

Coyote Prairie North Mitigation Bank 2018 Report



June 2019

This report was prepared by the Parks and Open Space Division
of the City of Eugene's Public Works Department



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Chapter 1. **Introduction**

The Coyote Prairie North Mitigation Bank (CPNMB) operates under an agreement between the Oregon Department of State Lands (DSL), Oregon Department of Environmental Quality, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and the City of Eugene. The Mitigation Bank Instrument establishing this Bank was signed in 2011.

Wetland enhancement work, in the form of site preparation, began in 2008 in the East Phase of the bank and earthwork and seeding of this phase occurred in 2009. Fifth year monitoring of the East phase was completed in summer 2014, and in 2015 it was determined to have met its performance criteria.

The West Phase is the final phase of the CPNMB. Site preparation began in the West Phase in 2013. Earthwork and seeding of this phase were completed in fall 2015, with planting completed January 2016. Spring 2018 results represent the third growing season after first native seeding.

The 2015 earthwork also included conversion of an agricultural ditch to restore site hydrology at the CPNMB. The ditch, which flowed through the East Phase and Phase 2, was modified into a broad swale that now outlets into vegetated, restored, wet prairie. The west end of the ditch was filled to allow water to flow and infiltrate across the southeast part of the site through restored wet prairie, without being intercepted by the ditch and directed rapidly off-site. This annual report includes the seeding and vegetation establishment data for that project, as well as credit summaries and 2018 monitoring, seeding, and planting information for the West Phase.

Chapter 2. Credit Summary for the Coyote Prairie North Mitigation Bank

The first release of credits to the Coyote Prairie North Mitigation Bank (CPNMB) occurred in 2011. Final releases for the East Phase and 25% of the credits expected for the West Phase were released in fall 2015 following approval of the Long-Term Management Plan. For the West Phase a series of releases and sales followed site construction and monitoring results from the first growing season (2016).

At the end of 2017 the bank had a balance of 0.00 credits and was granted a release of 3.92 credits in the first half of 2019 for achieving 2nd year (2017) performance standards.

No transactions for credit sales occurred in the 2018 calendar year. Annual credit sales for the CPNMB since 2012 are summarized in Table 2.1.

The CPNMB currently has 3.92 credits in the ledger, and these credits are available for internal projects related to transportation, parks development, or the Eugene Airport. The anticipated credit release schedule for the West Phase is provided in Table 2.2.

Annual credit sales from 2012 - 2018

Since 2012, the Coyote Prairie North Mitigation Bank has sold a total of 59.78 mitigation credits.

Table 2.1. Summary of CPNMB Annual Credit Sales, 2012 – 2018	
Calendar Year	Total Credits Sold
2012	0.71
2013	8.23
2014	20.06
2015	6.16
2016	5.032
2017	19.588
2018	0.00
Total	59.78

Table 2.2 Credit Release Summary Anticipated for West Phase of the Coyote Prairie North Mitigation Bank (39.25 credits anticipated)

Year of Release	Percentage (Cumulative)	Performance Standard	Credits Anticipated for West Phase (Cumulative)	Credits Released
2011	15% (15%)	Approval of MBI	6.08 (6.08)	6.08
2015	25% (40%)	Approval of long-term management plan	9.81 (15.89)	9.81
2016	5% (45%)	Initial grading, seeding, and reporting of as-builts	1.79 (17.68) *	1.79
2017	10% (55%)	1 st growing season performance standards	3.92 (21.60)	3.92
2019	10 % (65%)	2 nd growing season performance standards	3.92 (25.52)	3.92
(request with 4 th season data)	10% (75%)	3 rd growing season performance standards	3.92 (29.44)	
	10% (85%)	4 th growing season performance standards	3.92 (33.36)	
	15% (100%)	5 th growing season performance standard	5.89 (39.25) **	

*adjusted down 0.17 credits to balance prior release of 6.08 credits from 2011 (MBI approval), when anticipated total credits was higher, and to address rounding error. Anticipated credits are lower than that identified in the CPNMB Instrument due to the 2015 construction of a berm and nesting areas for the federally threatened streaked horned lark.

**A final determination of the number of credits for the West Phase will be made after a final delineation has been approved.

Chapter 3. Site Description, Management and Monitoring

Site Area: 240 Acres

Coyote Prairie North Mitigation Bank Area: 165 acres

Ownership: City of Eugene

Table 3.1 Coyote Prairie Unit site timeline.

Section	Year of Construction	Enhancement Acres	Monitoring Period
East Phase	2009	84	Completed
West Phase	2015	81	2016 - 2020

Location

Coyote Prairie North is located in the Coyote Creek drainage approximately 1.5 miles west of Eugene. It lies on the south side of Cantrell Road and is part of the larger Coyote Prairie enhancement site that is bisected by the east branch of Coyote Creek. The south region of the 240-acre site is part of the now-completed West Eugene Wetland Mitigation Bank and the north region of the site comprises the Coyote Prairie North Mitigation Bank. The Coyote Prairie North Mitigation Bank is divided into an East Phase and a West Phase (Fig. 3.1). The East Phase is further subdivided into the Ha-Yaba Unit (Unit 1; south) and the Walahan Unit (Unit 2; north).

Site History

The site has likely been in agricultural use since the late 1800s or early 1900s, initially as pasture, and then cropped for grass seed production beginning in the early 1970s.

Bank Goals and Objectives

The Bank has two primary goals. The first is to enhance 165 acres of slope/flat wetlands, also referred to as palustrine emergent wetlands using the Cowardin classification. The second goal is to forward conservation goals articulated in the West Eugene Wetlands Plan.

Specific objectives of the Bank include:

- Provide 165 acres of compensatory wetland mitigation credits to approved applicants within its service area to offset impacts to wetland resources. All credits will be enhancement credits generated from slope/flat wetlands under the HGM classification, also referred to as palustrine emergent wetlands using the Cowardin classification. All buffer areas will be included in enhancement areas.
- Enhance site hydrology and historic surface water flow to support the establishment of wet prairie (primarily), and vernal pool, and emergent communities (secondarily) across the site meeting specific hydrologic criteria outlined in the performance standards.

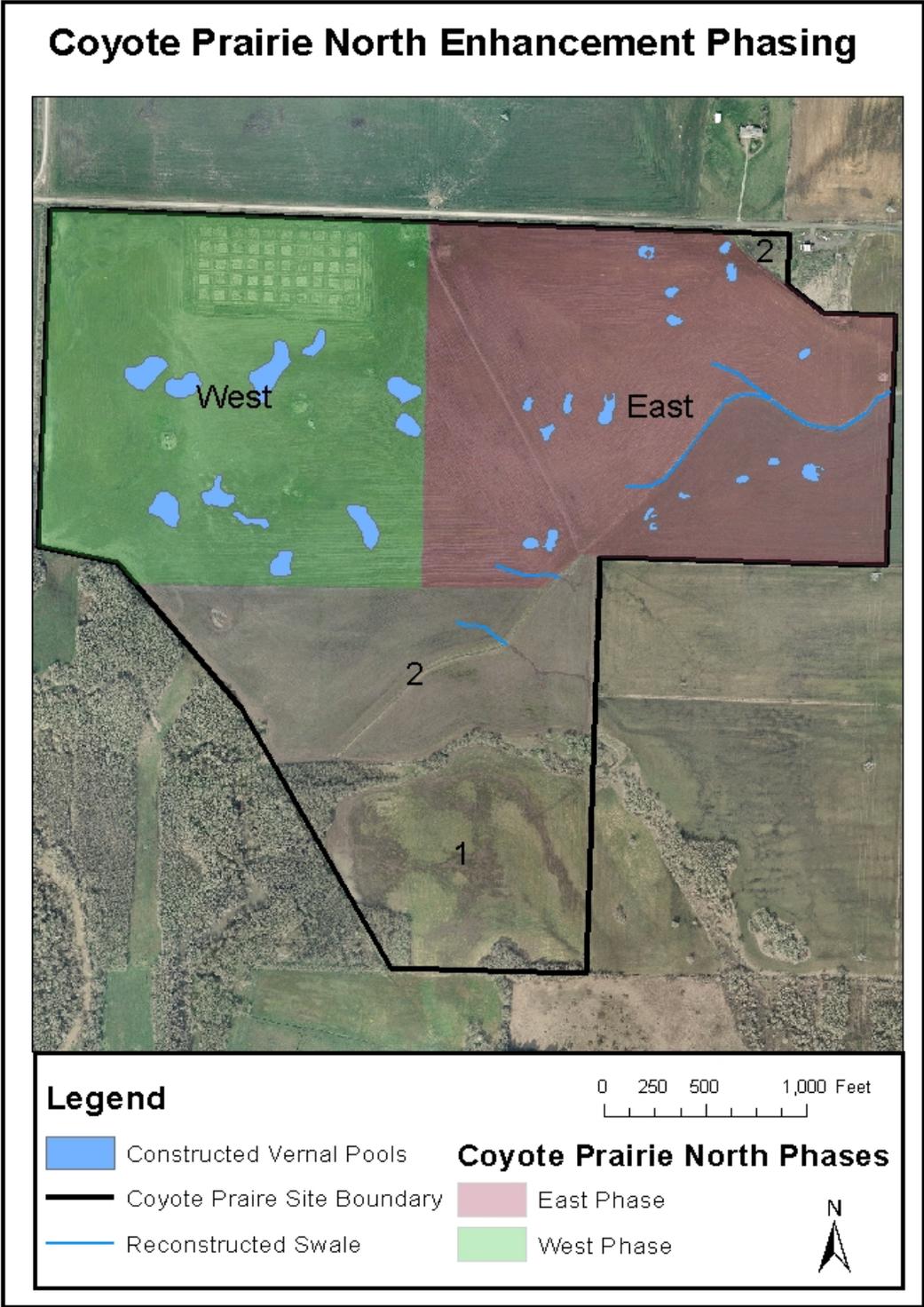


Figure 3.1 Coyote Prairie North Enhancement Phasing Map, identifying the two enhancement phases, East (84 acres) and West (81 acres).

- Enhance vegetation to provide highly diverse wetland communities that are resistant to invasion and resilient to disturbance and that meet the specific criteria outlined in the performance standards. Emphasis includes wetland prairie plant communities with some vernal pool and emergent plant communities. Endangered, rare and uncommon species will be included.
- Establish a diverse prairie plant community to provide food, shelter, and breeding areas for native prairie invertebrates, reptiles, amphibians, mammals and birds, including those listed as Oregon Conservation Strategy species by the Oregon Department of Fish and Wildlife (ODFW).

