

Coyote Prairie North Mitigation Bank

2012 Report



April 2013

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 Wetland Mitigation Bank 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 began in 2008 in the East Phase of the bank. This phase is further divided into two units known as the Walahan¹ Unit (Unit 1) and the Ha-Yaba² Unit (Unit 2), both of which have different performance criteria identified in the Mitigation Bank Instrument. This annual report is required as a condition of the Mitigation Bank Instrument and includes management actions and monitoring results from 2012.

This report is organized to provide a management and monitoring summary, management and monitoring detail, and an assessment of progress toward meeting performance criteria. Appendix A describes monitoring methodologies in detail. Results are also being submitted electronically.

¹ Walahan is a Kalapuya word meaning “down below a hill or mountain” (E. Stutzman, personal communication).

² Ha-Yaba is a Kalapuya term meaning “camas” or “camas digging area” (E. Stutzman, personal communication).

Chapter 2. Credit and Financial Summary

All credit sales for the Coyote Prairie North bank are tracked in a ledger separate from the ledger of credit sales for the City's West Eugene Wetlands Mitigation Bank. However capital costs and operations and maintenance costs are managed in combination with the West Eugene Wetlands Mitigation Bank, since lands from both banks are adjacent to one another and are managed to increase connectivity between the enhancement phases. A financial summary for the West Eugene Wetlands Mitigation Bank is available in a separate report.

The first release of credits to the bank occurred in 2011 with 5.73 and 6.08 credits generated from both the East Phase and the West Phase upon the approval of the bank instrument. No credits were sold in 2011, which carried the initial balance of 11.81 credits into 2012. A total of 9.55 credits were released in 2012 for work completed in 2011 to achieve performance standards in the East Phase, bringing the total number of credits generated to 21.36.

Three separate transactions were completed for a cumulative total of 0.71 mitigation credit sold, leaving a balance of 20.65 credits in the ledger.

Credits released for purchase and credits sold in 2012 are reported in Table 2.1. The anticipated credit release schedule for the active phase of the bank (East Phase) is provided in Table 2.2.

| Table 2.1 Credit Balance, 2012 | | | |
|-----------------------------------------------|----------------------|-------------------------------|----------------|
| | Purchase Date | Credits in Transaction | Balance |
| Credit balance on January 1, 2012 | | | 11.81 |
| Credits certified during year | | | |
| East Phase | | 9.55 | 21.36 |
| West Phase | | | |
| Credits sold in 2012 | | | |
| City of Springfield | | (0.49) | 20.87 |
| Sierra Development, LLC | | (0.12) | 20.75 |
| Department of Homeland Security (FEMA) | | (0.10) | 20.65 |
| | | | |
| Credit balance as of December 31, 2011 | | | 20.65 |

Table 2.2 Credit Release Schedule for East Phase³ of the Coyote Prairie North Wetland Mitigation Bank.

| Release | Percentage (cumulative) | Performance Standards to be Met | Credits for East Phase (Cumulative) | Year Expected (Received) |
|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------|
| One | 15% (15%) | Approval of MBI | 5.73 (5.73) | 2011 |
| Two | 5% (20%) | Initial grading and seeding/planting and reporting of as-builts. | 1.91 (7.64) | 2011 (2012) |
| Three | Up to 10% (30%) | 1 st growing season (2010) performance standards | 3.82 (11.46) | 2011 (2012) |
| Four | Up to 10 % (40%) | 2 nd growing season (2011) performance standards | 3.82 (15.28) | 2012 (2012) |
| Five | Up to 10% (50%) | 3 rd growing season (2012) performance standards | 3.82 (19.10) | 2013 |
| Six | Up to 10% (60%) | 4 th growing season (2013) performance standards | 3.82 (22.92) | 2014 |
| Seven | 15% or up to a cumulative total of 75% | 5 th growing season (2014) performance standards | 5.73 (28.65) | 2015 |
| Eight | 25% (100%) | Approval of long term management plan and stewardship agreement by co-chairs; plan is executed/signed by steward | 9.54 (38.18) | On or before 2015 |

³ The credit release schedule for the West Phase is described on Table 12 (page 49) of the Coyote Prairie North Mitigation Bank Instrument. 6.08 credits (15%) were released in 2011 after approval of the MBI.

Chapter 3. Site Description, Management and Monitoring

Site Area: 240 Acres

Coyote Prairie North Mitigation Bank Area: 165 acres

Ownership: City of Eugene

Site Timeline:

Table 3.1 Coyote Prairie Unit site timeline.

| Section | Year of Construction | Enhancement Acres | Monitoring Period |
|------------|----------------------|-------------------|-------------------|
| East Phase | 2009 | 84 | 2010 - 2014 |
| West Phase | TBD | 81 | N/A |

Location

Coyote Prairie North is located in the Coyote Creek drainage approximately 1.5 miles west of Eugene. The site 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 West Eugene Wetlands Mitigation Bank and the north region of the site comprises the Coyote Prairie North Mitigation Bank. The enhancement schedule at Coyote Prairie North Wetland Mitigation Bank will be 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) and the Walahan Unit (Unit 2).

