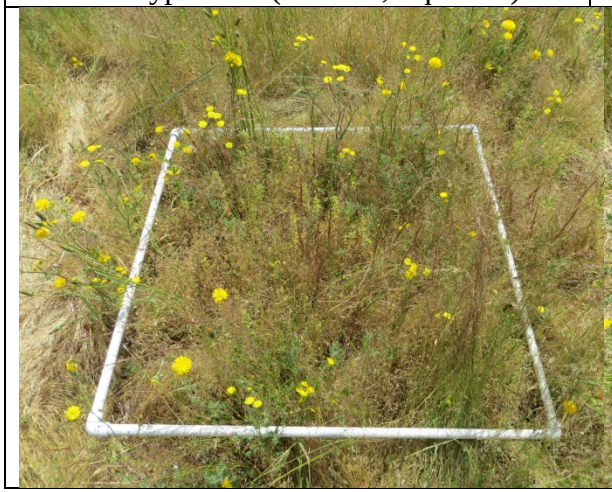
Finley Field 29, Corvallis West Recovery Zone, (2011 Outplantings)

2015 Photographs

Control (Block 1, Square 4)	Mow (Block 1, Square 3)	Carbon (Block 1, Square 1)
		
Burn + Glyphosate (Block 1, Square 2)	**Fusilade (Block 1, Square 6)**	**Glyphosate (Block 1, Square 5)**
		

Finley Field 29, Corvallis West Recovery Zone, (2013 Outplantings)

2015 Photographs

Control (Block 3, Square 6)	Mow (Block 3, Square 5)	Carbon (Block 3, Square 4)
		
Burn + Glyphosate (Block 3, Square 2)	**Fusilade (Block 3, Square 3)**	**Glyphosate (Block 3, Square 1)**
		

APPENDIX D. SUMMARY OF COVER DATA BY SITE AND TREATMENT

Data reported were recorded in 2015 and represent the average across the three treatment blocks. 1 m^2 was measured in each treatment plot.

Habitat quality requirements are taken from the 2009 Recovery Plan for Willamette Valley Prairie Species. While these measurements do not necessarily quantify the entire occupied area, they can provide a general glimpse into the baseline prairie conditions at each site.

Plant community data was also collected in 2012-2014, but are not reported here for brevity.

Applegate

Site	Applegate					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1	Fusilade	Mow	Control	Carbon	Graze
2015 treatment #	1	3	4	5	6	7
Ground Cover						
Bare ground	2.0	2.0	4.0	5.7	0.1	1.0
Litter	96.0	92.5	92.7	96.7	99.0	98.7
Moss	0.7	11.0	8.0	10.0	2.0	4.0
Graminoids						
Agrostis stolonifera	56.7	29.5	35.0	14.0	65.0	52.7
Aira caryophylla	5.7	2.0	0.0	2.0	0.0	0.0
Anthoxanthum odoratum	4.0	7.0	14.0	11.7	4.5	4.7
Arrhenatherum elatius	0.0	0.0	0.0	0.0	0.0	0.0
Briza minor	0.2	0.1	0.0	0.0	0.0	0.0
Bromus carinatus	0.0	0.0	0.0	0.0	0.0	0.0
Bromus hordeaceous	0.0	0.0	0.0	0.0	0.0	0.0
Carex sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cynosurus echinatus	0.0	0.0	0.0	0.0	0.0	0.0
Dactylis glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Danthonia californica	11.0	5.0	14.3	7.7	0.5	2.7
Deschampsia caespitosa	0.0	0.0	0.0	0.0	0.0	0.0
Elymus glaucus	0.0	0.0	0.0	0.0	0.0	0.0
Festuca arundinacea	0.0	0.0	0.0	0.0	0.0	0.0
Festuca roemeri	0.0	0.0	0.0	0.0	0.0	0.0
Holcus lanatus	0.0	0.1	2.7	1.0	0.0	1.3
Juncus bufonius	0.0	0.0	0.0	0.0	0.0	0.0
Juncus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Luzula sp.	0.0	0.1	0.0	0.3	0.1	0.0
Panicum occidentale	0.0	0.0	0.0	10.0	0.0	0.0
Phleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Poa compressa	0.0	0.0	0.0	0.0	0.0	0.0
Poa pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Vulpia spp.	3.3	0.0	0.0	0.0	0.0	0.0
Tree/Shrub						
Cretaegus douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Cytisus scoparius	0.0	0.0	0.0	0.0	0.0	0.0
Fraxinus latifolia	0.0	0.0	20.0	1.3	4.0	0.0
Malus sp.	0.0	0.0	0.0	0.0	0.0	0.1
Pinus ponderosa	0.0	0.0	0.0	0.0	0.5	0.0

Site	Applegate					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1	Fusilade	Mow	Control	Carbon	Graze
2015 treatment #	1	3	4	5	6	7
Prunus emarginata	0.0	0.0	0.0	0.0	0.0	0.0
Pseudotsuga menzesii	0.0	0.0	0.0	0.0	0.0	0.0
Rosa sp.	3.3	6.5	1.3	6.0	0.0	0.0
Rubus armeniacus	0.0	0.0	0.0	0.0	0.0	0.0
Rubus ursinus	0.0	0.0	0.0	0.0	0.0	0.0
Spirea douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Symphoricarpos albus	0.0	0.0	0.0	0.0	0.0	0.0
Toxicodendron diversilobum	0.0	0.0	0.0	0.0	0.0	0.0
Forbs						
Achillea millefolium	0.0	0.0	0.0	0.0	0.0	0.0
Agoseris sp.	0.0	0.0	0.0	0.0	0.0	0.0
Allium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Anaphales margarita	0.0	0.0	0.0	0.0	0.0	0.0
Aster halii	4.0	6.0	2.8	7.4	0.1	0.0
Brodiea sp.	0.0	0.0	0.2	0.1	0.1	0.0
Cammasia quamash	0.2	0.6	1.3	0.5	0.1	2.0
Castilleja levisecta	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea erythrea	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Cerastium arvense	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Clarkia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Collomia grandiflora	0.0	0.0	0.0	0.0	0.0	0.0
Crepis capillaris	0.0	0.0	0.0	0.0	0.0	0.0
Crepis setosa	0.0	0.0	0.0	0.0	0.0	0.0
Daucus carota	0.7	0.0	0.3	0.0	0.0	0.0
Dipsacus fullonum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium ciliatum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium munitum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Equisetem sp.	0.0	0.0	0.0	0.3	0.0	0.0
Erigeron decumbens	0.0	1.0	0.3	0.0	0.5	0.3
Eriophyllum lanatum	0.0	0.0	0.0	0.0	0.0	0.0
Fragaria virginiana	0.0	0.0	0.0	0.0	0.0	0.0
Galium aparine	0.0	0.0	0.0	0.0	0.0	0.0
Galium parisiense	4.7	18.5	25.0	12.0	26.0	33.7
Geranium dissectum	0.0	0.0	0.0	0.0	0.0	0.0
Geranium molle	0.0	0.0	0.0	0.0	0.0	0.0

Site	Applegate					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1	Fusilade	Mow	Control	Carbon	Graze
2015 treatment #	1	3	4	5	6	7
Gilia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Gnaphalium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Grindelia integrifolia	0.0	0.0	0.0	0.0	0.0	0.0
Heracleum	0.0	0.0	0.0	0.0	0.0	0.0
Hypericum perforatum	0.0	0.5	0.1	0.0	0.1	0.0
Hypochaeris radicata	2.3	22.5	6.7	4.3	3.0	1.3
Lactuca sp.	0.0	0.0	0.0	0.0	0.0	0.0
Lathyrus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Leucanthemum vulgare	15.3	27.5	0.3	3.3	0.0	0.3
Linum bienne	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium nudicaule	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium triternatum	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium utriculatum	0.0	0.0	0.0	0.0	0.0	0.0
Lotus formosissimus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus micranthus	0.0	0.1	0.0	0.0	0.0	0.0
Lotus unifoliolatus	0.4	2.6	0.0	0.0	1.1	0.0
Lupinus albicaulis	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus bicolor	0.0	0.0	0.0	0.0	0.0	0.0
Lythrum hyssopifolium	0.0	0.0	0.0	0.0	0.0	0.0
Madia elegans	0.0	0.0	0.0	0.0	0.0	0.0
Madia glomerata	1.7	1.1	1.0	0.0	0.0	0.0
Madia sp.	0.0	0.0	0.3	0.0	1.0	0.0
Marah oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Mentha pulegium	0.0	0.0	0.0	0.0	0.0	0.0
Moenchia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Myosotis discolor	0.0	0.1	0.0	0.0	0.1	0.0
Navarretia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Orthocarpus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Osmorhiza chilensis	0.0	0.0	0.0	0.0	0.0	0.0
Parentucellia viscosa	0.4	0.0	0.3	0.0	0.0	1.3
Peplis portula	0.0	0.0	0.0	0.0	0.0	0.0
Perideridia	0.0	0.0	0.0	0.0	0.0	0.0
Plantago lanceolata	0.3	5.0	3.0	6.3	0.1	5.0
Potentilla gracilis	0.0	0.0	0.0	0.0	0.0	0.0
Prunella vulgaris	0.7	7.5	0.2	1.0	0.0	0.0
Pteridium aquilinum	0.0	0.0	0.0	0.0	0.0	0.0
Ranunculus occidentalis	0.4	0.0	0.0	0.0	0.0	0.0
Rumex acetosella	1.3	3.5	0.7	3.7	0.0	5.0
Saxifraga oregana	0.0	0.0	0.0	0.0	0.0	0.0

Site	Applegate					
Recovery Zone	**Eugene West Recovery Zone**					
2015 Treatment Name	**Burn x 1**	**Fusilade**	**Mow**	**Control**	**Carbon**	**Graze**
2015 treatment #	1	3	4	5	6	7
Scleranthus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Senecio jacobaea	0.0	1.0	0.0	1.0	0.0	0.0
Senecio vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Sherardia arvensis	0.0	0.0	0.0	0.0	0.0	0.0
Sidalcea virgata	0.0	0.0	0.0	0.0	0.0	0.0
Sisyrinchium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Spergularia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium dubium	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium repens	0.0	0.0	0.0	0.0	0.0	0.0
Triphysaria pusilla	0.0	0.0	0.0	0.0	0.0	0.0
Veronica americana	0.0	0.0	0.0	0.0	0.0	0.0
Vicia cracca	0.0	0.0	0.0	0.0	0.0	0.0
Vicia hirsuta	0.0	0.0	0.0	0.0	0.0	0.0
Vicia sativa	0.0	0.1	0.0	0.3	0.1	0.0
Vicia tetrasperma	0.0	0.0	0.0	0.0	0.0	0.0
Wyethia angustifolia	0.0	0.1	0.0	0.0	0.0	0.0
Zigadenus venenosus	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS:						
Ground Cover	98.7	105.5	104.7	112.4	101.1	103.7
Trees/Shrubs	3.4	6.5	21.3	7.3	4.5	0.1
Native Graminoid	11.0	5.1	14.3	18.0	0.6	2.7
Invasive Graminoid	69.9	38.6	51.7	28.8	69.5	58.7
Invasive Annual Grass	9.2	2.1	0.1	2.1	0.0	0.1
Invasive Perennial Grass	60.7	36.6	51.7	26.7	69.5	58.7
Native Forb	5.7	17.7	5.2	9.4	2.8	2.5
Invasive Forb	25.2	78.6	36.5	31.1	29.2	46.8