Activity and Results Summary 2018

In 2018, the West Phase enhancement was in its third precipitation year and growing season. Staff continued to track hydrology and the functioning of vernal pools; water control structures; the recontoured swale and filled ditch in the West Phase, East Phase and Phase 2; and vegetation establishment. Native, perennial vegetation continued to establish well in the West Phase and vernal pool species are thriving, including the rare *Navarettia willamettensis*. The hydrology of the West Phase and the adjacent Phases continues to perform as anticipated, with water moving slowly northwest across the site (rather than exiting the site via agricultural ditches), pools holding water until May and June, and little sediment movement occurring as the vegetation cover increases. The 2018 vegetation monitoring determined that two nonnative annual forbs tripled in cover between June 2017 and June 2018. This was likely due to successful control of non-native grasses in fall 2017 which created bare space that these two species quickly colonized. Due to the increase in cover by annual non-native *Lythrums*, these species met the definition of invasive included in the mitigation bank instrument, causing the phase to exceed its 10% invasive species cover maximum. It is likely these species will decline in the next several years, as they did in the adjacent East Phase, as the native perennial vegetation cover increases. To increase native diversity and to add native grasses, about 25% of the West Phase received grass or forb seed in fall 2018.

Management of adjacent, completed phases of Coyote Prairie continued, including a controlled ecological burn of one-third of the East Phase and half of Phase 1 and 2 in fall 2018.

West Phase Management Action Detail 2018

1. Monitoring results showed that no further adjustment of vernal pool outlets was needed in 2018, since their margins were well vegetated and this, combined with coir and cobble, maintained soil stability.

2. City staff directed the work of contract crews to control nonnative invasive species in the West Phase, and in the filled ditch and swale, using spot spraying, hand removal, and mowing. In 2018, the most frequent non-native species needing treatment in the West Phase were nonnative grasses ((rattail fescue (*Vulpia myuros*), brome fescue (*Vulpia bromoides*)), barnyard grass (*Echinochloa crus-galli*)), pennyroyal (*Mentha pulegium*), curly dock (*Rumex crispus*) and false dandelion (*Hypochaeris radicata*). On the filled ditch and in the recontoured swale, staff treated primarily the nonnative grasses in the genus *Vulpia*, North African grass (*Ventenata dubia*), and velvet grass (*Holcus lanatus*).
3. Nonnative invasive species control using spot herbicide applications was needed for the lark pads and staff continued the early fall mow of the south and southeast region of the West Phase, surrounding the lark pads, where tall, abundant, native beggartick (*Bidens frondosa*) and willow-herb (*Epilobium brachycarpum*), had established at very high levels (volunteer establishment, not seeded). No surveys of larks were conducted this year and no larks were known to nest on the site.
4. In fall 2018, staff seeded 5 native grasses and 14 forbs and rushes over about 25 percent of the site to increase diversity. The grasses were broadcast with an ATV and the forbs and rushes were hand seeded in patches where it appeared they'd best establish or to supplement existing populations (e.g. of hall's aster (*Symphyotrichum hallii*)). Table A-1 in Appendix A lists the species seeded and amounts. Major areas of seeding are shown in Fig. 3.2.

Monitoring

Hydrology. Methods and Results. Staff checked West Phase vernal pool staff gauges and hydrology several times in late fall 2017 and winter 2018 and then monthly from March through June 2018. The 11 constructed pools functioned similar to prior years with pool depths ranging from 6 – 14 inches at full pool, with the majority 10 – 12 inches deep from January through mid-March. All pools held water into May. Pool 3 consistently holds water the longest, finally drying in late June or early July.

In the northwest corner of the West Phase, about 9 to 14 acres experiences repeated inundation from December to late March, depending on precipitation patterns. Water depths at the corner adjacent to the water control structure are about 2 feet. This area is currently vegetated with native fragrant popcorn flower (*Plagiobothrys figuratus*), water foxtail (*Alopecurus geniculatus*), *Bidens frondosa*, and *Grindelia integrifolia x nana*, with *Carex* species beginning to establish and nonnative *Lythrum portula* present as an understory in some areas.

Vegetation. Methods: Vegetation monitoring consisted of the third year of quantitative point-intercept monitoring of the entire West Phase on June 8, 11, 14, and 19, and point-intercept monitoring along the recontoured swale and filled ditch through the East Phase and

Phase 2 on June 21. In addition, vegetation monitoring included site-wide walking surveys to record all species encountered in May, June, and August. Appendix B more fully describes monitoring methods. The presence of *Navarretia willamettensis* and *N. intertexta* was also recorded in each of the West Phase vernal pools. Staff had noted that *Navarretia* species were establishing well in the vernal pools, but the species are not flowering until July and therefore are not distinguished during point-intercept monitoring in June. *Navarretia willamettensis* is a rare Willamette Valley endemic that City staff had seeded, so a simple qualitative assessment was undertaken.

Results: West Phase. The West Phase was well-vegetated with native species in its third growing season. Native vegetation cover was 93.6% (absolute cover; Table 3.2), with the densest perennial vegetation again in the north central area previously used for restoration research and the greatest bare ground occurring in vernal pools and in scattered patches in the central and southwest regions where inundation is also extended. In 2017 staff had noted that the site's past ryegrass crop (*Lolium multiflorum*) was still maintaining over 5% cover, so staff contracted for application of a grass-specific herbicide to be broadcast over greater than half the site in November 2017. The potential for a site's prior non-native grass crop to persist is the reason the City does not typically introduce native grasses until the 3rd or later fall after first seeding. The application was successful and monitoring results show that it removed both the annual ryegrass as well as the abundant volunteer native grass, *Alopecurus geniculatus* that had covered over 30% of the site in 2017 after most of the *Lolium* crop was initially removed and before forbs had time to establish. This year, in June 2018, cover of *Alopecurus geniculatus* was less than 4% (Table 3.2). Removing much of the combined cover of both grasses, which had provided 40% cover in June 2017, opened up substantial bare ground that was colonized by both natives and non-native plants. In particular, two annual forb species were able to rapidly make use of this bare space and more than doubled their combined cover between the 2017 and 2018 monitoring years. Increases were also seen in the colonizing native autumn willowherb (*Epilobium brachycarpum*) and native perennials *Grindelia integrifolia* x *nana* (Willamette gumplant) and one-sided sedge (*Carex unilateralis*).

During point-intercept monitoring, 39 native species and 11 nonnative species were recorded at sampling points. During meandering surveys, 85 native species and 45 nonnative species were found (species list Appendix C). It is typical that many fewer species will be sampled at the points than will be encountered during surveys throughout the site, since many species occur in small, localized patches. Of the six most abundant native species (site-wide cover estimates over 5 percent), 2 were graminoids and 4 were forbs. Two of the forbs (*Bidens frondosa* and *Epilobium brachycarpum*) were not seeded, but colonized abundantly from the soil seed bank (Table 3.2). *Navarretia willamettensis* is the most abundant of the two *Navarretia* species in the West Phase vernal pool. It occurs in all pools there and occupies the pool bottoms more frequently than *N. intertexta*, which is found most frequently on pool upper margins.

The Coyote Prairie North Mitigation Bank Instrument’s definition of an invasive species was adapted from Department of State Land’s definition. It considers the following as invasive plant species: (1) those that occur on the Oregon Department of Agriculture’s Noxious Weed List; (2) The following species: *Phalaris arundinacea*, *Mentha pulegium*, *Holcus lanatus*, and *Anthoxanthum odoratum*; (3) the last crop on the site (in this case *Lolium multiflorum*) and (4) beginning in year two, a nonnative species that comprises more than 15% cover over at least 10% of the vegetation monitoring area and increases from one monitoring year to the next. An assessment of all non-native species that increased and had a minimum cover that could equate to 15% of one-tenth of the West Phase, resulted in both *Lythrum hyssopifolium* and *Lythrum portula* being considered invasive.

Based on the successional changes in vegetation observed at earlier restoration phases, the cover of the two annual *Lythrum*s are likely to diminish as native perennial vegetation establishes, although *Lythrum portula* has some ability to persist under the cover of other species, both annual and perennial. To date, City staff have not actively controlled these species in the West Phase due to the high potential for negative effects to adjacent natives and to the high likelihood that they will be substantially reduced by native perennial establishment. City staff will evaluate if control seems prudent in spring 2019 and assess cover results in summer 2019.

Table 3.2. Coyote Prairie North Mitigation Bank, West Phase, Point-intercept Monitoring Results, 2018.

Percent cover results are shown (with 80% binomial confidence intervals (CI)) for several guild types as well as each species intercepted during monitoring.

Area Sampled: 81 acres		Sample Size: 638 points		
		Wet Prairie with vernal pools		
Origin¹	Species or Guild	% Cover	CI Low	CI High
	Native (absolute cover)	93.6		
	Invasive Nonnative (absolute cover)	25.2		
	Nonnative, excluding invasives (absolute cover)	2.2		
	Total Plant Cover (absolute cover)	121.0		
	Bare ground (no vascular plants, moss may occur)	17.6		
	Native² (a relative cover value)	93.6	92.1	94.8
	All Nonnative² (a relative cover value)	27.4	25.1	29.8
Native	<i>Grindelia integrifolia</i>	20.4	18.3	22.6

Native	<i>Deschampsia cespitosa</i>	9.1	7.7	10.7
Native	<i>Bidens frondosa</i>	8.6	7.2	10.2
Native	<i>Juncus occidentalis</i>	5.8	4.6	7.2
Native	<i>Plagiobothrys figuratus</i>	5.3	4.2	6.7
Native	<i>Epilobium brachycarpum</i>	5.3	4.2	6.7
Native	<i>Carex unilateralis</i>	3.9	3.0	5.1
Native	<i>Alopecurus geniculatus</i>	3.8	2.8	4.9
Native	<i>Gnaphalium palustre</i>	3.8	2.8	4.9
Native	<i>Carex densa</i>	3.1	2.3	4.2
Native	<i>Prunella vulgaris</i> var. <i>lanceolata</i>	3.0	2.2	4.0
Native	<i>Rorippa curvisiliqua</i>	2.4	1.6	3.3
Native	<i>Juncus bufonius</i>	2.0	1.4	3.0
Native	<i>Madia glomerata</i>	1.9	1.2	2.8
Native	<i>Epilobium densiflorum</i>	1.6	1.0	2.4
Native	<i>Downingia yina</i>	1.6	1.0	2.4
Native	<i>Hordeum brachyantherum</i>	1.4	0.9	2.2
Native	<i>Eleocharis obtusa</i>	1.3	0.7	2.0
Native	<i>Navarretia intertexta</i> and <i>N. willamettensis</i>	1.1	0.6	1.8
Native	<i>Galium trifidum</i>	0.9	0.5	1.6
Native	<i>Eryngium petiolatum</i>	0.9	0.5	1.6
Native	<i>Eleocharis palustris</i>	0.8	0.4	1.4
Native	<i>Alisma triviale</i>	0.6	0.3	1.2
Native	<i>Rumex salicifolius</i>	0.6	0.3	1.2
Native	<i>Agrostis exarata</i>	0.5	0.2	1.0
Native	<i>Lasthenia glaberrima</i>	0.5	0.2	1.0
Native	<i>Plagiobothrys scouleri</i>	0.5	0.2	1.0
Native	<i>Microseris laciniata</i>	0.5	0.2	1.0
Native	<i>Beckmannia syzigachne</i>	0.3	0.1	0.8
Native	<i>Epilobium ciliatum</i>	0.3	0.1	0.8
Native	<i>Gratiola ebracteata</i>	0.3	0.1	0.8
Native	<i>Madia sativa</i>	0.3	0.1	0.8
Native	<i>Juncus ensifolius</i>	0.2	0.0	0.6
Native	<i>Lomatium nudicaule</i>	0.2	0.0	0.6
Native	<i>Microsteris gracilis</i>	0.2	0.0	0.6
Native	<i>Panicum capillare</i>	0.2	0.0	0.6
Native	<i>Symphotrichum hallii</i>	0.2	0.0	0.6
Native	<i>Veronica peregrina</i>	0.2	0.0	0.6
Native	<i>Carex</i> sp (<i>C. unilateralis</i> or <i>C. densa</i>)	0.2	0.0	0.6
Native	<i>Sisyrinchium idahoense</i>	0.2	0.0	0.6
Nonnative (2 categories)				
Invasive	<i>Lythrum portula</i>	12.7	11.0	14.6

Invasive	<i>Lythrum hyssopifolium</i>	12.2	10.6	14.1
Invasive	<i>Mentha pulegium</i>	0.3	0.1	0.8
Nonnative	<i>Hypochaeris radicata</i>	0.6	0.3	1.2
Nonnative	<i>Vulpia myuros / Vulpia bromoides</i>	0.6	0.3	1.2
Nonnative	<i>Alisma lanceolatum</i>	0.2	0.0	0.6
Nonnative	<i>Echinochloa crus-galli</i>	0.2	0.0	0.6
Nonnative	<i>Geranium dissectum</i>	0.2	0.0	0.6
Nonnative	<i>Lactuca serriola</i>	0.2	0.0	0.6
Nonnative	<i>Vicia tetrasperma</i>	0.2	0.0	0.6
Nonnative	<i>Galium divaricatum</i>	0.2	0.0	0.6

1 In Origin column, invasive is as defined in the Mitigation Bank Instrument for this site.

2 Native and nonnative cover data are provided here transformed to allow calculation of binomial confidence intervals appropriate for point guild data. In the transformed data, each of the two guilds (native and nonnative) can only be recorded once at each point (e.g. each point is either native, nonnative, both, or neither). Total native and nonnative cover could therefore each equal 100%.

Recontoured swale and filled ditch vegetation:

These locations in the East Phase and Phase 2 are primarily vegetating with native graminoids on the swale sides and bottom and a mix of native and nonnative forbs along the filled ditch. The linear extent of the disturbed zone is about 2 acres. Plant establishment on the swale has been somewhat slow, due to exposed clay slopes and the harsher growing conditions than on the top of the filled ditch. In addition, in May 2018 staff mowed and applied grass-specific herbicide in select areas of the filled ditch and lower swale to control two invasive nonnative grass genera - the *Vulpias* (*V. myuros* and *V. bromoides*) and Ventanata grass (*Ventanata dubia*). Due to both these management activities, summer 2018 monitoring showed a decrease in relative cover of native plants to 54% and an increase in bare ground to 31%. This is a temporary condition of the swale, but staff expects to be controlling these two grass species for several more years to ensure natives will be well established.

Monitoring results show that the vegetation in this 2-acre area is relatively diverse, with about 25 native species encountered during point-intercept monitoring. This diversity is primarily in the filled ditch where it runs through Phase 2. Four species had at least 5% cover in the filled ditch and swale, all native, with 2 forbs and 2 grasses (Table 3.3).

The recontoured swale and filled ditch continue to require annual control of non-native species, which are diverse likely because more plant species persisted along its length during the site's decades of grass seed production, both because a ditch is difficult to keep free of non-crop species and because seeds are transported to the site through water flow. Invasive nonnative species encountered during 2018 point-intercept monitoring were *Mentha pulegium* (2.4% cover) and *Lythrum hyssopifolium* (10.7% cover). As in the West Phase, there was an increase in *Lythrum hyssopifolium* from 2017 to 2018 causing it to meet the definition of invasive. City staff are not controlling this species and expect it to decline to low levels as native perennials establish.

Table 3.3. Coyote Prairie North Swale/Fill Area Point-intercept Monitoring Results, 2018.
Percent cover results are shown (with 80% binomial confidence intervals (CI)) for several guild types as well as each species intercepted during monitoring.

	Area Sampled: 2 acres (entire)	Sample Size: 206 points		
		Wet Prairie (in recontoured swale and on filled ditch)		
Origin¹	Species or Guild	% Cover	CI Low	CI High
	Native (absolute cover)	61.2		
	Invasive Nonnative (absolute cover)	13.1		
	Nonnative, excluding invasives (absolute cover)	11.7		
	Total Plant Cover (absolute cover)	85.9		
	Bare ground (no vascular plants, moss may occur)	31.5		
	Native² (a relative cover value)	53.8	49.2	58.5
	All Nonnative² (a relative cover value)	24.7	20.9	29.0
Native	<i>Grindelia integrifolia</i>	12.6	9.7	16.1
Native	<i>Madia sativa</i>	11.7	8.8	15.0
Native	<i>Deschampsia cespitosa</i>	11.2	8.4	14.5
Native	<i>Agrostis exarata</i>	6.3	4.2	9.1
Native	<i>Beckmannia syzigachne</i>	1.9	0.8	3.8
Native	<i>Madia elegans</i>	1.9	0.8	3.8
Native	<i>Madia glomerata</i>	1.9	0.8	3.8
Native	<i>Juncus bufonius</i>	1.5	0.5	3.2
Native	<i>Rorippa curvisiliqua</i>	1.5	0.5	3.2
Native	<i>Epilobium densiflorum</i>	1.0	0.3	2.6
Native	<i>Glyceria occidentalis</i>	1.0	0.3	2.6
Native	<i>Hordeum brachyantherum</i>	1.0	0.3	2.6
Native	<i>Juncus occidentalis</i>	1.0	0.3	2.6
Native	<i>Sidalcea cusickii</i>	1.0	0.3	2.6
Native	<i>Alisma triviale</i>	0.5	0.1	1.9
Native	<i>Carex densa</i>	0.5	0.1	1.9
Native	<i>Carex species (sm, not flowering)</i>	0.5	0.1	1.9
Native	<i>Eleocharis palustris</i>	0.5	0.1	1.9
Native	<i>Epilobium brachycarpum</i>	0.5	0.1	1.9
Native	<i>Epilobium ciliatum</i>	0.5	0.1	1.9
Native	<i>Erythranthe guttata</i>	0.5	0.1	1.9

Table 3.3. Coyote Prairie North Swale/Fill Area Point-intercept Monitoring Results, 2018.
Percent cover results are shown (with 80% binomial confidence intervals (CI)) for several guild types as well as each species intercepted during monitoring.

	Area Sampled: 2 acres (entire)	Sample Size: 206 points		
		Wet Prairie (in recontoured swale and on filled ditch)		
Origin ¹	Species or Guild	% Cover	CI Low	CI High
Native	<i>Gratiola ebracteata</i>	0.5	0.1	1.9
Native	<i>Lotus unifolius</i>	0.5	0.1	1.9
Native	<i>Navarretia intertexta</i> and <i>N. willamettensis</i>	0.5	0.1	1.9
Native	<i>Plagiobothrys scouleri</i>	0.5	0.1	1.9
Native	<i>Potentilla gracilis</i>	0.5	0.1	1.9
Nonnative (2 categories)				
Invasive	<i>Lythrum hyssopifolium</i>	10.7	1.2	4.5
Invasive	<i>Mentha pulegium</i>	2.4	8.0	14.0
Nonnative	<i>Galium divaricatum</i>	2.4	1.2	4.5
Nonnative	<i>Vulpia myuros</i> & <i>V. bromoides</i>	2.4	1.2	4.5
Nonnative	<i>Bromus commutatus</i>	1.9	0.8	3.8
Nonnative	<i>Linum bienne</i>	1.0	0.3	2.6
Nonnative	<i>Vicia sativa</i>	1.0	0.3	2.6
Nonnative	<i>Anagallis arvensis</i>	0.5	0.1	1.9
Nonnative	<i>Bromus hordeaceus</i>	0.5	0.1	1.9
Nonnative	<i>Daucus carota</i>	0.5	0.1	1.9
Nonnative	<i>Echinochloa crus-gallii</i>	0.5	0.1	1.9
Nonnative	<i>Lythrum portula</i>	0.5	0.1	1.9
Nonnative	<i>Ventenata dubia</i>	0.5	0.1	1.9

Management Actions for 2019

1. Continue to control nonnative plant species in the West Phase, the swale (East Phase), and the filled ditch in Phase 2.
2. Continue to monitor for, and treat if necessary, erosion on swale slopes, berm edges, and drainage features.
3. Monitor vegetation establishment and hydrology in the West Phase and swale/fill area.
4. Seed native grasses in the West Phase after nonnative grasses are controlled.