Site	Applegate					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1	Fusilade	Mow	Control	Carbon	Graze
2015 treatment #	1	3	4	5	6	7
HABITAT QUALITY REQUIREMENTS						
Species Richness	16.3	18.5	14.7	16.3	12.0	12.0
Native Species Richness	6.3	7.5	5.7	6.7	6.0	3.7
Count of non-native species with >50% absolute cover	0.7	1.0	0.3	0.0	1.0	1.0
Absolute % cover native	19%	17%	30%	30%	7%	5%
Absolute % tree/shrub	4%	5%	13%	10%	4%	0%
Exceeds woody threshold (1 = Yes)	0	0	0.33	0.33	0	0
Fails native vegetation threshold (1= Yes)	1.00	1.00	1.00	0.67	1.00	1.00

Atlantic Pacific

Site	Atlantic/Pacific					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Burn x 1	Fusilade	Control	Grazing
2015 treatment #	14	15	17	18	19	20
Ground Cover						
Bare ground	15.3	27.7	45.0	13.4	7.4	2.0
Litter	82.7	78.3	63.3	81.7	92.3	88.7
Moss	0.0	0.0	0.0	1.0	0.0	0.3
Graminoids						
Agrostis stolonifera	0.3	0.0	0.0	0.7	0.0	0.0
Aira caryophylla	5.3	1.0	0.7	0.8	1.4	6.3
Anthoxanthum odoratum	1.3	1.7	0.0	1.0	0.7	1.4
Arrhenatherum elatius	0.0	0.0	0.0	0.0	0.0	0.0
Briza minor	0.1	0.0	0.0	0.2	0.0	0.0
Bromus carinatus	0.0	0.0	0.0	0.0	0.0	0.0
Bromus hordeaceous	0.0	0.0	0.0	0.0	0.0	0.0
Carex sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cynosurus echinatus	0.0	0.0	0.0	0.0	0.0	0.0
Dactylis glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Danthonia californica	71.7	58.3	2.3	58.3	66.7	28.3
Deschampsia caespitosa	0.0	1.7	0.0	0.0	0.0	0.0
Elymus glaucus	0.0	0.0	0.0	0.0	0.0	0.0
Festuca arundinacea	0.4	4.0	0.0	1.3	13.3	4.7
Festuca roemeri	0.0	0.0	0.0	0.0	0.0	0.0
Holcus lanatus	0.0	0.0	0.0	0.0	0.0	0.0
Juncus bufonius	0.0	0.0	0.0	0.0	0.0	0.0
Juncus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Luzula	0.2	0.1	0.0	0.4	0.2	0.0
Panicum occidentale	0.0	0.0	0.0	0.0	0.0	0.0
Phleum sp.	0.0	0.0	0.0	0.0	2.0	0.0
Poa compressa	0.0	0.0	0.0	0.0	0.0	0.0
Poa pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Vulpia spp.	0.0	0.0	0.0	0.0	0.0	0.0
Tree/Shrub						
Cretaegus douglasii	0.0	0.0	0.0	0.2	11.7	0.0
Cytisus scoparius	0.0	0.0	0.0	0.0	0.0	0.0
Fraxinus latifolia	0.0	0.0	0.0	0.0	0.0	0.0
Malus sp.	0.0	0.0	0.0	2.0	0.0	0.0
Pinus ponderosa	0.0	0.0	0.0	0.0	0.0	0.0

Site	Atlantic/Pacific					
Recovery Zone	**Eugene West Recovery Zone**					
2015 Treatment Name	**Mow x 2**	**Carbon x 1**	**Burn x 1**	**Fusilade**	**Control**	**Grazing**
2015 treatment #	14	15	17	18	19	20
Prunus emarginata	0.0	0.0	0.0	0.0	0.0	0.0
Pseudotsuga menzesii	0.0	0.0	0.0	0.0	0.0	0.0
Rosa sp.	0.0	0.0	0.0	0.0	0.0	0.0
Rubus armeniacus	2.0	1.7	40.0	4.0	11.7	20.3
Rubus ursinus	0.0	0.0	0.0	0.0	0.0	0.0
Spirea douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Symphoricarpos albus	0.0	0.0	0.0	0.0	0.0	0.0
Toxicodendron diversilobum	0.0	0.0	0.0	0.0	0.0	0.0
Forbs						
Achillea millefolium	0.7	0.0	0.0	0.2	0.2	0.0
Agoseris sp.	0.0	0.0	0.0	0.0	0.0	0.0
Allium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Anaphales margarita	0.0	0.0	0.0	0.0	0.0	0.0
Aster halii	0.0	1.7	0.0	2.3	1.0	0.0
Brodiea sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cammasia quamash	2.0	0.7	0.7	3.3	0.3	2.7
Castilleja levisecta	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea erythrea	3.3	0.3	10.3	4.0	3.0	5.3
Centaurea pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Cerastium arvense	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Clarkia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Collomia grandiflora	0.0	0.0	0.0	0.0	0.0	0.0
Crepis capillaris	0.0	0.0	0.0	0.0	0.0	0.0
Crepis setosa	0.0	0.0	0.0	0.0	0.0	0.0
Daucus carota	1.5	0.0	0.0	0.3	1.0	3.3
Dipsacus fullonum	0.0	0.0	1.3	0.0	0.0	0.0
Epilobium ciliatum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium munitum	2.7	0.9	21.7	3.7	1.0	2.0
Epilobium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Equisetem sp.	0.0	0.0	0.0	0.0	0.0	0.0
Erigeron decumbens	0.5	0.2	0.2	1.0	1.0	0.0
Eriophyllum lanatum	0.0	0.0	0.0	0.0	1.0	0.0
Fragaria virginiana	0.0	0.0	0.0	0.0	0.0	30.0
Galium aparine	0.0	0.0	0.0	0.0	0.0	0.0
Galium parisiense	1.2	2.3	20.0	1.2	4.0	1.7
Geranium dissectum	0.0	0.7	0.0	0.2	0.7	0.7
Geranium molle	0.0	0.0	0.0	0.0	0.0	0.0

Site	Atlantic/Pacific					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Burn x 1	Fusilade	Control	Grazing
2015 treatment #	14	15	17	18	19	20
Gilia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Gnaphalium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Grindelia integrifolia	0.0	0.0	0.0	0.0	0.0	0.0
Heracleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Hypericum perforatum	0.1	0.0	0.4	0.0	0.0	0.4
Hypochaeris radicata	1.0	0.0	0.0	0.3	0.0	3.0
Lactuca sp.	0.0	0.0	0.0	0.0	0.0	0.0
Lathyrus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Leucanthemum vulgare	15.7	25.0	65.0	23.3	43.3	31.7
Linum bienne	0.1	0.0	0.0	0.0	0.1	0.0
Lomatium nudicaule	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium triternatum	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium utriculatum	0.0	0.0	0.0	0.0	0.0	0.0
Lotus formosissimus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus micranthus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus unifoliolatus	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus albicaulis	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus bicolor	0.0	0.0	0.0	0.0	0.0	0.0
Lythrum hyssopifolium	0.0	0.0	0.0	0.0	0.0	0.0
Madia elegans	2.3	10.7	2.7	5.3	7.0	2.7
Madia glomerata	0.0	1.7	0.0	0.3	0.0	0.0
Madia sp.	4.0	2.0	6.0	4.0	2.0	1.3
Marah oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Mentha pulegium	0.0	0.0	0.0	0.0	0.0	0.0
Moenchia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Myosotis discolor	0.0	0.0	0.0	0.0	0.0	0.0
Navarretia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Orthocarpus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Osmorhiza chilensis	0.0	0.0	0.0	0.0	0.0	0.0
Parentucellia viscosa	0.0	0.0	0.4	0.0	0.0	0.0
Peplis portula	0.0	0.0	0.0	0.0	0.0	0.0
Perideridia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Plantago lanceolata	1.5	0.0	5.0	0.2	1.5	12.7
Potentilla gracilis	0.0	0.0	0.0	0.0	1.7	0.0
Prunella vulgaris	12.0	7.0	0.0	28.3	5.7	0.0
Pteridium aquilinum	0.0	0.0	0.0	0.0	0.0	0.0
Ranunculus occidentalis	0.0	0.0	0.0	0.0	0.0	0.0
Rumex acetosella	0.7	0.0	0.0	0.7	0.2	0.0
Saxifraga oregana	0.4	0.0	0.0	0.1	0.0	0.0

Site	Atlantic/Pacific					
Recovery Zone	**Eugene West Recovery Zone**					
2015 Treatment Name	**Mow x 2**	**Carbon x 1**	**Burn x 1**	**Fusilade**	**Control**	**Grazing**
2015 treatment #	14	15	17	18	19	20
Scleranthus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Senecio jacobaea	0.0	0.0	0.0	0.0	0.0	0.0
Senecio vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Sherardia arvensis	0.0	0.0	0.0	0.0	0.2	0.0
Sidalcea virgata	0.0	0.0	0.0	0.0	0.0	0.0
Sisyrinchium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Spergularia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium dubium	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium repens	0.0	0.0	0.0	0.0	0.0	0.0
Triphysaria pusilla	0.0	0.0	0.0	0.0	0.0	0.0
Veronica americana	0.0	0.0	0.0	0.0	0.0	0.0
Vicia cracca	0.0	0.0	0.0	0.0	0.0	0.0
Vicia hirsuta	0.0	0.0	0.0	0.0	0.0	0.0
Vicia sativa	0.0	0.0	0.0	0.0	0.0	0.0
Vicia tetrasperma	0.0	0.0	0.0	0.1	0.0	0.2
Wyethia angustifolia	0.7	0.7	0.0	2.3	0.0	0.0
Zigadenus venenosus	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS:						
Ground Cover	98.0	106.0	108.4	96.0	99.7	91.0
Trees/Shrubs	2.0	1.7	40.0	6.2	23.3	20.3
Native Graminoid	71.9	60.1	2.3	58.7	66.9	28.3
Invasive Graminoid	7.5	6.8	0.8	4.1	17.4	12.4
Invasive Annual Grass	5.4	1.1	0.7	1.0	1.4	6.3
Invasive Perennial Grass	2.0	5.7	0.1	3.0	16.0	6.0
Native Forb	25.3	23.8	31.2	50.6	20.9	38.8
Invasive Forb	25.1	28.5	102.5	30.3	54.0	59.0