Coyote Prairie North 2018 West Phase Seeded Areas

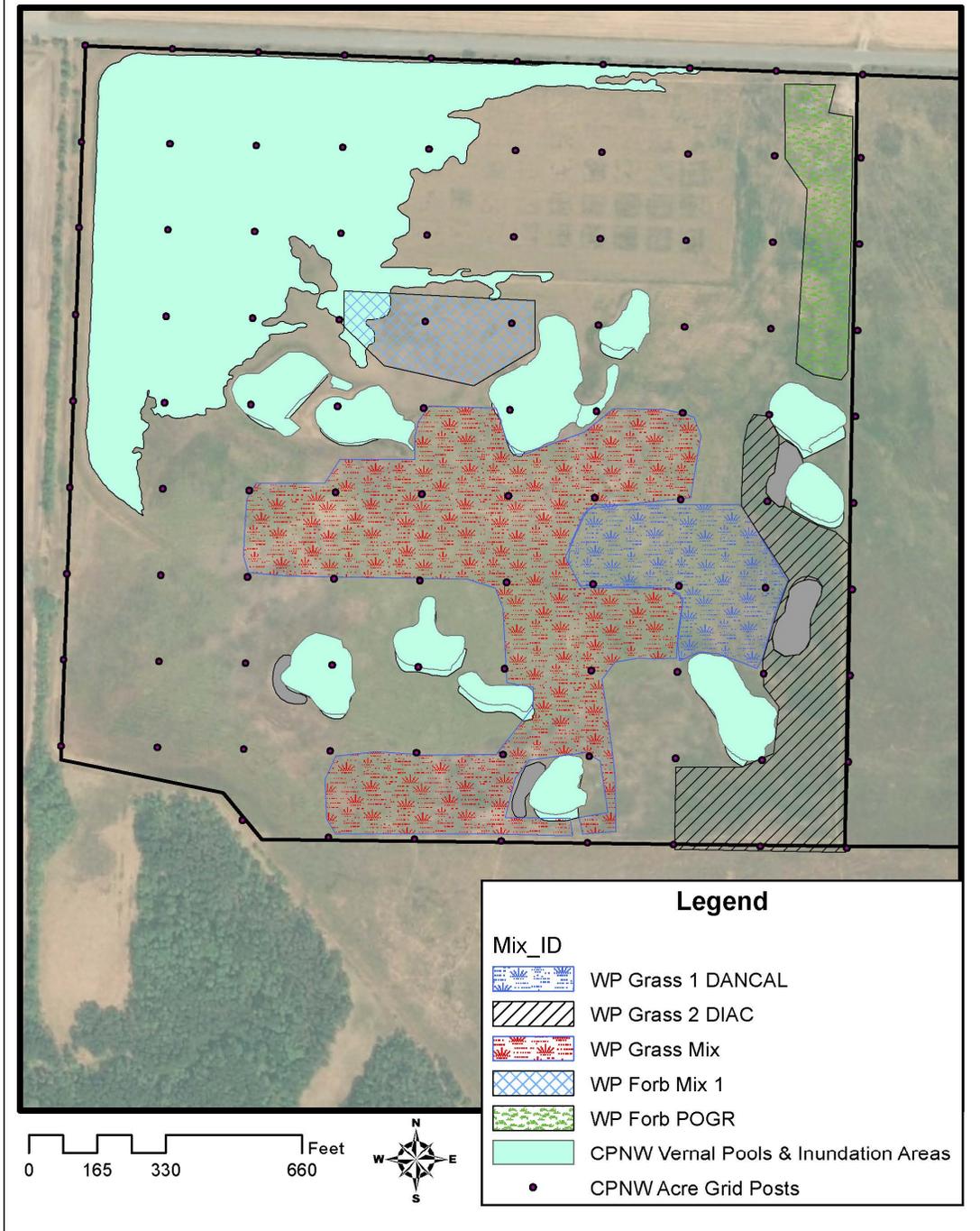


Figure 3.2. Coyote Prairie North 2018 Seeding Map. Seed mix composition is found in Table A-1. Vernal pools are shown for location only – no seed applied there in 2018.

Wildlife Utilization at Coyote Prairie through 2018

Invertebrates:

A variety of caddisfly larvae and other aquatic macroinvertebrates (e.g. ostracods, copepods, daphnia) are present in pooled and flowing water in all phases of Coyote Prairie and terrestrial invertebrates, such as dragonflies, bumblebees, other native bees, and wasps are routinely encountered. Solitary native bees are particularly frequently observed feeding on *Downingia* species in vernal pools. A group of North American Butterfly Association volunteers collected butterfly use data from other phases of Coyote Prairie during enhancement and documented over 700 individuals of 14 species using the East Phase enhancement from April through September 2012. The West Phase is likely similar.

Their report: <http://www.naba.org/chapters/nabaes/>.

Reptiles and amphibians:

Adult long-toed salamanders and larvae in pools have been observed in both the East and West Phases. Pacific chorus frog larvae are abundant in East and West Phase pools (observed in 8 of 11 West Phase pools in 2017). Garter snakes and racers have been observed in both enhancements and the garter snakes are occasionally found hunting or resting in vernal pools.

Birds:

Raptors (e.g. hawks, kites, owls) and songbirds continue to be sighted regularly foraging in all Coyote Prairie restoration phases and a bald eagle was inadvertently flushed from the ground in the West Phase in summer 2016. Northern harriers nested in the East Phase and hatched at least 4 young in 2017. Also of note, western meadowlarks are documented frequently in winter feeding flocks, males are observed singing from stakes and cottonwood logs, and young have been seen on fledgling flights. Ground-nesting birds, such as California quail, killdeer, and savannah sparrows have been documented nesting in the East phase and streaked horned larks have been seen in the West Phase, but not verified to have nested. In 2017 and 2018, Grasshopper sparrows were observed singing on territories in the West Phase. The large expanse of water in the northwest corner of the West Phase has attracted flocks of pintails, Canada geese, and other native waterbirds, including Greater Yellowlegs, Least Sandpiper and at least one Long-billed curlew.

Mammals:

Voles and their trails are commonly seen in the enhanced wet prairie vegetation. Elk use the entire site, as evidenced by tracks and scat and occasional observation of the herd. Coyotes use the site, based on scat, and a bear and bear sign were spotted in the nearby Phase 1 enhancement in the past.

Chapter 4. Progress Toward Meeting Performance Standards

Monitoring and assessment to verify progress toward meeting performance standards in the West Phase, as described in the Coyote Prairie North Mitigation Bank Instrument, are summarized in Tables 4.1 and 4.2, below. Table 4.1 shows progress toward meeting vegetation standards and Table 4.2 shows progress toward meeting hydrologic performance standards. Progress toward meeting vegetation standards in the recontoured swale and filled ditch are shown in Table 4.3.

Table 4.1. Progress of the Coyote Prairie North, West Phase Enhancement, Toward Meeting the Vegetation Performance Standards Identified in the MBI.					
The most recent data for the West Phase are compared to their relevant performance standards. The number in the 'Monitoring Year' column indicates the summer growing season in which the data was collected to evaluate the site's success in meeting the associated standard. A corresponding year in the 'West Phase Data' column indicates the calendar year data was collected.					
Monitoring Year	Phase/ Unit	Vegetation Performance Standards	Monitoring method	West Phase Data (Calendar Yr Collected)	Goal Met?
1	All	Seeding assessment will document initial vegetation establishment	Qualitative seeding assessment	Completed (2016 report)	Y
2	All	Native vascular plant cover > 40%	Point Intercept	Native cover = 113.9% (2017 report)	Y
2	All	Bare ground < 40%	Point Intercept	Bare ground = 8.5% (2017 report)	Y
2	All	Nonnative <i>invasive</i> vascular plant cover ≤ 10%	Point Intercept	Nonnative invasive plant cover = 6.6% (2017 report)	Y

Table 4.1. Progress of the Coyote Prairie North, West Phase Enhancement, Toward Meeting the Vegetation Performance Standards Identified in the MBI.

The most recent data for the West Phase are compared to their relevant performance standards. The number in the 'Monitoring Year' column indicates the summer growing season in which the data was collected to evaluate the site's success in meeting the associated standard. A corresponding year in the 'West Phase Data' column indicates the calendar year data was collected.

Monitoring Year	Phase/ Unit	Vegetation Performance Standards	Monitoring method	West Phase Data (Calendar Yr Collected)	Goal Met?
3	All	Native vascular plant cover > 40%	Point Intercept	Native cover = 93.6% (this report)	Y
3	All	Bare ground < 40%	Point Intercept	Bare ground = 17.6% (this report)	Y
3	All	Nonnative <i>invasive</i> vascular plant cover ≤ 10%	Point Intercept	Nonnative invasive plant cover = 25.2% (this report); however 24.9% of that is two annual <i>Lythrum</i> s (<i>L. hyssopifolium</i> and <i>L. portula</i>)	N (but see note)
3	All	6 native species have ≥ 5% cover in 10% of area sampled	Point Intercept	6 native species have ≥ 5% cover site-wide (this report)	Y
4	All	Native vascular plant cover > 60%	Point Intercept	Anticipated 2019	TBD
4	All	Bare ground < 40%	Point Intercept	Anticipated 2019	TBD
4	All	Nonnative invasive vascular plant cover ≤ 10%	Point Intercept	Anticipated 2019	TBD

Table 4.1. Progress of the Coyote Prairie North, West Phase Enhancement, Toward Meeting the Vegetation Performance Standards Identified in the MBI.

The most recent data for the West Phase are compared to their relevant performance standards. The number in the 'Monitoring Year' column indicates the summer growing season in which the data was collected to evaluate the site's success in meeting the associated standard. A corresponding year in the 'West Phase Data' column indicates the calendar year data was collected.

Monitoring Year	Phase/ Unit	Vegetation Performance Standards	Monitoring method	West Phase Data (Calendar Yr Collected)	Goal Met?
4	All	6 native species have $\geq 5\%$ cover in 10% of area sampled	Point Intercept	Anticipated 2019	TBD
5	All	Native vascular plant cover > 75%	Point Intercept	Anticipated 2020	TBD
5	All	Bare ground < 20%	Point Intercept	Anticipated 2020	TBD
5	All	6 native species have $\geq 5\%$ cover in 10% of area sampled	Point Intercept	Anticipated 2020	TBD
5	All	Nonnative invasive vascular plant cover is $\leq 10\%$	Point Intercept	Anticipated 2020	TBD
5	All	Nonnative plant cover is less than 15% of total plant cover	Point Intercept	Anticipated 2020	TBD
5	All	At least 50 native vascular plant species are present	Walking surveys	Anticipated 2020	TBD

Table 4.2. Progress of the Coyote Prairie North, West Phase Enhancement, Toward Meeting the Hydrologic Performance Standards Identified in the MBI.

The most recent data for the West Phase are compared to their relevant performance standards. The number in the ‘Monitoring Year’ column indicates the potential years in which data can be collected to evaluate the site’s success in meeting the associated standard. Year “0” is the site preparation stage, before the initial seeding. A corresponding year in the ‘West Phase Data’ column indicates the calendar year data was actually collected.

Monitoring Year	Hydrologic Performance Standards	Monitoring and Reporting Method	West Phase Data (Calendar Yr Collected)	Goal Met?
0	PSH3: fill west length of Coyote Ditch	2015 as-built report	Ditch filled summer 2015	Y
0	PSH4: recontour east region of Coyote Ditch	2015 as-built report	Swale recontoured summer 2015	Y
0	PSH6: flows leaving the NW corner of the site are regulated by a berm and culvert	2015 as-built report and 2016 annual report	Culvert and berm installed summer 2015 and functioning (photos 2016 report)	Y
3, 4, or 5	PSH1: 84 acres exhibit wetland hydrology	Modified wetland delineation addendum	Anticipated 2019 or 2020	TBD
3, 4, or 5	PSH3: surface flows from Coyote South (Coyote Prairie Phase 2) not intercepted by Coyote Ditch	Photos, hydrologic mapping in year with “normal” rainfall	Anticipated 2019 or 2020	TBD
3, 4, or 5	PSH4: water flows released from Coyote Ditch across East Phase	Photos, hydrologic mapping in year with “normal” rainfall	Anticipated 2019 or 2020	TBD
3, 4, or 5	PSH4: >5% of the entire site’s acreage (East and West Phases) are in vernal pools that are inundated for at least 8 weeks from January through April.	November – May fill dates and depths	Anticipated 2019 or 2020	TBD

Table 4.3. Progress of the Coyote Prairie North, Swale Hydrologic Enhancements, Toward Meeting the Vegetation Performance Standards Identified in the Removal-Fill Permit.

The most recent data for the Swale/Ditch Enhancements quantitative vegetation monitoring are compared to their relevant performance standards. The number in the 'Monitoring Year' column indicates the summer growing season in which the data was collected to evaluate the site's success in meeting the associated standard. A corresponding year in the 'Data' column indicates the calendar year data was collected.

Monitoring Year	Phase/ Unit	Vegetation Performance Standards	Monitoring method	Swale Data (Calendar Yr Collected)	Goal Met?
1	All	Seeding assessment will document initial vegetation establishment	Qualitative seeding assessment	Completed (2016 report)	Y
2	All	Native vascular plant cover > 40%	Point Intercept	Native cover = 108% (2017 report)	Y
2	All	Bare ground < 40%	Point Intercept	Bare ground = 18% (2017 report)	Y
2	All	Nonnative <i>invasive</i> vascular plant cover ≤ 10%	Point Intercept	Invasive cover = 2.8% (2017 report)	Y
3	All	Native vascular plant cover > 40%	Point Intercept	Native cover = 61% (this report)	Y
3	All	Bare ground < 40%	Point Intercept	Bare ground = 32 (this report)	Y
3	All	Nonnative <i>invasive</i> vascular plant cover ≤ 10%	Point Intercept	Nonnative invasive cover (primarily <i>Lythrum hyssopifolium</i>) = 13.1% (this report)	N

Table 4.3. Progress of the Coyote Prairie North, Swale Hydrologic Enhancements, Toward Meeting the Vegetation Performance Standards Identified in the Removal-Fill Permit.

The most recent data for the Swale/Ditch Enhancements quantitative vegetation monitoring are compared to their relevant performance standards. The number in the 'Monitoring Year' column indicates the summer growing season in which the data was collected to evaluate the site's success in meeting the associated standard. A corresponding year in the 'Data' column indicates the calendar year data was collected.

Monitoring Year	Phase/ Unit	Vegetation Performance Standards	Monitoring method	Swale Data (Calendar Yr Collected)	Goal Met?
4	All	Native vascular plant cover > 60%	Point Intercept	Anticipated 2019	TBD
4	All	Bare ground < 40%	Point Intercept	Anticipated 2019	TBD
4	All	Nonnative invasive vascular plant cover ≤ 10%	Point Intercept	Anticipated 2019	TBD
5	All	Native vascular plant cover > 75%	Point Intercept	Anticipated 2020	TBD
5	All	Bare ground < 20%	Point Intercept	Anticipated 2020	TBD
5	All	Nonnative invasive vascular plant cover is ≤ 10%	Point Intercept	Anticipated 2020	TBD
5	All	Nonnative plant cover is less than 15% of total plant cover	Point Intercept	Anticipated 2020	TBD

Appendix A. 2018 Seed Mixes

Table A-1. Coyote Prairie North Mitigation Bank, Native Seed Distributed Fall 2018.				
Seed mixes or single-species distributions indicated below under acres as “NA” were distributed patchily throughout the seeding region in appropriate habitat and where they appeared most likely to establish (e.g. in less densely vegetated areas). This table includes the species seeded and total grams. Grams per acre are provided only when a consistent rate was applied across the entire region.				
Seed Mix Name	Acres	Scientific Name	Total Gms	Grams /Acre
CPNW WP Grass 1	2	<i>Danthonia californica</i>	27,240	
Purpose/Location: Add <i>Danthonia californica</i> at 20 lbs/acre to 3 acres where bare ground exists and few nonnatives are present.				
CPNW WP Grass 2	2	<i>Dicanthelium acuminatum</i> var. <i>fasciculatum</i>	8,709	
Purpose/Location: Add this late-germinating native grass to regions where bare ground exists and few nonnatives are present.				
CPNW WP Grass Mix	12	<i>Beckmannia syzigachne</i>	2,339	
Purpose/Location: Add grasses and 1 forb to central south region.				
		<i>Deschampsia cespitosa</i>	240	
		<i>Hordeum brachyantherum</i>	4,200	
		<i>Potentilla gracilis</i> var. <i>gracilis</i>	2,160	
CPNW WP Forb Mix 1, POGR, and other species by hand	NA	<i>Camassia leichtlinii</i> var. <i>suksdorfii</i>	1,741	
Purpose/Location: Increase forb diversity at scattered locations throughout the West phase; only the largest ones are included on the 2018 seed map.				
		<i>Camassia quamash</i> var. <i>maxima</i>	13,603	
		<i>Eriophyllum lanatum</i> var. <i>lanatum</i>	4,840	
		<i>Juncus patens</i>	102	
		<i>Lomatium nudicaule</i>	3,300	
		<i>Lupinus polyphyllus</i>	1,291	
		<i>Luzula comosa</i>	709	
		<i>Perideridia oregana</i>	1,200	
		<i>Plagiobothrys figuratus</i>	450	
		<i>Potentilla gracilis</i> var. <i>gracilis</i>	6,940	
		<i>Pyrocoma racemosa</i> var. <i>racemosa</i>	4,676	
		<i>Ranunculus occidentalis</i> var. <i>occidentalis</i>	2,250	
		<i>Rumex salicifolius</i> var. <i>salicifolius</i>	1,050	
		<i>Sisyrinchium idahoense</i> var. <i>idahoense</i>	1,756	
		<i>Symphyotrichum hallii</i>	541	
		<i>Wyethia angustifolia</i>	3,835	
		TOTAL	48,284	

Appendix B. Monitoring Methods

Overview

Monitoring methods for the Coyote Prairie North Mitigation Bank are based on methods developed for the West Eugene Wetland Mitigation Bank that were revised and expanded to provide a more complete assessment of performance for Coyote Prairie North enhancements.

The Coyote Prairie North Mitigation Bank is divided into the West Phase (current active phase) and the East Phase (complete). The monitoring is designed to document development of the enhancements for this Bank and determine if performance criteria area being met. Monitoring types are conducted for each Phase, depending on the Performance Criteria or Monitoring Benchmarks developed for the Phase.

Photopoints

Purpose: Photo document surface hydrology. Photos are taken pre- and post- treatment to show landscape level changes. Photos are also used to document specific actions and site conditions.

Method:

1. Permanent photo stations are established with metal stakes or GPSed in the field in sufficient number to provide photo coverage of the enhanced area.
2. Photographs are taken pre- and post-project and documented by photopoint number and compass bearing and/or landmarks.
3. For the NW Phase hydrologic enhancements, photos from regular point-and-shoot cameras were discontinued as UAV photography will be available to better document hydrologic changes and function.

Hydrology

Purpose: Assess whether wetland hydrology is established within the enhancement site. The extent of soil saturation during the growing season is an important factor in determining jurisdictional wetlands.

Method:

1. Site visits during the winter and spring include a brief description of the location, extent, and depth of standing water at each site.
2. Water depth is recorded at maximum height in pools and emergent areas (typically during January), and again as pools start to dry April – June. Depth is typically recorded from staff gauges installed in vernal pool and emergent areas in a given phase. Depths and duration of inundation in other pools is collected based on specific needs.

3. A modified wetland delineation is conducted in year 3, 4, or 5, when precipitation is near normal (see DSL's Delineation "Lite" for Mitigation Monitoring in: Oregon Dept State Lands. 2009. Removal-Fill Guidelines, Compensatory Mitigation for Non-Tidal Wetlands and Tidal Waters and Compensatory Non-wetland Mitigation. Interim Review draft, October 14).

Vegetation Monitoring

The standard protocol for quantitative vegetation monitoring at the Coyote Prairie North Mitigation Bank sites was developed in 1994 for the West Eugene Wetland Mitigation Bank and further expanded and revised in 1997/1998, and 2010. It relies on the point-intercept method to assess plant cover by species, combined with full site surveys to identify species occurring in the mitigation site, but not encountered during point-intercept monitoring. The vegetation monitoring method for Coyote Prairie North builds on past monitoring experience and continues the use of point-intercept sampling and site-wide plant surveys to provide an objective method of measuring plant cover and assessing plant species richness.

Overall Goal

Monitor the establishment and development of hydrophytic and other vegetation within enhancement sites.

Species Lists

Purpose: Annually assess the status of each phase in meeting the City of Eugene's intent to enhance and restore wetland prairies with a high diversity of native wetland prairie plant species that encompass many spatial, temporal, and functional groups (e.g. species that are early-germinating, late-flowering, or nitrogen-fixing).

Method:

1. The species list should be collected annually; once early in the growing season (late May to mid-June), and once late in the growing season (August/Sept).
2. Compile the list by thoroughly walking through a site while filling out the species checklist.
3. Cross check and add to the list from other monitoring efforts including the Point-Intercept Sampling and Planting Establishment Assessments to ensure all species observed are represented.