Site	Atlantic/Pacific					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Burn x 1	Fusilade	Control	Grazing
2015 treatment #	14	15	17	18	19	20
HABITAT QUALITY REQUIREMENTS						
Species Richness	20.0	16.3	12.0	19.0	17.7	16.7
Native Species Richness	8.7	8.3	3.7	8.7	7.7	4.7
Count of non-native species with >50% absolute cover	0.0	0.0	1.0	0.0	0.3	0.0
Absolute % cover native	74%	70%	18%	73%	55%	40%
Absolute % tree/shrub	1%	1%	21%	4%	11%	13%
Exceeds woody threshold (1 = Yes)	0	0	0.67	0.00	0.33	0.33
Fails native vegetation threshold (1= Yes)	0.00	0.00	1.00	0.00	0.33	0.67

Big Spires

Site	Big Spires					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Burn x 1	Fusilade	Control	Grazing
2015 treatment #	14	15	17	18	19	20
Ground Cover						
Bare ground	1.1	0.7	2.7	0.1	6.7	0.1
Litter	99.3	100.0	93.3	99.7	94.3	100.0
Moss	1.0	1.4	0.4	2.7	2.3	1.7
Graminoids						
Agrostis stolonifera	41.0	28.0	30.0	7.3	7.0	63.3
Aira caryophylla	0.0	0.0	1.7	0.0	0.3	0.0
Anthoxanthum odoratum	0.0	0.0	0.0	0.0	0.0	0.0
Arrhenatherum elatius	2.7	1.7	0.0	0.0	8.3	0.0
Briza minor	0.0	0.0	0.0	0.0	0.0	0.0
Bromus carinatus	0.0	0.0	0.0	0.0	0.0	0.0
Bromus hordeaceous	0.0	0.0	0.0	0.0	0.0	0.0
Carex sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cynosurus echinatus	0.0	0.0	0.0	0.0	0.0	0.0
Dactylis glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Danthonia californica	0.0	0.7	0.0	0.0	0.0	0.0
Deschampsia caespitosa	0.0	0.0	0.0	0.0	0.0	0.0
Elymus glaucus	1.0	0.4	0.0	1.0	0.0	0.0
Festuca arundinacea	0.0	0.0	0.0	0.0	0.0	0.0
Festuca roemeri	40.0	37.7	41.0	86.7	41.3	38.3
Holcus lanatus	0.0	0.0	0.0	0.0	0.0	0.0
Juncus bufonius	0.0	0.0	0.0	0.0	0.0	0.0
Juncus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Luzula sp.	0.0	0.0	0.0	0.0	0.0	0.0
Panicum occidentale	0.0	0.0	0.0	0.0	0.0	0.0
Phleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Poa compressa	0.0	0.0	0.0	0.0	0.0	0.0
Poa pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Vulpia spp.	45.0	20.0	0.7	14.0	22.3	35.0
Cytisus scoparius	0.0	0.0	0.0	0.0	0.0	0.0
Fraxinus latifolia	0.0	0.0	0.0	0.0	0.0	0.0
Malus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Tree/Shrub						
Pinus ponderosa	0.0	0.0	0.0	0.0	0.0	0.0

Site	Big Spires					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Burn x 1	Fusilade	Control	Grazing
2015 treatment #	14	15	17	18	19	20
Prunus emarginata	0.0	0.0	0.0	0.0	0.0	0.0
Pseudotsuga menzesii	0.0	0.0	0.0	0.0	0.0	0.0
Malus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Rubus armeniacus	6.0	8.3	0.0	2.0	8.3	0.0
Rubus ursinus	0.0	0.0	0.0	0.0	0.0	0.0
Spirea douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Symphoricarpos albus	0.0	0.0	0.0	0.0	0.0	0.0
Toxicodendron diversilobum	0.0	0.0	0.0	0.0	0.0	0.0
Achillea millefolium	0.0	0.0	0.0	0.3	0.3	0.0
Agoseris sp.	0.0	0.0	0.0	0.0	0.0	0.0
Allium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Anaphales margarita	0.0	0.0	0.0	0.0	0.0	0.0
Forbs						
Aster halii	0.0	0.0	0.0	0.0	0.0	0.0
Brodiea sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cammasia quamash	0.0	0.0	0.0	0.0	0.0	0.0
Castilleja levisecta	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea erythrea	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Cerastium arvense	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Clarkia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Collomia grandiflora	0.0	0.0	0.0	0.0	0.0	0.0
Crepis capillaris	0.3	0.0	0.0	0.0	0.0	0.0
Crepis setosa	0.0	0.0	0.0	0.0	0.0	0.0
Daucus carota	1.0	2.2	0.7	0.7	0.3	0.3
Dipsacus fullonum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium ciliatum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium munitum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Equisetem sp.	0.0	0.0	0.0	0.0	0.0	0.0
Erigeron decumbens	0.0	0.0	0.0	0.0	0.0	0.0
Eriophyllum lanatum	7.0	4.7	23.0	15.3	4.0	23.7
Fragaria virginiana	0.0	0.0	0.0	0.0	0.0	0.0
Galium aparine	0.0	0.0	0.0	0.0	0.0	0.0
Galium parisiense	0.7	0.0	0.7	1.4	1.4	13.7
Geranium dissectum	0.0	0.0	0.0	0.0	0.0	0.0

Site	Big Spires					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Burn x 1	Fusilade	Control	Grazing
2015 treatment #	14	15	17	18	19	20
Geranium molle	0.0	0.0	0.0	0.0	0.0	0.0
Gilia sp.	0.0	0.0	0.3	0.0	0.0	0.0
Gnaphalium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Grindelia integrifolia	0.0	0.0	0.0	0.0	0.0	0.0
Heracleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Hypericum perforatum	0.0	0.0	2.7	0.0	0.0	0.0
Hypochaeris radicata	3.0	17.7	13.3	1.0	3.3	10.7
Lactuca sp.	0.0	0.0	0.0	0.0	0.0	0.0
Lathyrus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Leucanthemum vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Linum bienne	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium nudicaule	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium triternatum	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium utriculatum	0.0	0.0	0.0	0.0	0.0	0.0
Lotus formosissimus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus micranthus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus unifoliolatus	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus albicaulis	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus bicolor	0.0	0.0	0.2	0.0	0.0	0.0
Lupinus oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Lythrum hyssopifolium	0.0	0.0	0.0	0.0	0.0	0.0
Madia elegans	0.0	0.0	0.0	0.0	0.0	0.0
Madia glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Marah oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Mentha pulegium	0.0	0.0	0.0	0.0	0.0	0.0
Moenchia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Myosotis discolor	0.0	0.0	0.0	0.0	0.0	0.0
Navarretia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Orthocarpus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Osmorhiza chilensis	0.0	0.0	0.0	0.0	0.0	0.0
Parentucellia viscosa	0.0	0.0	0.4	0.0	0.1	0.0
Peplis portula	0.0	0.0	0.0	0.0	0.0	0.0
Perideridia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Plantago lanceolata	0.0	2.0	8.8	3.3	20.7	0.3
Potentilla gracilis	0.0	0.0	0.0	0.0	0.0	0.0
Peplis portula	1.0	1.0	0.0	2.3	0.7	0.0
Pteridium aquilinum	0.0	0.0	0.0	0.0	0.0	0.0
Ranunculus occidentalis	0.0	0.0	0.0	0.0	0.0	0.0

Site	Big Spires					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Burn x 1	Fusilade	Control	Grazing
2015 treatment #	14	15	17	18	19	20
Rumex acetosella	0.3	0.3	1.3	0.7	0.2	0.3
Saxifraga oregana	0.0	0.0	0.0	0.0	0.0	0.0
Scleranthus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Senecio jacobaea	0.0	0.0	0.0	0.0	0.0	0.0
Senecio vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Sherardia arvensis	0.0	0.0	0.0	0.0	0.0	0.0
Sidalcea virgata	0.0	0.0	0.0	0.0	0.0	0.0
Sisyrinchium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Spergularia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium dubium	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium repens	0.0	0.0	0.0	0.0	0.0	0.0
Triphysaria pusilla	0.0	0.0	0.0	0.0	0.0	0.0
Veronica americana	0.0	0.0	0.0	0.0	0.0	0.0
Vicia cracca	0.0	0.0	0.0	0.0	0.0	0.0
Vicia hirsuta	0.0	0.0	0.0	0.0	0.0	0.0
Vicia sativa	0.2	0.3	0.4	0.4	0.5	0.7
Vicia tetrasperma	0.0	0.0	0.2	0.0	0.0	0.0
Wyethia angustifolia	0.0	0.0	0.0	0.0	0.0	0.0
Zigadenus venenosus	0.0	0.0	0.0	0.0	0.0	0.0
Ground Cover	101.4	102.1	96.4	102.5	103.4	101.8
Graminoids	129.7	88.4	73.4	109.1	79.4	136.7
Forbs	13.6	28.3	52.1	25.5	31.5	49.8
Trees/Shrubs	6.0	8.3	0.0	2.0	8.3	0.0
TOTALS:						
Native Graminoid	41.0	38.7	41.0	87.7	41.4	38.4
Invasive Perennial Grass	43.7	29.7	30.0	7.4	15.3	63.3
Native Forb	8.0	5.7	23.5	18.1	5.0	23.8
Invasive Forb	5.5	22.7	28.5	7.5	26.5	26.0
Species Richness	8.7	9.3	13.3	11.0	11.0	8.3
Native Species Richness	3.3	3.0	3.3	4.7	3.3	3.0
Native Bunch Grass Cover	41.0	38.7	41.0	87.7	41.4	38.4
Count of non-native species with >50% cover	1.0	0.3	0.3	0.0	0.3	1.3

Site	Big Spires					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Burn x 1	Fusilade	Control	Grazing
2015 treatment #	14	15	17	18	19	20
HABITAT QUALITY REQUIREMENTS						
Species Richness	8.7	9.3	13.3	11.0	11.0	8.3
Native Species Richness	3.33	3.00	3.33	4.67	3.33	3.00
Count of non-native species with >50% absolute cover	1.00	0.33	0.33	0.00	0.33	1.33
Absolute % cover native	38%	36%	54%	78%	41%	33%
Absolute % tree/shrub	5%	7%	0%	2%	6%	0%
Exceeds woody threshold (1 = Yes)	0.00	0.33	0.00	0.00	0.33	0.00
Fails native vegetation threshold (1= Yes)	0.67	0.67	0.33	0.00	0.67	0.67