Plant Establishment Assessments

Purpose: To provide an early qualitative assessment of plant establishment that will help guide future seeding and planting plans.

Method:

1. The assessment usually takes place in the first growing season, when the maximum number of species are identifiable and flowering (June to mid-July).

2. Each native species encountered during meandering surveys through the site is noted and its presence across the enhancement site (or target area if within a region covered by a specific seed mix) is assigned to one of 4 broad cover classes. Although the classes may be defined based on comparison with one another, they typically equate to the following cover classes in the first growing season: Dominant = 40+% of vegetation cover, Common = 10% – 39% of vegetation cover, Occasional = 2% -9% of vegetation cover, Trace = present, but less than 2% of vegetation cover.

Point-intercept Sampling

Purpose: To assess whether the enhancement or restoration site is meeting performance criteria addressing native and non-native plant cover, bare ground, and diversity, identified in the Coyote Prairie North Mitigation Bank Instrument.

Methods:

1. The entire restoration or enhancement site is sampled annually in years 2, 3, 4, and 5. This is a variation of methods used in the West Eugene Wetlands Mitigation Bank where representative, randomly chosen macroplots were sampled, rather than the entire enhancement area.
2. The sampling method is a systematic sampling with a random start, with each point being one sampling unit. These are not repeated sampling of the same points each year.
3. Sample points are dispersed systematically throughout the sampled area. Locations of sample points are determined by pacing and use of an on-site grid system that covers the entire site, rather than use of measuring tape. In non-mitigation bank locations where no grid systems exist, a visual grid system can be overlaid using the Collector App and monitoring staff can use GPS locations to align themselves.
4. The number of samples collected is at least 200 per enhancement phase, unless prior monitoring in an enhancement phase has identified that smaller sample sizes would still meet monitoring objectives identified in the Mitigation Bank Instrument and in the Oregon Department of State Lands Routine Performance Standards. At Coyote Prairie we collect 8 samples per acre (~640 samples) for an 80-acre site.
5. The sampling method uses the grid system that the City installed which divides the phase into equally sized 1-acre squares. The corner of each grid square is marked with a wooden pole about 6 ft tall. Therefore, poles occur about every 64 meters throughout the site.
 - a. For monitoring purposes, the x-axis of the site is east-west, parallel to Cantrell Road, and the y-axis is north-south (Fig. A-1). The start location for the first point on the x-axis is identified using a randomly chosen number (chosen via generator app or table) between 1 and 5 and this is the number of meters added to the first 13 meters

- off the start line. So for example, if the random number was 3, then the first point would be at 16 (13+3) and then 29 (adds 13), 42, and 55 east of the start point.
- b. To locate the start point of the transects we also use 2 random numbers that will place the first transect in the northern half of the grid square and the second in the southern half. For example, with randomly chosen start points of 9 meters and 45 meters and the desire for at least 600 sampled points, the sampling locations would be as follows: 4 points are sampled in the north half of the each grid square at 16 m, 29 m, 42 m, and 55 m east of each grid line (Fig. B-1). This is repeated, using the same x-coordinates along a second transect in the south half of each grid.
 - c. Thus in this example, within each of the one-acre squares, sampling occurred at the following x-y coordinates: 16-9, 29-9, 42-9, 55-9, and 16-45, 29-45, 42-45, and 55-45 (Fig. B-1).
 - d. All distances were paced by the monitoring crew after calibrating their paces to actual distances measured with a measuring tape. The grid pole line at the boundary of each grid square was used to readjust position at each acre.
 - e. The West site is slightly larger than 81 acres and partial grid squares exist at the site's boundaries, so with 8 sample points collected in each of the 1-acre grid squares, 639 total samples were collected.
 - f. To reduce bias when arriving at the exact sample location, the monitoring crew member positioning the tripod watches the level on the top of the tripod. Adjusting the tripod to level determines the trajectory of the pin.
6. Each sample (or point) is obtained by lowering a vertical cylindrical metal rod with a sharp pin at the tip and noting each vascular plant species the tip intersects ("hits") on its route to the ground at that location. The pole is dropped through a tube affixed to a specially modified camera tripod with a built in level, to ensure it stays vertical.
 7. Ground cover is identified at each sample point as either bare, litter, or moss, where no plant cover is "hit". All locations with no plant cover are identified as "bare ground" in the summary of cover (that is, moss/litter/bare aren't distinguished in the summary).
 8. The percentage of ground covered by each species is calculated by dividing the total number of "hits" of each plant by the total number of sample points. Cover estimates are given with 80% binomial confidence intervals, unless otherwise indicated.

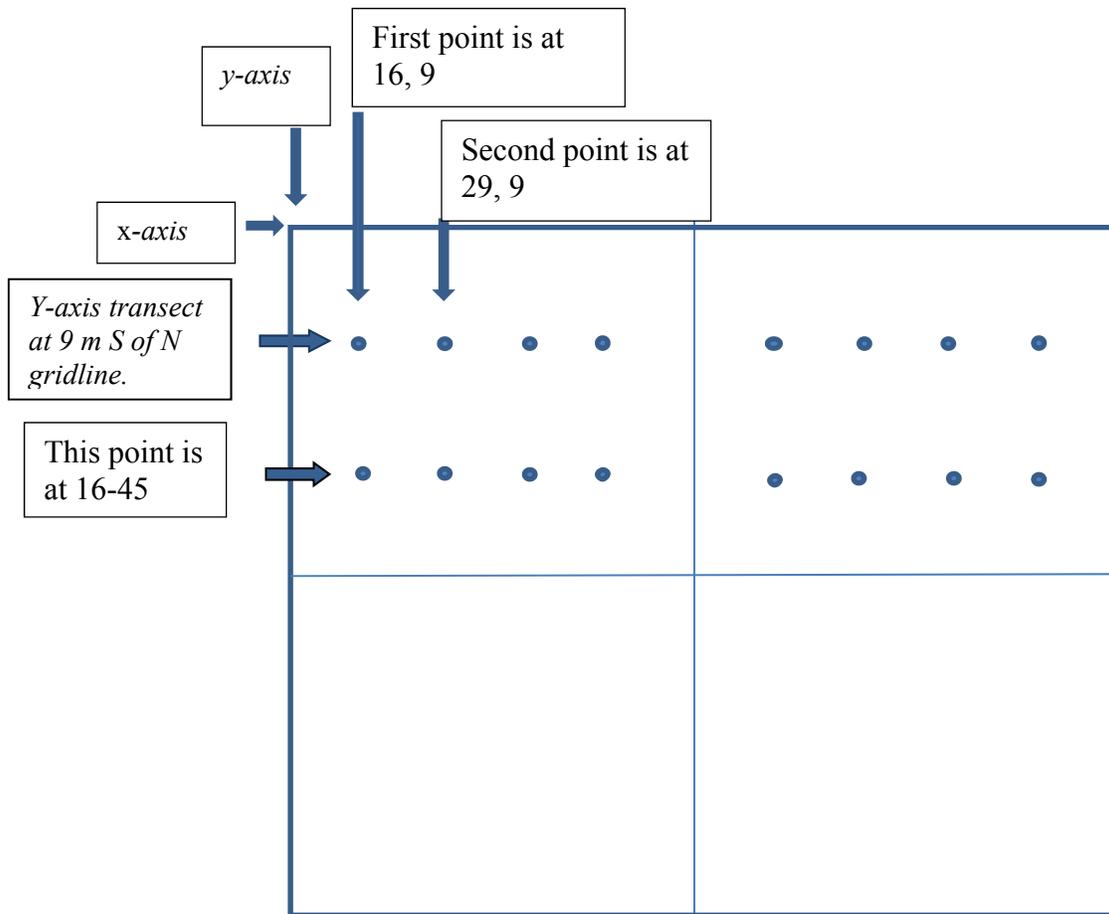


Figure B-1. **Coyote Prairie North grid-based monitoring strategy.** Four example one-acre grid squares are shown (points shown only in two). Dots represent sampled points, based on sample size needs and random start number. In each grid square 8 sample points were collected in 2018 (4 on each of two transects).

9. The data is summarized and reported using the following definitions:

<p>Native Cover: <i>the sum of all individual native vascular plant species cover values (individual cover values are the sum of all 'hits' for a species divided by the total pin drops); an absolute value that can exceed 100%</i></p>
<p>Nonnative Cover: <i>the sum of all individual nonnative vascular plant species cover values; an absolute value that can exceed 100%</i></p>
<p>Invasive Nonnative Cover: <i>computed the same as Nonnative Cover, but with only those species identified as invasive according to the definition accepted by the Oregon Department of State Lands and included in the Mitigation Bank Instrument.</i></p>

Total Plant Cover: *the sum of all vascular plants species cover values; an absolute value that can exceed 100%;*

Total Native and Nonnative Plant Cover (a relative cover value): *the number of pin drops out of the total pin drops that hit a vascular plant in one of those guilds (native, nonnative). For example, the hit is recorded as 'native' if at least one native species is hit with that pin drop and does not change if the pin drop hits more than 1 native species. Total native and nonnative cover could each equal 100%.*

Bare ground: *the sum of all pin drops that do not hit a plant, divided by the total pin drops; combines scores for bare ground, litter, and moss, where no vascular plant cover occurs.*

Appendix C. Species List

This list include species recorded in all enhancement phases at Coyote Prairie, including Phase 1 and 2 completed under the *West Eugene Wetland Mitigation Bank*, the East Phase, and the West Phase, being completed under the *Coyote Prairie Wetland Mitigation Bank*. Under Origin, N refers to Native and I to introduced (non-native).