Kirk East

Site	Kirk East					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1 2012	Fusilade x 3	Mow x 3	Control	Carbon x 2	Graze x 2
2015 treatment #	1	3	4	5	6	7
Ground Cover						
Bare ground	93.5	94.0	0.1	0.1	0.1	2.1
Litter	1.1	3.1	98.0	97.0	95.0	98.5
Moss	40.0	37.5	2.1	4.1	6.1	6.5
Graminoids						
Agrostis stolonifera	10.5	0.0	12.0	40.0	14.0	75.0
Aira caryophylla	7.5	17.5	1.0	0.0	0.0	0.0
Anthoxanthum odoratum	0.0	0.0	12.5	52.5	47.5	25.0
Arrhenatherum elatius	0.0	0.0	0.0	0.0	0.0	0.0
Briza minor	0.0	0.0	0.0	0.0	0.0	0.0
Bromus carinatus	0.0	0.0	0.0	0.0	0.0	0.0
Bromus hordeaceous	0.0	0.0	0.1	0.0	0.0	0.0
Carex sp.	0.3	0.0	0.0	0.0	0.0	0.0
Cynosurus echinatus	0.0	0.0	0.1	0.0	0.0	0.0
Dactylis glomerata	24.0	17.5	0.0	0.0	0.5	0.0
Danthonia californica	0.0	0.0	17.5	15.0	27.5	19.0
Deschampsia caespitosa	0.0	0.0	0.0	0.0	0.0	0.0
Elymus glaucus	0.0	5.0	0.0	0.0	0.0	0.0
Festuca arundinacea	0.0	0.0	0.0	0.0	7.5	0.5
Festuca roemeri	0.0	0.0	3.0	0.0	0.0	0.0
Holcus lanatus	0.0	0.0	0.0	0.0	0.0	0.1
Juncus bufonius	0.0	0.0	0.0	0.0	0.0	0.0
Juncus sp.	0.5	0.5	0.0	0.5	0.0	0.1
Luzula	0.0	0.0	0.1	0.0	0.1	0.0
Panicum occidentale	0.0	0.0	0.0	5.0	0.0	0.0
Phleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Poa compressa	0.0	0.0	0.0	0.0	0.0	0.0
Poa pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Vulpia spp.	0.0	2.0	0.0	0.0	0.0	0.0
Tree/Shrub						
Cretaegus douglasii	4.0	7.5	0.0	0.0	0.0	0.0
Cytisus scoparius	0.0	0.3	0.1	25.0	0.5	0.0
Fraxinus latifolia	0.0	0.0	0.0	0.5	0.0	0.0
Malus sp.	0.0	0.0	0.0	0.0	0.0	0.0

Site	Kirk East					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1 2012	Fusilade x 3	Mow x 3	Control	Carbon x 2	Graze x 2
2015 treatment #	1	3	4	5	6	7
Pinus ponderosa	0.0	0.0	0.0	0.0	0.0	0.0
Prunus emarginata	0.0	0.0	0.0	0.0	0.0	0.0
Pseudotsuga menzesii	17.5	40.0	0.0	0.0	0.0	0.0
Rosa sp.	11.0	12.5	5.0	6.0	21.0	1.0
Rubus armeniacus	0.0	0.0	0.5	7.5	1.0	1.0
Rubus ursinus	0.0	0.0	0.0	0.0	0.0	0.0
Spirea douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Symphoricarpos albus	0.0	0.0	0.0	0.0	0.0	0.0
Toxicodendron diversilobum	0.0	0.0	0.0	3.5	0.0	0.0
Forbs						
Achillea millefolium	0.5	1.5	0.0	0.0	0.0	0.0
Agoseris sp.	0.0	0.0	4.5	2.5	2.0	3.0
Allium sp.	0.0	0.0	0.0	0.3	0.0	0.1
Anaphales margarita	0.6	1.0	0.0	0.0	0.0	0.0
Aster halii	0.1	0.5	16.0	1.5	8.5	0.3
Brodiea sp.	0.0	0.0	0.6	0.0	0.5	0.1
Cammasia quamash	0.0	0.0	0.0	0.5	0.0	0.0
Castilleja levisecta	0.1	0.0	0.0	0.0	0.0	0.0
Centaurea erythrea	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Cerastium arvense	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Clarkia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Collomia grandiflora	0.0	0.0	0.0	0.0	0.0	0.0
Crepis capillaris	0.0	0.0	0.0	0.0	0.0	0.0
Crepis setosa	25.0	3.0	0.0	0.0	0.0	0.0
Daucus carota	0.0	0.0	2.5	2.5	8.5	5.1
Dipsacus fullonum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium ciliatum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium munitum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Equisetem sp.	0.0	0.5	0.0	0.0	0.0	0.0
Erigeron decumbens	0.0	0.0	0.5	0.5	0.0	0.0
Eriophyllum lanatum	0.0	0.0	0.0	0.0	0.0	0.0
Fragaria virginiana	0.0	0.0	4.0	15.0	0.0	0.0
Galium aparine	5.1	6.0	0.0	0.0	0.0	0.0
Galium parisiense	0.0	0.0	50.0	0.1	0.1	7.6

Site	Kirk East					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1 2012	Fusilade x 3	Mow x 3	Control	Carbon x 2	Graze x 2
2015 treatment #	1	3	4	5	6	7
Geranium dissectum	0.0	0.0	0.0	0.0	0.0	0.0
Geranium molle	0.0	0.0	0.0	0.0	0.0	0.0
Gilia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Gnaphalium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Grindelia integrifolia	0.0	0.0	1.0	0.0	0.0	0.0
Heracleum sp.	0.1	0.1	0.0	0.0	0.0	0.0
Hypericum perforatum	18.5	18.0	0.0	1.0	0.0	0.5
Hypochaeris radicata	0.0	0.0	4.5	0.0	28.0	4.0
Lactuca sp.	0.0	0.0	0.0	0.0	0.0	0.0
Lathyrus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Leucanthemum vulgare	0.1	0.0	0.0	0.0	0.0	0.0
Linum bienne	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium nudicaule	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium triternatum	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium utriculatum	0.0	0.0	0.0	0.0	0.0	0.0
Lotus formosissimus	0.0	0.1	0.0	0.0	0.0	0.0
Lotus micranthus	0.0	0.1	0.0	0.0	0.0	0.0
Lotus unifoliolatus	0.0	0.0	0.1	0.3	0.3	0.1
Lupinus albicaulis	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus bicolor	0.0	0.0	0.0	0.0	0.0	0.0
Lythrum hyssopifolium	0.0	0.0	0.0	0.0	0.0	0.0
Madia elegans	0.0	0.0	0.0	0.0	0.0	0.0
Madia glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Madia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Marah oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Mentha pulegium	0.0	0.0	0.0	0.0	0.0	0.0
Moenchia sp.	0.1	0.1	0.0	0.0	0.0	0.0
Myosotis discolor	0.0	0.0	0.0	0.0	0.0	0.1
Navarretia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Orthocarpus sp.	0.0	0.0	0.0	0.1	0.0	0.0
Osmorhiza chilensis	0.5	0.0	0.0	0.0	0.0	0.0
Parentucellia viscosa	0.0	0.0	0.0	0.0	0.1	1.0
Peplis portula	0.0	0.0	0.0	0.0	0.0	0.0
Perideridia	26.0	5.0	0.0	0.0	0.0	0.0
Plantago lanceolata	0.0	0.0	13.0	5.5	2.5	23.0
Potentilla gracilis	0.0	1.0	0.0	0.0	0.0	0.0
Prunella vulgaris	0.0	0.0	1.0	0.0	0.0	0.0
Pteridium aquilinum	0.0	0.0	0.0	0.0	0.0	0.0

Site	Kirk East					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1 2012	Fusilade x 3	Mow x 3	Control	Carbon x 2	Graze x 2
2015 treatment #	1	3	4	5	6	7
Ranunculus occidentalis	0.5	0.5	0.1	0.0	0.1	0.0
Rumex acetosella	0.0	0.0	1.0	0.0	0.0	1.0
Saxifraga oregana	0.0	0.0	0.0	0.0	0.0	0.0
Scleranthus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Senecio jacobaea	0.0	0.0	0.0	0.0	0.0	0.0
Senecio vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Sherardia arvensis	0.0	0.0	0.0	0.0	0.0	0.0
Sidalcea virgata	0.0	0.0	0.0	0.0	0.0	0.0
Sisyrinchium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Spergularia	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium dubium	0.0	0.0	0.0	0.0	0.1	0.0
Trifolium repens	0.0	0.0	0.0	0.0	0.0	0.0
Triphysaria pusilla	0.0	0.0	0.0	0.0	0.0	0.0
Veronica americana	0.0	0.0	0.0	0.0	0.0	0.0
Vicia cracca	0.0	0.0	0.0	0.0	0.0	0.0
Vicia hirsuta	0.0	0.0	0.0	0.0	0.0	0.0
Vicia sativa	0.0	0.0	0.0	0.6	0.3	0.3
Vicia tetrasperma	0.0	0.0	0.0	0.0	1.0	0.0
Wyethia angustifolia	0.0	0.0	0.0	1.0	0.0	0.1
Zigadenus venenosus	96.6	98.1	0.0	0.0	0.0	0.0
TOTALS:						
Ground Cover	82.8	78.0	100.2	101.2	101.1	107.1
Trees/Shrubs	24.5	18.0	5.6	42.5	22.5	2.0
Native Graminoid	58.3	60.0	20.6	20.5	27.6	19.1
Invasive Graminoid	10.8	0.0	25.6	92.5	69.5	100.6
Invasive Annual Grass	47.5	60.0	1.1	0.0	0.0	0.0
Invasive Perennial Grass	9.1	39.6	24.5	92.5	69.5	100.6
Native Forb	75.8	32.6	27.7	21.6	11.3	3.5
Invasive Forb	17.5	16.5	71.0	9.6	40.4	42.5