		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem- nant		
Scientific Name	Common Name	Origin					
<i>Achillea millefolium</i>	Yarrow	N	X	X	X	X	X
<i>Acmispon americanus</i> (syn. <i>Lotus unifoliolatus</i>)	Spanish clover	N	X	X	X	X	X
<i>Agrostis exarata</i>	spike bentgrass	N	X	X	X	X	X
<i>Agrostis stolonifera/capillaris</i>	fiorin (bentgrass)	I					
<i>Aira elegans</i> (syn <i>A. caryophyllea</i>)	silver hairgrass	I		X			
<i>Alisma lanceolatum</i>	narrowleaf waterplantain	I					X
<i>Alisma trivale</i>	northern waterplantain	N	X	X		X	X
<i>Allium amplexans</i>	Slim leaf onion	N	X	X	X	X	X
<i>Alopecurus geniculatus</i>	water foxtail	N	X	X		X	X
<i>Alopecurus pratensis</i>	meadow foxtail	I	X		X	X	X
<i>Amelanchier alnifolia</i> var. <i>semiintegrifolia</i>	western serviceberry	N			X		
<i>Anagallis arvensis</i>	scarlet pimpernel	I	X	X		X	X
<i>Anaphalis margaritacea</i>	pearly everlasting	N					X
<i>Anthemis cotula</i>	mayweed chamomile	I					
<i>Anthoxanthum odoratum</i>	sweet vernalgrass	I			X		
<i>Anthriscus caucalis</i>	bur chervil	I			X		
<i>Asclepias speciosa</i>	showy milkweed	N					
<i>Beckmannia syzigachne</i>	American sloughgrass	N	X	X	X	X	X
<i>Bellis perenne</i>	Lawn daisy	I					
<i>Bidens frondosa</i>	leafy beggars-tick	N				X	X
<i>Bidens sp.</i>							
<i>Briza minor</i>	little quaking-grass	I			X	X	

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		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Brodiaea coronaria</i>	harvest brodiaea	N					
<i>Brodiaea elegans</i>	harvest brodiaea	N		X	X	X	
<i>Bromus carinatus</i>	California brome	N				X	
<i>Bromus hordeaceus</i>	soft brome	I		X	X	X	X
<i>Bromus sp.</i>	Brome sp (no flr)	-					X
<i>Calandrinia ciliata</i>	red maids	N					
<i>Camassia leichtlinii</i> ssp. <i>suksdorfii</i>	tall camas	N		X	X	X	X
<i>Camassia quamash</i> ssp. <i>maxima</i>	common camas	N		X	X	X	X
<i>Cardamine hirsuta</i>	hairy bittercress	I		X			X
<i>Cardamine penduliflora</i>	Willamette V. bittercress	N					
<i>Carex densa</i>	dense sedge	N	X	X	X	X	X
<i>Carex feta</i>	green-sheath sedge	N	X			X	X
<i>Carex leporina</i>	oval broom sedge	N	X		X	X	X
<i>Carex obnupta</i>	slough sedge	N	X				X
<i>Carex stipata</i> var. <i>stipata</i>	awl-fruit sedge	N				X	
<i>Carex tumulicola</i>	foothill sedge	N			X		
<i>Carex unilateralis</i>	one-sided sedge	N	X	X	X	X	X
<i>Carex vesicaria</i>	inflated sedge	N					
<i>Castilleja tenuis</i>	hairy owl-clover	N	X	X	X	X	X
<i>Centaureum erythraeae</i>	common centaury	I	X	X	X	X	
<i>Centunculus minimus</i>	chaffweed	N	X				
<i>Cerastium glomeratum</i>	sticky chickweed	I	X	X	X	X	X
<i>Chamerion angustifolium</i> var. <i>canescens</i>	perennial fireweed	N		X		X	X
<i>Cicendia quadrangularis</i>	Timwort	N					
<i>Cirsium arvense</i>	Canada thistle	I			X		X
<i>Cirsium vulgare</i>	bull thistle	I		X	X		X
<i>Clarkia amoena</i> ssp. <i>lindleyi</i>	farewell-to-spring	N	X	X		X	
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	winecup clarkia	N		X	X	X	X
<i>Collomia grandiflora</i>	grand collomia	N		X		X	
<i>Convolvulus arvensis</i>	bindweed	I					
<i>Conyza canadensis</i>	Canadian horseweed	I					

Coyote Prairie North Mitigation Bank Report

		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Crassula aquatica</i>	water pygmy weed	N	X				
<i>Crataegus monogyna</i>	English hawthorn	I					X
<i>Crataegus suksdorfii</i>	black hawthorn	N			X	X	
<i>Crataegus suksdorfii X monogyna</i>	hybrid hawthorn	I					X
<i>Crepis capillaries</i>	smooth hawksbeard	I		X			
<i>Crepis setosa</i>	bristly hawksbeard	I					X
<i>Cynosurus echinatus</i>	hedgehog dogtail	I	X				
<i>Cyperus eragrostis</i>	tall flatsedge	I			X		
<i>Danthonia californica</i>	California oatgrass	N		X		X	
<i>Daucus carota</i>	Queen Anne's lace	I		X	X	X	X
<i>Deschampsia cespitosa</i>	tufted hairgrass	N	X	X	X	X	X
<i>Deschampsia danthonioides</i>	annual hairgrass	N					
<i>Dianthus armeria</i>	Deptford pink	I		X	X		
<i>Dichanthelium acuminatum var. fasciculatum</i>	western witchgrass	N		X	X		
<i>Dichelostemma congestum</i>	ookow	N		X			
<i>Dipsacus fullonum</i>	teasel	I		X	X	X	X
<i>Downingia elegans</i>	showy downingia	N		X		X	X
<i>Downingia yina</i>	Willamette downingia	N	X	X	X	X	X
<i>Echinochloa crus-galli</i>	large barnyard-grass	I		X		X	X
<i>Eleocharis acicularis</i>	needle spike-rush	N	X			X	X
<i>Eleocharis obtusa</i>	common spike-rush	N	X	X		X	X
<i>Eleocharis palustris</i>	common spikerush	N	X	X		X	X
<i>Elymus glaucus ssp.ssp. glaucus</i>	western ryegrass	N					
<i>Epilobium brachycarpum</i>	autumn willowherb	N	X	X	X	X	X
<i>Epilobium campestre</i>	smooth willowherb	N					
<i>Epilobium ciliatum</i>	hairy willowherb	N	X	X	X	X	X
<i>Epilobium densiflorum</i>	dense spike-primrose	N		X	X	X	X

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		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Equisetum sp.</i>	horsetail	N					
<i>Eriophyllum lanatum</i> var. <i>lanatum</i>	wooly sunflower	N	X	X	X	X	X
<i>Eryngium petiolatum</i>	coyote thistle	N		X		X	X
<i>Euchiton sphaericus</i>	Star cudweed	I					X
<i>Festuca roemerii</i>	Roemer's fescue	N					
<i>Fragaria virginiana</i> ssp.ssp. <i>platypetala</i>	mountain strawberry	N	X	X			
<i>Fraxinus latifolia</i>	Oregon ash	N		X	X		X
<i>Galium aparine</i>	catchweed	N		X			
<i>Galium divaricatum</i>	wall bedstraw	I	X	X		X	
<i>Galium sp.</i>	bedstraw sp.	N/I			X		
<i>Galium trifidum</i>	small bedstraw	N	X	X		X	X
<i>Galium triflorum</i>	fragrant bedstraw	N					
<i>Gentiana sceptrum</i>	king's gentian	N					
<i>Geranium dissectum</i>	cut-leaved geranium	I	X	X	X		X
<i>Geranium lucidum</i>	shining geranium	I		X			X
<i>Geum macrophyllum</i>	large-leaf avens	N				X	
<i>Gilia capitata</i> ssp. <i>capitata</i>	bluehead gilia	N		X			
<i>Glyceria occidentalis</i>	western mannagrass	N					X
<i>Glyceria declinata</i>	Waxy mannagrass	I					X
<i>Gnaphalium palustre</i>	lowland cudweed	N	X	X		X	X
<i>Gnaphalium purpureum</i>	purple cudweed	N	X			X	
<i>Gnaphalium stramineum</i>	cotton batting plant	N	X				
<i>Gnaphalium uliginosum</i>	marsh cudweed	I	X				
<i>Gratiola ebracteata</i>	bractless hedge-hyssop	N	X	X		X	X
<i>Grindelia integrifolia</i> × <i>Grindelia nana</i> var.var. <i>nana</i>	Willamette V. gumweed	N	X	X	X	X	X
<i>Heracleum maximum</i>	cow parsnip	N		X			
<i>Holcus lanatus</i>	velvet grass	I			X	X	X
<i>Hordeum brachyantherum</i>	meadow barley	N		X		X	X
<i>Hordeum marinum</i>	Mediterranean barley	I					
<i>Hypericum perforatum</i>	St. John's-wort	I		X	X	X	X

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		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Hypochaeris radicata</i>	false dandelion	I	X	X	X	X	X
<i>Isoetes sp.</i>	quillwort	N	X				
<i>Juncus acuminatus</i>	tapered rush	N	X				
<i>Juncus articulatus</i>	jointed rush	N			X		
<i>Juncus bolanderi</i>	Bolander's rush	N	X	X		X	X
<i>Juncus bufonius</i>	toad rush	N	X	X	X	X	X
<i>Juncus effusus var. var. effuses</i>	common rush	I				X	
<i>Juncus effusus var. var. pacificus</i>	soft rush	N	X			X	X
<i>Juncus ensifolius</i>	Swordleaf rush	N	X			X	X
<i>Juncus marginatus</i>	grass-leaf rush	I	X				X
<i>Juncus nevadensis</i>	Nevada rush	N			X	X	X
<i>Juncus occidentalis</i>	slender rush	N	X	X	X	X	X
<i>Juncus oxymeris</i>	pointed rush	N	X			X	X
<i>Juncus patens</i>	Spreading rush	N	X		X	X	X
<i>Kickxia elatine</i>	cancerwort	I					
<i>Lactuca saligna</i>	willow lettuce	I		X			
<i>Lactuca serriola</i>	prickly lettuce	I		X	X	X	X
<i>Lasthenia glaberrima</i>	smooth lasthenia	N	X	X		X	X
<i>Lathyrus aphaca</i>	yellow vetch	I		X			
<i>Lathyrus hirsutus</i>	rough pea	I					
<i>Lathyrus sphaericus</i>	grass pea	I					
<i>Leontodon taraxacoides</i>	hairy hawkbit	I	X	X	X	X	X
<i>Leucanthemum vulgare</i>	oxeye daisy	I	X		X		X
<i>Linum bienne</i>	pale flax	I	X		X		
<i>Lolium multiflorum</i>	Italian ryegrass	I		X	X	X	X
<i>Lomatium bradshawii</i>	Bradshaw's desert parsley	N			X		
<i>Lomatium nudicaule</i>	barestem desert-parsley	N		X	X	X	X
<i>Lotus corniculatus</i>	bird'sfoot trefoil	I	X				X
<i>Lotus formosissimus</i>	seaside lotus	N	X	X		X	
<i>Lotus micranthus</i>	small-flowered deervetch	N					
<i>Ludwigia palustris</i>	marsh speedbox					X	X
<i>Lupinus affinis</i>	fleshy lupine	N					
<i>Lupinus polycarpus</i>	smallflower lupine	N		X			X

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		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Lupinus oreganus</i>	Kincaid's lupine	N					
<i>Lupinus polyphyllus</i> var. var. <i>polyphyllus</i>	bigleaf lupine	N		X		X	X
<i>Lupinus rivularis</i>	stream lupine	N	X	X		X	
<i>Luzula comosa</i> var. <i>comosa</i>	field woodrush	N	X	X	X		
<i>Lythrum hyssopifolium</i>	hyssop loosestrife	I	X	X	X	X	X
<i>Lythrum portula</i>	water-purslane	I	X	X		X	X
<i>Madia elegans</i>	showy tarweed	N	X	X	X	X	X
<i>Madia glomerata</i>	cluster tarweed	N	X	X	X	X	X
<i>Madia sativa</i>	coast tarweed	N	X	X	X	X	X
<i>Malus fusca</i>	western crab-apple	N					
<i>Matricaria discoidea</i>	pineapple weed	N					
<i>Melilotus alba</i>	white sweetclover	I					
<i>Mentha pulegium</i>	pennyroyal	I	X	X	X	X	X
<i>Micranthes integrifolia</i>	swamp saxifrage	N					
<i>Micranthes oregana</i>	bog saxifrage	N	X	X		X	
<i>Microseris laciniata</i> ssp. <i>laciniata</i>	cut-leaved microseris	N		X	X	X	X
<i>Microsteris gracilis</i>	pink microsteris	N	X	X		X	X
<i>Mimulus guttatus</i> var. <i>depauperatus</i>	depauperate monkeyflower	N		X	X	X	X
<i>Moenchia erecta</i> ssp. <i>erecta</i>	moenchia	I			X		
<i>Montia linearis</i>	narrow-leaved montia	N	X	X			X
<i>Myosotis discolor</i>	yellow & blue forget me not	I	X	X	X		
<i>Myosotis laxa</i>	small-flowered forget me not	N	X	X		X	X
<i>Navarretia intertextata</i> ssp. <i>intertextata</i>	needle-leaved navarretia	N	X	X	X	X	X
<i>Navarretia squarrosa</i>	skunkweed	N		X	X		X
<i>Navarretia willamettensis</i>	Willamette navarretia	N				X	X
<i>Nemophila menziesii</i>	baby blue eyes	N		X			
<i>Orobanche californica</i> ssp. <i>californica</i>	California broomrape	N					X
<i>Orthocarpus bracteosus</i>	rosy owl-clover	N		X		X	X

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		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Panicum capillare</i> ssp. <i>capillare</i>	common witchgrass	N	X			X	
<i>Parentucellia viscosa</i>	yellow parentucellia	I	X	X	X	X	X
<i>Perideridia montana</i>	Gairdner's yampah	N		X			X
<i>Perideridia oregana</i>	Oregon yampah	N			X	X	
<i>Persicaria hydropiperoides</i>	marshpepper smartweed	N	X				X
<i>Persicaria maculosa</i>	heartweed	I	X	X			X
<i>Persicaria lapathifolia</i>	Curltop ladythumb	N					
<i>Phalaris aquatica</i>	Harding grass	I					
<i>Phalaris arundinacea</i>	reed canarygrass	I					
<i>Phleum pratense</i>	Timothy	I					
<i>Plagiobothrys figuratus</i> var. <i>figuratus</i>	fragrant popcorn-flower	N	X	X	X	X	X
<i>Plagiobothrys scouleri</i>	Scouler's popcorn-flower	N	X	X		X	X
<i>Plantago lanceolata</i>	English plantain	I			X		X
<i>Plectritis congesta</i>	rosy plectritis	N	X	X	X	X	
<i>Poa annua</i>	annual bluegrass	I		X			X
<i>Poa compressa</i>	Canada bluegrass	I					
<i>Poa pratensis</i>	Kentucky blugrass	I				X	
<i>Poa sp.</i>	bluegrass sp	I		X			
<i>Polygonum aviculare</i> ssp. <i>aviculare</i>	doorweed	I					
<i>Polygonum douglasii</i>	douglas knotweed	N					
<i>Populus trichocarpa</i>	black cottonwood	N	X			X	X
<i>Portulaca oleracea</i>	little hogweed	I				X	
<i>Potentilla gracilis</i> var. <i>gracilis</i>	slender cinquefoil	N	X	X	X	X	X
<i>Prunella vulgaris</i> var. <i>lanceolata</i>	self-heal	N	X	X	X	X	X
<i>Prunus sp.</i>	plum	I					X
<i>Psilocarphus spp.</i>	wooly heads	N					
<i>Pyrrocoma racemosa</i> var. <i>racemosa</i>	racemed goldenweed	N				X	
<i>Pyrus communis</i>	pear	I			X		
<i>Pyrus malus</i>	apple	I					

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		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Ranunculus alismifolius</i>	water-plantain buttercup	N				X	X
<i>Ranunculus aquatilis</i>	white water buttercup	N					
<i>Ranunculus flammula</i>	creeping buttercup	N					
<i>Ranunculus occidentalis</i>	western buttercup	N	X	X	X	X	
<i>Ranunculus orthorhynchus</i>	straight beaked buttercup	N		X	X	X	X
<i>Ranunculus sceleratus</i>	celery-leaf buttercup	N					
<i>Rhamnus purshiana</i>	casacara	N					
<i>Rorippa curvisiliqua</i>	western yellowcress	N	X	X		X	X
<i>Rorippa palustris</i>							
<i>Rosa multiflora</i>	many flowered rose	I					
<i>Rosa nutkana</i>	Nootka rose	N			X	X	
<i>Rosa pisocarpa</i>	peafruit rose	I					
<i>Rosa sp.</i>	rose sp.	N/I	X				
<i>Rubus bifrons</i>	Himalayan blackberry	I	X	X	X	X	X
<i>Rubus laciniatus</i>	evergreen blackberry	I					
<i>Rumex acetocella</i>	sheep sorrel	I	X				X
<i>Rumex conglomeratus</i>	clustered dock	I	X				
<i>Rumex crispus</i>	curly dock	I	X	X	X	X	X
<i>Rumex salicifolius</i> var. <i>salicifolius</i>	willow dock	N	X	X		X	X
<i>Saxifraga oregana</i> (see <i>Micranthes oregana</i>)							
<i>Salix sp.</i>	willow	N	X			X	X
<i>Schedonorus arundinaceus</i>	tall fescue	I		X	X		
<i>Schoenoplectus tabernaemontani</i>	softstem bulrush	N					
<i>Senecio jacobea</i>	tansy ragwort	I		X	X	X	X
<i>Senecio sylvaticus</i>	wood groundsel	I		X			
<i>Senecio vulgaris</i>	old-man-in-the-spring	I		X			X
<i>Sericocarpus rigidus</i>	rigid white topped aster	N					

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		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Sherardia arvensis</i>	blue field-madder	I					
<i>Sidalcea cusickii</i>	Cusick's checker-mallow	N		X		X	X
<i>Sidalcea malviflora</i> ssp. <i>virgata</i>	dwarf checker-mallow	N	X				
<i>Sisyrinchium bellum</i>	Western blue-eyed grass	N					
<i>Sisyrinchium hitchcockii</i>	Hitchcock's blue-eyed grass	N				X	X
<i>Sisyrinchium idahoense</i>	Idaho blue-eyed grass	N	X	X	X	X	X
<i>Solanum dulcamara</i>	bitter nightshade	I		X			
<i>Solanum nigrum</i>	black nightshade	I					
<i>Solidago elongata</i> (syn. <i>Solidago canadensis</i> var. <i>salebrosa</i>)	West coast goldenrod	N	X				X
<i>Sonchus asper</i>	prickly sow-thistle	I		X	X	X	
<i>Sparganium emersum</i>	simplestem bur-reed	N					
<i>Spergula arvensis</i>	stickwort	I					
<i>Spergula rubra</i>	red sandspurry	I		X			
<i>Spiraea douglasii</i>	Douglas spirea	N	X			X	
<i>Spiranthes romanzoffiana</i>	hooded ladies tresses	N					
<i>Stellaria media</i>	chickweed	I					
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	snowberry	N					
<i>Symphyotrichum hallii</i>	Hall's aster	N		X	X	X	X
<i>Tanacetum vulgare</i>	common tansy	I					
<i>Taraxicum officinale</i>	dandelion	I		X			
<i>Toxicodendron diversiloba</i>	poison oak	N					
<i>Toxicoscordion venenosum</i>	meadow death camas	N		X	X	X	
<i>Trifolium arvense</i>	rabbitfoot clover	I					
<i>Trifolium dubium</i>	least hop clover	I			X		X
<i>Trifolium pratense</i>	red clover	I					
<i>Trifolium repens</i>	white clover	I					
<i>Trifolium subterraneum</i>	subterranean clover	I					
<i>Trifolium vesiculosum</i>	arrowleaf clover	I					

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		Site	Coyote Prairie				
		Phase	1	2	2	N East	N West
		Section			Rem-nant		
<i>Triphysaria versicolor</i> ssp. <i>versicolor</i>	johnnytuck	N					
<i>Triteleia hyacinthina</i>	hyacinth brodiaea	N		X	X	X	
<i>Typha latifolia</i>	cat-tail	N		X		X	X
<i>Ventanata dubia</i>	Ventanata grass	I		X			X
<i>Verbascum blattaria</i>	moth mullein	I					
<i>Verbascum thapsus</i>	common mullein	I					
<i>Veronica americana</i>	American speedwell	N					
<i>Veronica peregrine</i> var. <i>xalapensis</i>	purslane speedwell	N	X	X	X	X	X
<i>Veronica scutellata</i>	marsh speedwell	N	X			X	X
<i>Vicia cracca</i>	bird vetch	I			X		
<i>Vicia hirsuta</i>	hairy vetch	I					X
<i>Vicia sativa</i>	common vetch	I			X		X
<i>Vicia tetrasperma</i>	slender vetch	I	X	X	X	X	X
<i>Vulpia bromoides</i>	barren fescue	I	X	X	X	X	
<i>Vulpia myuros</i>	rat-tail fescue	I	X	X		X	X
<i>Wyethia angustifolia</i>	narrow-leaf mule's ears	N	X	X	X	X	X
<i>Xanthium strumarium</i>	Rough cocklebur	N					X
<i>Zeltnera muehlenbergii</i>	monterey centaury	N					