Site	Kirk East					
Recovery Zone	Eugene West Recovery Zone					
2015 Treatment Name	Burn x 1 2012	Fusilade x 3	Mow x 3	Control	Carbon x 2	Graze x 2
2015 treatment #	1	3	4	5	6	7
HABITAT QUALITY REQUIREMENTS						
Species Richness	4.5	7.0	19.0	16.0	15.0	15.5
Native Species Richness	24.0	17.5	9.0	8.5	4.5	4.5
Count of non-native species with >50% absolute cover	0.2	0.3	0.5	1.5	1.0	1.0
Absolute % cover native	17%	33%	33%	26%	28%	14%
Absolute % tree/shrub	18%	30%	4%	21%	13%	1%
Exceeds woody threshold (1 = Yes)	1.00	1.00	0	0.50	0.50	0
Fails native vegetation threshold (1= Yes)	1.00	1.00	1.00	1.00	1.00	1.00

Finley Field 8N – 2011 Outplanting

Site	Finley Field 8N, (2011 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Fusilade x 3	Mow x 3	Control	Carbon x 2	Glyphosate x 3	Burn x 2
2015 treatment #	3	4	5	6	12	13
Ground Cover						
Bare ground	1.4	2.0	0.1	7.7	2.0	1.3
Litter	93.3	96.7	97.7	85.0	76.7	86.0
Moss	2.7	0.0	0.0	0.4	1.0	1.3
Graminoids						
Agrostis stolonifera	53.3	46.7	46.7	26.3	5.7	55.0
Aira caryophylla	0.0	0.0	0.0	1.0	0.0	0.0
Anthoxanthum odoratum	0.0	0.0	0.0	0.0	0.0	0.0
Arrhenatherum elatius	0.0	0.0	0.0	0.0	0.0	0.0
Briza minor	0.0	0.0	0.0	0.0	0.0	0.0
Bromus carinatus	0.0	0.0	0.0	0.0	0.0	0.0
Bromus hordeaceous	0.0	0.0	0.0	0.0	0.0	0.0
Carex sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cynosurus echinatus	0.0	0.0	0.0	0.0	0.0	0.0
Dactylis glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Danthonia californica	1.3	2.0	5.3	2.7	0.0	0.0
Deschampsia caespitosa	0.7	0.0	0.0	0.0	0.0	0.0
Elymus glaucus	0.3	0.7	0.0	0.0	0.0	0.0
Festuca arundinacea	0.0	0.0	0.0	0.0	0.0	0.0
Festuca roemeri	6.3	4.7	3.4	5.3	1.3	0.0
Holcus lanatus	0.0	0.0	0.0	0.7	0.0	0.0
Juncus bufonius	0.0	0.0	0.0	0.0	0.0	0.0
Juncus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Luzula sp.	0.0	0.0	0.0	0.0	0.0	0.0
Panicum occidentale	0.0	0.0	0.0	0.0	0.0	0.0
Phleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Poa compressa	0.0	0.0	0.0	0.0	0.0	0.0
Poa pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Vulpia spp.	35.0	73.3	53.3	28.3	28.0	36.0
Tree/Shrub						
Cretaegus douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Cytisus scoparius	0.0	0.0	0.0	0.0	0.0	0.0
Fraxinus latifolia	0.0	0.0	0.0	0.0	0.0	0.0
Malus sp.	0.0	0.0	0.0	0.0	0.0	0.0

Site	Finley Field 8N, (2011 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Fusilade x 3	Mow x 3	Control	Carbon x 2	Glyphosate x 3	Burn x 2
2015 treatment #	3	4	5	6	12	13
Pinus ponderosa	0.0	0.0	0.0	0.0	0.0	0.0
Prunus emarginata	0.0	0.0	0.0	0.0	0.0	0.0
Pseudotsuga menzesii	0.0	0.0	0.0	0.0	0.0	0.0
Rosa sp.	0.0	0.0	0.0	0.0	0.0	0.0
Rubus armeniacus	0.0	0.0	0.0	0.0	0.0	0.0
Rubus ursinus	0.0	0.0	0.0	0.0	0.0	0.0
Spirea douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Symphoricarpos albus	0.0	0.0	0.0	0.0	0.0	0.0
Toxicodendron diversilobum	0.0	0.0	0.0	0.0	0.0	0.0
Forbs						
Achillea millefolium	0.0	0.0	0.0	0.0	0.0	0.0
Agoseris sp.	0.0	0.0	0.0	0.0	0.0	0.0
Allium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Anaphales margarita	0.7	0.0	0.0	0.0	0.0	0.0
Aster halii	0.0	0.0	0.0	0.0	0.0	0.0
Brodiea sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cammasia quamash	0.0	0.0	0.0	0.0	0.0	0.0
Castilleja levisecta	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea erythrea	0.0	0.0	0.0	0.0	0.0	0.7
Centaurea pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Cerastium arvense	0.0	0.0	0.0	0.0	0.3	0.0
Cirsium vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Clarkia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Collomia grandiflora	0.0	0.0	0.0	0.0	0.0	0.0
Crepis capillaris	0.0	0.0	0.0	0.0	0.0	0.0
Crepis setosa	0.0	0.0	0.0	0.0	0.0	0.0
Daucus carota	0.0	0.0	0.0	0.0	0.0	0.0
Dipsacus fullonum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium ciliatum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium munitum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Equisetem sp.	0.0	0.0	0.0	0.0	0.0	0.0
Erigeron decumbens	0.4	0.3	0.0	0.0	0.7	0.0
Eriophyllum lanatum	15.3	1.4	1.7	1.3	33.3	43.7
Fragaria virginiana	0.0	0.0	0.0	0.0	0.0	0.0
Galium aparine	0.0	0.0	0.0	0.0	0.0	0.0
Galium parisiense	0.5	0.7	1.3	0.2	3.0	2.0

Site	Finley Field 8N, (2011 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Fusilade x 3	Mow x 3	Control	Carbon x 2	Glyphosate x 3	Burn x 2
2015 treatment #	3	4	5	6	12	13
Geranium dissectum	0.0	0.0	0.0	0.0	0.0	0.0
Geranium molle	0.0	0.0	0.0	0.0	0.0	0.0
Gilia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Gnaphalium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Grindelia integrifolia	0.0	0.0	0.0	0.0	0.0	0.0
Heracleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Hypericum perforatum	0.0	0.0	0.0	0.0	0.0	0.0
Hypochaeris radicata	66.7	25.0	14.0	16.0	60.0	6.0
Lactuca sp.	0.0	0.0	0.0	0.0	0.0	0.0
Lathyrus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Leucanthemum vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Linum bienne	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium nudicaule	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium triternatum	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium utriculatum	0.0	0.0	0.0	0.0	0.0	0.0
Lotus formosissimus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus micranthus	0.5	0.0	0.0	0.0	0.0	0.2
Lotus unifoliolatus	0.0	0.0	0.0	1.0	0.0	0.5
Lupinus albicaulis	68.3	85.0	85.0	38.3	80.0	35.0
Lupinus bicolor	0.0	0.0	0.0	0.0	0.0	0.0
Lythrum hyssopifolium	0.0	0.0	0.0	0.0	0.0	0.0
Madia elegans	0.0	0.0	0.0	0.0	0.0	0.0
Madia glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Madia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Marah oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Mentha pulegium	0.0	0.0	0.0	0.0	0.0	0.0
Moenchia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Myosotis discolor	0.0	0.0	0.0	0.0	0.0	0.0
Navarretia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Orthocarpus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Osmorhiza chilensis	0.0	0.0	0.0	0.0	0.0	0.0
Parentucellia viscosa	0.7	0.4	1.0	0.2	0.7	2.0
Peplis portula	0.0	0.0	0.0	0.0	0.0	0.0
Perideridia	0.0	0.0	0.0	0.0	0.0	0.0
Plantago lanceolata	0.0	0.0	0.0	0.0	0.0	0.0
Potentilla gracilis	5.7	4.8	3.3	1.0	1.3	3.3
Prunella vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Pteridium aquilinum	0.0	0.0	0.0	0.0	0.0	0.0

Site	Finley Field 8N, (2011 Outplanting)					
Recovery Zone	**Corvallis West Recovery Zone**					
2015 Treatment Name	**Fusilade x 3**	**Mow x 3**	**Control**	**Carbon x 2**	**Glyphosate x 3**	**Burn x 2**
2015 treatment #	3	4	5	6	12	13
Ranunculus occidentalis	0.0	0.0	0.0	0.0	0.0	0.0
Rumex acetosella	1.3	0.0	0.1	1.4	0.0	0.0
Saxifraga oregana	0.0	0.0	0.0	0.0	0.0	0.0
Scleranthus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Senecio jacobaea	0.0	0.0	0.0	0.0	1.3	0.0
Senecio vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Sherardia arvensis	0.0	0.0	0.0	0.0	0.0	0.0
Sidalcea virgata	0.0	0.2	1.3	0.0	0.7	0.0
Sisyrinchium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Spergularia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium dubium	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium repens	0.0	0.0	0.0	0.0	0.0	0.0
Triphysaria pusilla	0.0	0.0	0.0	0.0	0.0	0.0
Veronica americana	0.0	0.0	0.0	0.0	0.0	0.0
Vicia cracca	0.0	0.0	0.0	0.0	0.0	0.0
Vicia hirsuta	0.0	0.0	0.0	0.0	0.0	0.0
Vicia sativa	0.7	0.2	0.0	0.0	0.0	0.0
Vicia tetrasperma	0.0	0.0	0.0	0.0	0.0	0.0
Wyethia angustifolia	0.0	0.0	0.0	0.0	0.0	0.0
Zigadenus venenosus	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS:						
Ground Cover	97.4	98.7	97.8	93.0	79.7	88.7
Trees/Shrubs	0.0	0.0	0.0	0.0	0.0	0.0
Native Graminoid	8.7	7.3	8.7	8.0	1.3	0.0
Invasive Graminoid	88.3	120.0	100.0	56.4	33.7	91.0
Invasive Annual Grass	35.0	73.3	53.3	29.4	28.0	36.0
Invasive Perennial Grass	53.3	46.7	46.7	27.0	5.7	55.0
Native Forb	90.9	91.7	91.3	75.0	116.0	82.7
Invasive Forb	70.0	26.2	16.4	17.7	65.4	10.7

Site	Finley Field 8N, (2011 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Fusilade x 3	Mow x 3	Control	Carbon x 2	Glyphosate x 3	Burn x 2
2015 treatment #	3	4	5	6	12	13
HABITAT QUALITY REQUIREMENTS						
Species Richness	13.0	9.3	8.7	9.7	10.0	9.0
Native Species Richness	6.7	5.0	3.7	4.0	4.0	3.7
Count of non-native species with >50% absolute cover	1.7	1.7	0.7	0.0	0.7	0.7
Absolute % cover native	36%	40%	46%	52%	51%	46%
Absolute % tree/shrub	0%	0%	0%	0%	0%	0%
Exceeds woody threshold (1 = Yes)	0	0	0	0	0	0
Fails native vegetation threshold (1= Yes)	0.67	1.00	1.00	0.33	0.33	0.67

Finley Field 8N – 2013 Outplanting

Site	Finley Field 8N, (2013 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Glyphosate	Burn x 1	Fusilade	Control
2015 treatment #	14	15	16	17	18	19
Ground Cover						
Bare ground	0.0	2.0	2.7	0.0	3.3	0.4
Litter	94.7	88.3	91.7	93.0	81.7	94.3
Moss	0.0	1.3	1.3	0.0	10.0	0.0
Graminoids						
Agrostis stolonifera	53.3	33.3	22.0	58.3	9.4	68.3
Aira caryophylla	0.0	1.0	0.0	0.0	0.0	0.0
Anthoxanthum odoratum	0.0	0.0	0.0	0.0	0.0	0.0
Arrhenatherum elatius	0.0	0.0	0.0	0.0	0.0	0.0
Briza minor	0.0	0.0	0.0	0.0	0.0	0.0
Bromus carinatus	0.0	0.0	0.0	0.0	0.0	0.0
Bromus hordeaceous	0.0	0.0	0.0	0.0	0.0	0.0
Carex sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cynosurus echinatus	0.0	0.0	0.0	0.0	0.0	0.0
Dactylis glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Danthonia californica	2.7	2.8	0.7	0.0	0.7	1.3
Deschampsia caespitosa	0.0	2.7	0.0	0.0	1.3	2.7
Elymus glaucus	0.0	0.0	0.0	0.0	0.0	0.0
Festuca arundinacea	0.0	0.0	0.0	0.0	0.0	0.0
Festuca roemeri	22.7	15.0	0.0	3.3	17.7	11.3
Holcus lanatus	1.3	0.0	0.0	0.0	0.0	0.0
Juncus bufonius	0.0	0.0	0.0	0.0	0.0	0.0
Juncus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Luzula sp.	0.0	0.0	0.0	0.0	0.0	0.0
Panicum occidentale	0.0	0.0	0.0	0.0	0.0	0.0
Phleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Poa compressa	0.0	0.0	0.0	0.0	0.0	0.0
Poa pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Vulpia spp.	35.0	30.7	35.0	36.7	45.0	28.3
Tree/Shrub						
Cretaegus douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Cytisus scoparius	0.0	0.0	0.0	0.0	0.0	0.0
Fraxinus latifolia	0.0	0.0	0.0	0.0	0.0	0.0
Malus sp.	0.0	0.0	0.0	0.0	0.0	0.0

Site	Finley Field 8N, (2013 Outplanting)					
Recovery Zone	**Corvallis West Recovery Zone**					
2015 Treatment Name	**Mow x 2**	**Carbon x 1**	**Glyphosate**	**Burn x 1**	**Fusilade**	**Control**
2015 treatment #	14	15	16	17	18	19
Pinus ponderosa	0.0	0.0	0.0	0.0	0.0	0.0
Prunus emarginata	0.0	0.0	0.0	0.0	0.0	0.0
Pseudotsuga menzesii	0.0	0.0	0.0	0.0	0.0	0.0
Rosa sp.	0.0	0.0	0.0	0.0	0.0	0.0
Rubus armeniacus	0.3	0.0	0.0	0.0	0.0	0.0
Rubus ursinus	0.0	0.0	0.0	0.0	0.0	0.0
Spirea douglasii	0.0	0.0	0.0	0.0	0.0	0.7
Symphoricarpos albus	0.0	0.0	0.0	0.0	0.0	0.0
Toxicodendron diversilobum	0.0	0.0	0.0	0.0	0.0	0.0
Forbs						
Achillea millefolium	0.0	0.0	0.0	0.0	0.0	0.0
Agoseris sp.	0.0	0.0	0.0	0.0	0.0	0.0
Allium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Anaphales margarita	0.3	0.0	0.0	0.0	0.0	0.0
Aster halii	0.0	0.0	0.0	0.0	0.0	0.0
Brodiea sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cammasia quamash	0.0	0.0	0.0	0.0	0.0	0.0
Castilleja levisecta	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea erythrea	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Cerastium arvense	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Clarkia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Collomia grandiflora	0.0	0.0	0.0	0.0	0.0	0.0
Crepis capillaris	0.0	0.0	0.0	0.0	0.0	0.0
Crepis setosa	0.0	0.0	0.0	0.0	0.0	0.0
Daucus carota	0.0	0.0	0.0	0.0	0.0	0.0
Dipsacus fullonum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium ciliatum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium munitum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Equisetem sp.	0.0	0.0	0.0	0.0	0.0	0.0
Erigeron decumbens	0.0	0.0	0.0	0.0	0.0	0.0
Eriophyllum lanatum	3.4	1.0	21.8	30.7	4.3	6.3
Fragaria virginiana	0.0	0.0	0.0	0.0	0.0	0.0
Galium aparine	0.0	0.0	0.0	0.0	0.0	0.0
Galium parisiense	0.4	0.2	0.1	0.1	0.7	0.0

Site	Finley Field 8N, (2013 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Glyphosate	Burn x 1	Fusilade	Control
2015 treatment #	14	15	16	17	18	19
Geranium dissectum	0.0	0.0	0.0	0.0	0.0	0.0
Geranium molle	0.0	0.0	0.0	0.0	0.0	0.0
Gilia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Gnaphalium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Grindelia integrifolia	0.0	0.0	0.0	0.0	0.0	0.0
Heracleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Hypericum perforatum	0.0	0.0	0.0	0.0	0.0	0.0
Hypochaeris radicata	24.7	28.3	38.3	26.3	42.3	43.3
Lactuca sp.	0.0	0.0	0.0	0.0	0.0	0.0
Lathyrus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Leucanthemum vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Linum bienne	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium nudicaule	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium triternatum	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium utriculatum	0.0	0.0	0.0	0.0	0.0	0.0
Lotus formosissimus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus micranthus	0.0	0.0	0.0	0.7	0.0	0.0
Lotus unifoliolatus	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus albicaulis	70.0	51.7	80.0	45.3	64.7	48.3
Lupinus bicolor	0.0	0.0	0.0	0.0	0.0	0.0
Lythrum hyssopifolium	0.0	0.0	0.0	0.0	0.0	0.0
Madia elegans	0.0	0.0	0.0	0.0	0.0	0.0
Madia glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Madia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Marah oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Mentha pulegium	0.0	0.0	0.0	0.0	0.0	0.0
Moenchia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Myosotis discolor	0.0	0.0	0.0	0.0	0.0	0.0
Navarretia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Orthocarpus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Osmorhiza chilensis	0.0	0.0	0.0	0.0	0.0	0.0
Parentucellia viscosa	0.0	0.0	0.0	0.0	0.0	0.0
Peplis portula	0.0	0.0	0.0	0.0	0.0	0.0
Perideridia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Plantago lanceolata	0.0	0.0	0.0	0.0	0.0	0.0
Potentilla gracilis	2.7	2.2	1.3	3.7	3.0	2.5
Prunella vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Pteridium aquilinum	0.0	0.0	0.0	0.0	0.0	0.0

Site	Finley Field 8N, (2013 Outplanting)					
Recovery Zone	**Corvallis West Recovery Zone**					
2015 Treatment Name	**Mow x 2**	**Carbon x 1**	**Glyphosate**	**Burn x 1**	**Fusilade**	**Control**
2015 treatment #	14	15	16	17	18	19
Ranunculus occidentalis	0.0	0.0	0.0	0.0	0.0	0.0
Rumex acetosella	0.0	0.0	0.0	0.0	0.0	0.0
Saxifraga oregana	0.0	0.0	0.0	0.0	0.0	0.0
Scleranthus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Senecio jacobaea	0.0	0.0	0.0	0.0	0.0	0.0
Senecio vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Sherardia arvensis	0.0	0.0	0.0	0.0	0.0	0.0
Sidalcea virgata	0.0	0.3	0.0	0.0	0.2	0.0
Sisyrinchium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Spergularia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium dubium	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium repens	0.0	0.0	0.0	0.0	0.0	0.0
Triphysaria pusilla	0.0	0.0	0.0	0.0	0.0	0.0
Veronica americana	0.0	0.0	0.0	0.0	0.0	0.0
Vicia cracca	0.0	0.0	0.0	0.0	0.0	0.0
Vicia hirsuta	0.0	0.0	0.0	0.0	0.0	0.0
Vicia sativa	0.0	0.0	0.0	0.0	0.0	0.0
Vicia tetrasperma	0.0	0.0	0.0	0.0	0.0	0.0
Wyethia angustifolia	0.0	0.0	0.0	0.0	0.0	0.0
Zigadenus venenosus	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS:						
Ground Cover	94.7	91.7	95.7	93.0	95.0	94.7
Trees/Shrubs	0.3	0.0	0.0	0.0	0.0	0.7
Native Graminoid	25.4	20.5	0.7	3.3	19.7	15.3
Invasive Graminoid	89.7	65.0	57.0	95.0	54.4	96.7
Invasive Annual Grass	35.0	31.7	35.0	36.7	45.0	28.4
Invasive Perennial Grass	54.7	33.3	22.0	58.3	9.4	68.3
Native Forb	76.4	55.2	103.2	80.3	72.2	57.2
Invasive Forb	25.1	28.5	38.5	26.4	43.1	43.4

Site	Finley Field 8N, (2013 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Glyphosate	Burn x 1	Fusilade	Control
2015 treatment #	14	15	16	17	18	19
HABITAT QUALITY REQUIREMENTS						
Species Richness	10.3	9.3	7.7	8.0	9.3	9.3
Native Species Richness	5.0	5.3	3.3	4.0	5.3	5.7
Count of non-native species with >50% absolute cover	1.0	0.7	0.7	1.3	0.7	1.7
Absolute % cover native	46%	45%	54%	39%	48%	34%
Absolute % tree/shrub	0%	0%	0%	0%	0%	0%
Exceeds woody threshold (1 = Yes)	0	0	0	0	0	0
Fails native vegetation threshold (1= Yes)	0.67	0.67	0.67	0.67	0.33	1.00

Finley Field 29- 2011 Ouptlanting

Site	Finley Field 29, (2011 Ouptlanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Fusilade x 3	Mow x 3	Control	Carbon x 2	Glyphosate x 3	Burn x 2
2015 treatment #	3	4	5	6	12	13
Ground Cover						
Bare ground	4.0	6.1	2.0	18.3	3.7	22.7
Litter	99.0	94.7	97.7	81.0	96.0	88.3
Moss	0.0	0.0	0.0	0.3	0.1	0.4
Graminoids						
Agrostis stolonifera	33.4	53.3	70.0	58.3	7.3	10.3
Aira caryophylla	0.3	0.7	1.4	2.7	11.0	23.3
Anthoxanthum odoratum	25.0	20.0	26.7	16.3	50.0	46.7
Arrhenatherum elatius	0.0	0.0	0.0	0.0	0.0	0.0
Briza minor	0.0	0.3	0.0	0.1	2.4	0.0
Bromus carinatus	0.0	0.0	0.0	0.0	0.0	0.0
Bromus hordeaceous	0.0	0.3	0.7	0.0	0.0	0.0
Carex sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cynosurus echinatus	0.0	0.0	0.0	0.0	0.0	0.0
Dactylis glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Danthonia californica	5.0	11.3	2.7	20.0	0.0	1.3
Deschampsia caespitosa	0.0	0.0	0.0	0.0	0.0	0.0
Elymus glaucus	4.7	8.0	7.3	6.3	0.0	0.3
Festuca arundinacea	0.0	0.0	0.0	0.0	0.0	0.0
Festuca roemeri	0.0	0.7	0.0	0.0	0.0	0.0
Holcus lanatus	0.0	0.0	0.0	0.0	0.0	0.0
Juncus bufonius	0.0	0.0	0.0	0.0	0.0	0.0
Juncus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Luzula sp.	0.0	0.0	0.0	0.0	0.0	0.0
Panicum occidentale	0.0	0.0	0.0	0.0	0.0	0.0
Phleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Poa compressa	0.0	0.0	0.0	0.0	0.0	0.0
Poa pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Vulpia spp.	56.7	7.5	15.4	1.3	3.0	14.7
Tree/Shrub						
Cretaegus douglasii	0.0	0.0	0.0	0.0	0.0	0.3
Cytisus scoparius	0.0	0.0	0.0	0.0	0.0	0.0
Fraxinus latifolia	0.0	0.0	0.0	0.0	0.0	0.0
Malus sp.	0.0	0.0	0.0	0.0	0.0	0.0

Site	Finley Field 29, (2011 Ouptlanting)					
Recovery Zone	**Corvallis West Recovery Zone**					
2015 Treatment Name	**Fusilade x 3**	**Mow x 3**	**Control**	**Carbon x 2**	**Glyphosate x 3**	**Burn x 2**
2015 treatment #	3	4	5	6	12	13
Pinus ponderosa	0.0	0.0	0.0	0.0	0.0	0.0
Prunus emarginata	0.0	0.0	0.0	0.0	0.0	0.0
Pseudotsuga menzesii	0.0	0.0	0.0	0.0	0.0	0.0
Rosa sp.	0.0	0.0	0.0	0.0	0.0	0.0
Rubus armeniacus	0.0	0.0	0.0	0.0	0.0	2.7
Rubus ursinus	0.0	0.0	0.0	0.0	0.0	0.0
Spirea douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Symphoricarpos albus	0.0	0.0	0.0	0.0	0.0	0.0
Toxicodendron diversilobum	0.0	0.0	0.0	0.0	0.0	0.0
Forbs						
Achillea millefolium	0.0	0.0	0.0	0.0	0.0	0.0
Agoseris sp.	0.0	0.0	0.0	0.0	0.0	0.0
Allium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Anaphales margarita	0.0	0.0	0.0	0.0	0.0	0.0
Aster halii	0.0	0.0	0.0	0.0	0.0	0.0
Brodiea sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cammasia quamash	0.0	0.0	0.0	0.0	0.0	0.0
Castilleja levisecta	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea erythrea	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Cerastium arvense	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Clarkia sp.	0.0	0.0	0.0	0.0	0.7	0.0
Collomia grandiflora	0.0	0.0	0.0	0.0	0.0	0.0
Crepis capillaris	11.7	1.7	1.0	0.0	26.3	13.0
Crepis setosa	0.0	0.3	0.2	0.0	12.0	0.3
Daucus carota	0.0	0.0	0.0	0.0	0.0	0.0
Dipsacus fullonum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium ciliatum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium munitum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Equisetem sp.	0.0	0.0	0.0	0.0	0.0	0.0
Erigeron decumbens	1.0	2.7	2.2	1.0	3.0	6.0
Eriophyllum lanatum	0.0	0.2	0.0	0.0	0.0	0.0
Fragaria virginiana	0.0	0.0	0.0	0.0	0.0	0.0
Galium aparine	0.0	0.0	0.0	0.0	0.0	0.0
Galium parisiense	2.0	1.0	1.4	1.3	20.7	27.7

Site	Finley Field 29, (2011 Ouptlanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Fusilade x 3	Mow x 3	Control	Carbon x 2	Glyphosate x 3	Burn x 2
2015 treatment #	3	4	5	6	12	13
Geranium dissectum	0.8	0.0	0.2	0.0	1.0	0.0
Geranium molle	0.0	0.0	0.0	0.0	0.0	0.0
Gilia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Gnaphalium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Grindelia integrifolia	0.0	0.0	0.0	0.0	0.0	0.0
Heracleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Hypericum perforatum	0.0	0.4	0.4	0.0	0.0	2.3
Hypochaeris radicata	16.7	38.3	31.7	18.3	36.7	8.4
Lactuca sp.	0.0	0.0	0.0	0.0	0.0	0.0
Lathyrus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Leucanthemum vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Linum bienne	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium nudicaule	0.3	0.3	0.5	0.0	0.0	0.0
Lomatium triternatum	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium utriculatum	0.0	0.0	0.0	0.0	0.0	0.0
Lotus formosissimus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus micranthus	0.3	0.0	0.0	0.3	0.0	0.0
Lotus unifoliolatus	8.7	8.3	10.7	2.7	17.0	4.7
Lupinus albicaulis	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus bicolor	0.0	0.0	0.0	0.0	0.0	0.0
Lythrum hyssopifolium	0.0	0.0	0.0	0.0	0.0	0.0
Madia elegans	0.0	0.0	0.0	0.0	0.0	0.0
Madia glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Madia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Marah oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Mentha pulegium	0.0	0.0	0.0	0.0	0.0	0.0
Moenchia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Myosotis discolor	0.0	0.0	0.0	0.0	0.0	0.0
Navarretia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Orthocarpus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Osmorhiza chilensis	0.0	0.0	0.0	0.0	0.0	0.0
Parentucellia viscosa	10.7	14.0	2.0	2.0	26.7	2.5
Peplis portula	0.0	0.0	0.0	0.0	0.0	0.0
Perideridia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Plantago lanceolata	0.0	0.0	0.0	0.0	0.0	0.0
Potentilla gracilis	1.3	0.0	0.0	0.0	0.0	0.0
Prunella vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Pteridium aquilinum	0.0	0.0	0.0	0.0	0.0	0.0

Site	Finley Field 29, (2011 Ouptlanting)					
Recovery Zone	**Corvallis West Recovery Zone**					
2015 Treatment Name	**Fusilade x 3**	**Mow x 3**	**Control**	**Carbon x 2**	**Glyphosate x 3**	**Burn x 2**
2015 treatment #	3	4	5	6	12	13
Ranunculus occidentalis	0.0	0.0	0.0	0.0	0.0	0.0
Rumex acetosella	1.3	0.0	0.0	0.0	0.0	0.3
Saxifraga oregana	0.0	0.0	0.0	0.0	0.0	0.0
Scleranthus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Senecio jacobaea	0.0	0.0	0.0	0.0	0.7	3.3
Senecio vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Sherardia arvensis	0.0	0.0	0.0	0.0	0.0	0.0
Sidalcea virgata	0.7	0.0	0.0	0.0	0.7	0.8
Sisyrinchium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Spergularia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium dubium	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium repens	0.0	0.0	0.0	0.0	0.0	0.0
Triphysaria pusilla	0.0	0.0	0.0	0.0	0.0	0.0
Veronica americana	0.0	0.0	0.0	0.0	0.0	0.0
Vicia cracca	0.0	0.0	0.0	0.0	0.0	0.0
Vicia hirsuta	0.0	0.0	0.0	0.0	0.0	0.0
Vicia sativa	0.2	0.3	0.0	0.2	0.0	0.0
Vicia tetrasperma	0.0	0.0	0.0	0.0	0.0	0.0
Wyethia angustifolia	0.0	0.0	0.0	0.0	0.0	0.0
Zigadenus venenosus	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS:						
Ground Cover	103.1	100.8	99.7	99.7	99.8	111.4
Trees/Shrubs	0.0	0.0	0.0	0.0	0.0	3.0
Native Graminoid	9.7	20.0	10.0	26.3	0.0	1.7
Invasive Graminoid	115.4	82.2	114.1	78.7	73.7	95.0
Invasive Annual Grass	57.0	8.9	17.4	4.1	16.4	38.0
Invasive Perennial Grass	58.4	73.3	96.7	74.7	57.3	57.0
Native Forb	12.4	11.5	13.4	4.0	21.3	11.5
Invasive Forb	43.4	56.1	36.9	21.9	124.0	57.9

Site	Finley Field 29, (2011 Ouptlanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Fusilade x 3	Mow x 3	Control	Carbon x 2	Glyphosate x 3	Burn x 2
2015 treatment #	3	4	5	6	12	13
HABITAT QUALITY REQUIREMENTS						
Species Richness	14.7	14.3	13.7	9.7	13.7	13.3
Native Species Richness	5.0	5.0	3.7	3.3	2.7	3.7
Count of non-native species with >50% absolute cover	1.0	1.0	1.0	0.7	1.7	1.0
Absolute % cover native	13%	19%	13%	25%	9%	9%
Absolute % tree/shrub	0%	0%	0%	0%	0%	2%
Exceeds woody threshold (1 = Yes)	0	0	0	0	0	0
Fails native vegetation threshold (1= Yes)	1.00	1.00	1.00	0.67	1.00	1.00

Finley Field 29-2013 Outplanting

Site	Finley Field 29 (2013 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Glyphosate	Burn x 1	Fusilade	Control
2015 treatment #	14	15	16	17	18	19
Ground Cover						
Bare ground	7.3	8.3	2.0	2.7	5.0	1.4
Litter	90.0	83.0	66.7	71.7	83.0	89.3
Moss	0.0	0.0	0.0	0.0	2.7	0.0
Graminoids						
Agrostis stolonifera	27.0	27.0	6.7	53.3	43.3	54.7
Aira caryophylla	0.7	2.0	15.0	26.7	1.0	3.7
Anthoxanthum odoratum	40.0	35.0	32.7	4.3	22.0	46.7
Arrhenatherum elatius	0.0	0.0	0.0	0.0	0.0	0.0
Briza minor	0.7	0.3	2.3	0.7	0.3	0.7
Bromus carinatus	0.0	0.0	0.0	0.0	0.0	0.0
Bromus hordeaceous	0.0	0.0	0.0	0.0	0.0	0.0
Carex sp.	0.0	0.0	0.0	0.0	0.0	0.0
Cynosurus echinatus	0.0	0.0	0.0	0.0	0.0	0.0
Dactylis glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Danthonia californica	6.7	15.0	0.0	0.3	3.3	6.0
Deschampsia caespitosa	0.0	0.0	0.0	0.0	0.0	0.0
Elymus glaucus	9.3	4.3	0.7	1.0	6.7	2.0
Festuca arundinacea	0.0	0.0	0.0	0.0	0.0	0.0
Festuca roemeri	0.0	0.3	0.0	0.2	5.0	2.0
Holcus lanatus	1.3	0.0	0.0	0.0	0.0	0.0
Juncus bufonius	0.0	0.0	0.0	0.0	0.0	0.0
Juncus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Luzula sp.	0.0	0.0	0.0	0.0	0.0	0.0
Panicum occidentale	0.0	0.0	0.0	0.0	0.0	0.0
Phleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Poa compressa	0.0	0.0	0.0	0.0	0.0	0.0
Poa pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Vulpia spp.	32.3	2.0	19.7	28.3	17.0	22.0
Tree/Shrub						
Cretaegus douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Cytisus scoparius	0.0	0.0	0.0	0.0	0.0	0.0
Fraxinus latifolia	0.0	0.0	0.0	0.0	0.0	0.0
Malus sp.	0.0	0.0	0.0	0.0	0.0	0.0

Site	Finley Field 29 (2013 Outplanting)					
Recovery Zone	**Corvallis West Recovery Zone**					
2015 Treatment Name	**Mow x 2**	**Carbon x 1**	**Glyphosate**	**Burn x 1**	**Fusilade**	**Control**
2015 treatment #	14	15	16	17	18	19
Pinus ponderosa	0.0	0.0	0.0	0.0	0.0	0.0
Prunus emarginata	0.0	0.0	0.0	0.0	0.0	0.0
Pseudotsuga menzesii	0.0	0.0	0.0	0.0	0.0	0.0
Rosa sp.	0.0	0.0	0.0	0.0	0.0	3.3
Rubus armeniacus	3.3	0.0	0.0	0.0	0.0	1.3
Rubus ursinus	0.0	0.0	0.0	0.0	0.0	0.0
Spirea douglasii	0.0	0.0	0.0	0.0	0.0	0.0
Symphoricarpos albus	0.0	0.0	0.0	0.0	0.0	0.0
Toxicodendron diversilobum	0.0	0.0	0.0	0.0	0.0	0.0
Forbs						
Achillea millefolium	0.0	0.0	0.0	0.0	0.0	0.0
Agoseris sp.	0.0	0.0	0.0	0.0	0.0	0.0
Allium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Anaphales margarita	0.0	0.0	0.0	0.0	0.0	0.0
Aster halii	0.0	0.0	0.0	0.0	0.0	0.0
Brodiea sp.	0.0	0.0	0.0	0.0	0.0	0.3
Cammasia quamash	0.0	0.0	0.0	0.0	0.0	0.0
Castilleja levisecta	0.2	0.0	0.0	0.0	0.2	0.2
Centaurea erythrea	0.0	0.0	0.0	0.0	0.0	0.0
Centaurea pratensis	0.0	0.0	0.0	0.0	0.0	0.0
Cerastium arvense	0.0	0.0	0.0	0.0	0.0	0.0
Cirsium vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Clarkia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Collomia grandiflora	0.0	0.0	0.0	0.0	0.0	0.0
Crepis capillaris	0.7	0.3	16.7	24.7	5.0	1.7
Crepis setosa	4.8	1.7	11.0	3.3	1.3	5.2
Daucus carota	2.0	0.0	0.0	1.3	0.0	0.0
Dipsacus fullonum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium ciliatum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium munitum	0.0	0.0	0.0	0.0	0.0	0.0
Epilobium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Equisetem sp.	0.0	0.0	0.0	0.0	0.0	0.0
Erigeron decumbens	0.7	0.5	0.2	0.0	0.0	0.0
Eriophyllum lanatum	0.0	0.3	1.3	0.0	0.0	0.0
Fragaria virginiana	0.0	0.0	0.0	0.0	0.0	0.0
Galium aparine	0.0	0.0	0.0	0.0	0.0	0.0
Galium parisiense	0.4	13.4	73.3	20.7	12.7	15.3

Site	Finley Field 29 (2013 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Glyphosate	Burn x 1	Fusilade	Control
2015 treatment #	14	15	16	17	18	19
Geranium dissectum	2.7	0.8	1.7	2.0	0.3	0.7
Geranium molle	0.0	0.0	0.0	0.0	0.0	0.0
Gilia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Gnaphalium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Grindelia integrifolia	0.0	0.0	0.0	0.0	0.0	0.0
Heracleum sp.	0.0	0.0	0.0	0.0	0.0	0.0
Hypericum perforatum	0.0	0.3	0.0	1.0	0.7	0.0
Hypochaeris radicata	9.3	18.3	36.3	10.3	41.7	13.0
Lactuca sp.	0.0	0.0	0.0	0.0	0.0	0.0
Lathyrus sp.	0.0	1.7	0.0	0.3	0.0	0.0
Leucanthemum vulgare	0.0	0.0	0.0	0.0	0.0	0.0
Linum bienne	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium nudicaule	0.0	0.2	0.0	0.7	0.0	0.0
Lomatium triternatum	0.0	0.0	0.0	0.0	0.0	0.0
Lomatium utriculatum	0.0	0.0	0.0	0.0	0.0	0.0
Lotus formosissimus	0.0	0.0	0.0	0.0	0.0	0.0
Lotus micranthus	0.7	0.4	0.0	0.0	1.0	0.4
Lotus unifoliolatus	23.7	7.3	6.0	13.7	39.0	6.7
Lupinus albicaulis	0.0	0.0	0.0	0.0	0.0	0.0
Lupinus bicolor	0.0	0.0	0.0	0.0	0.0	0.0
Lythrum hyssopifolium	0.0	0.0	0.0	0.0	0.0	0.0
Madia elegans	0.0	0.0	0.0	0.0	0.0	0.0
Madia glomerata	0.0	0.0	0.0	0.0	0.0	0.0
Madia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Marah oreganus	0.0	0.0	0.0	0.0	0.0	0.0
Mentha pulegium	0.0	0.0	0.0	0.0	0.0	0.0
Moenchia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Myosotis discolor	0.0	0.0	0.0	0.0	0.0	0.0
Navarretia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Orthocarpus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Osmorhiza chilensis	0.0	0.0	0.0	0.0	0.0	0.0
Parentucellia viscosa	7.0	2.8	12.3	23.5	3.0	6.0
Peplis portula	0.0	0.0	0.0	0.0	0.0	0.0
Perideridia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Plantago lanceolata	0.0	0.0	0.0	0.0	0.0	0.0
Potentilla gracilis	0.2	0.3	0.0	0.0	0.0	0.0
Prunella vulgaris	0.0	0.0	0.0	0.0	0.0	0.0
Pteridium aquilinum	0.0	0.0	0.0	0.0	0.0	0.0

Site	Finley Field 29 (2013 Outplanting)					
Recovery Zone	**Corvallis West Recovery Zone**					
2015 Treatment Name	**Mow x 2**	**Carbon x 1**	**Glyphosate**	**Burn x 1**	**Fusilade**	**Control**
2015 treatment #	14	15	16	17	18	19
Ranunculus occidentalis	0.0	0.0	0.0	0.0	0.0	0.0
Rumex acetosella	1.0	0.3	0.0	0.0	1.7	0.2
Saxifraga oregana	0.0	0.0	0.0	0.0	0.0	0.0
Scleranthus sp.	0.0	0.0	0.0	0.0	0.0	0.0
Senecio jacobaea	0.0	0.0	0.0	0.0	0.0	0.0
Senecio vulgaris	0.0	0.0	0.0	0.0	0.2	0.0
Sherardia arvensis	0.0	0.0	0.0	0.0	0.0	0.0
Sidalcea virgata	1.7	0.3	0.0	4.0	0.0	0.0
Sisyrinchium sp.	0.0	0.0	0.0	0.0	0.0	0.0
Spergularia sp.	0.0	0.0	0.0	0.0	0.0	0.0
Taraxacum officinale	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium dubium	0.0	0.0	0.0	0.0	0.0	0.0
Trifolium repens	0.0	0.0	0.0	0.0	0.0	0.0
Triphysaria pusilla	0.0	0.0	0.0	0.0	0.0	0.0
Veronica americana	0.0	0.0	0.0	0.0	0.0	0.0
Vicia cracca	0.0	0.0	0.0	0.0	0.0	0.0
Vicia hirsuta	0.0	0.0	0.0	0.0	0.0	0.0
Vicia sativa	0.3	0.3	0.0	0.0	0.7	0.0
Vicia tetrasperma	0.0	0.0	0.0	0.0	0.0	0.0
Wyethia angustifolia	0.0	0.0	0.0	0.0	0.0	0.0
Zigadenus venenosus	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS:						
Ground Cover	97.4	91.3	68.7	74.4	90.7	90.7
Trees/Shrubs	3.3	0.0	0.0	0.0	0.0	4.7
Native Graminoid	16.0	19.7	0.7	1.5	15.0	10.0
Invasive Graminoid	102.0	66.4	76.3	113.3	83.7	127.7
Invasive Annual Grass	33.7	4.4	37.0	55.7	18.4	26.3
Invasive Perennial Grass	68.3	62.0	39.3	57.7	65.3	101.3
Native Forb	26.8	11.0	7.6	18.7	40.1	7.4
Invasive Forb	28.3	38.4	151.4	86.9	67.2	42.0

Site	Finley Field 29 (2013 Outplanting)					
Recovery Zone	Corvallis West Recovery Zone					
2015 Treatment Name	Mow x 2	Carbon x 1	Glyphosate	Burn x 1	Fusilade	Control
2015 treatment #	14	15	16	17	18	19
HABITAT QUALITY REQUIREMENTS						
Species Richness	16.0	15.3	12.7	13.7	15.7	14.7
Native Species Richness	4.7	6.0	2.7	3.7	4.3	4.7
Count of non-native species with >50% absolute cover	1.0	0.7	1.7	1.3	1.0	1.3
Absolute % cover native	24%	25%	3%	9%	29%	9%
Absolute % tree/shrub	2%	0%	0%	0%	0%	2%
Exceeds woody threshold (1 = Yes)	0	0	0	0	0	0
Fails native vegetation threshold (1= Yes)	1.00	0.67	1.00	1.00	1.00	1.00