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 Wetland 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.
- Enhance vegetation to provide highly diverse wetland communities that are resistant to invasion and resilient to disturbance 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).

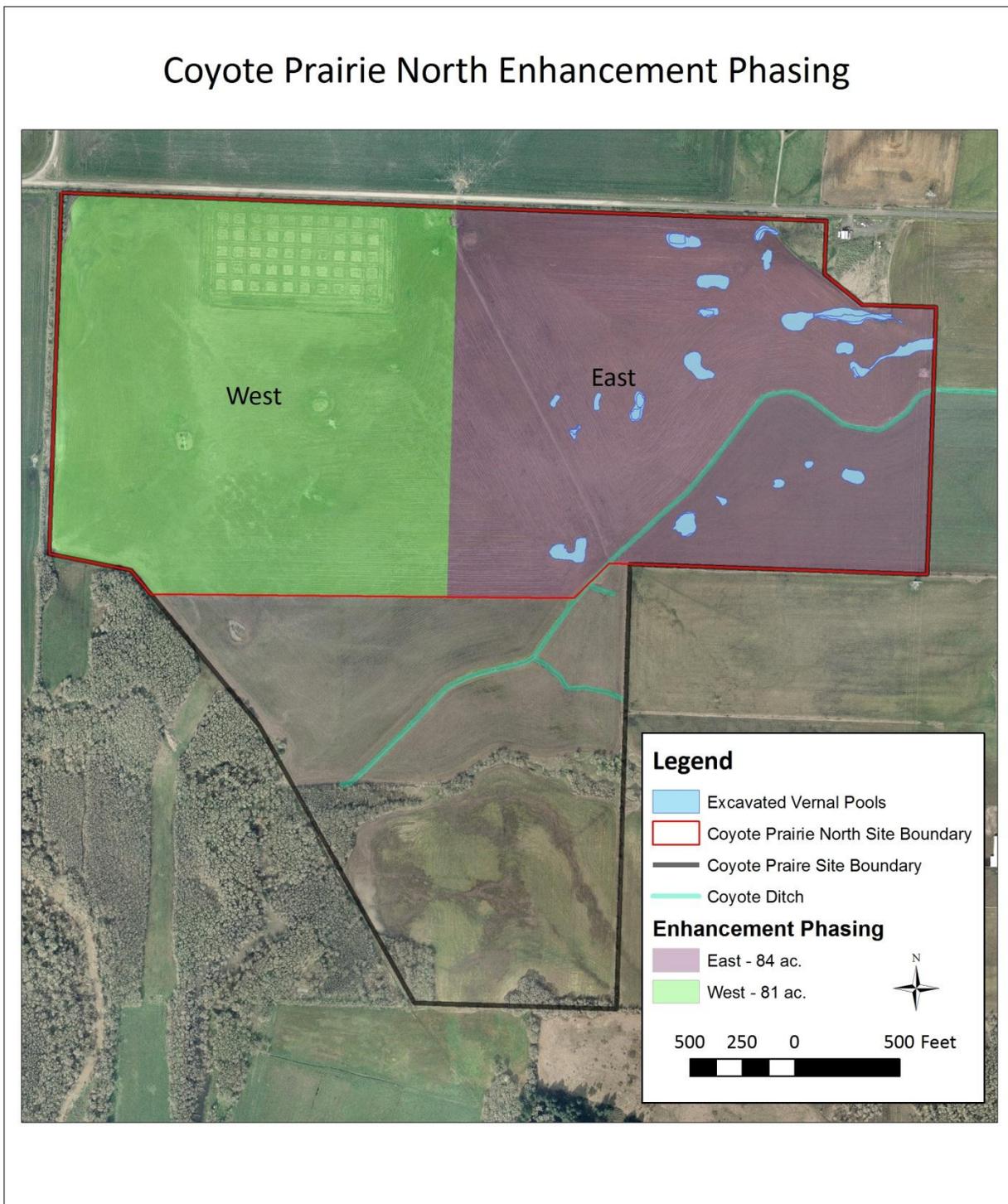


Figure 3.1. Coyote Prairie North Enhancement Phasing Map. The two enhancement phases at Coyote Prairie are labeled with their approximate acreages.

Management and Monitoring Summary 2012

The East Phase is the only phase currently under active enhancement and is the focus of this report. This phase was planted in fall 2009. The 2012 growing season monitoring represents the 3rd monitoring year for this phase. Monitoring results indicate that the East Phase has met all 3rd year performance standards and benchmarks for hydrology and vegetation.

Intensive control of nonnative invasive species continued in the East Phase as the plant community developed. The City coordinated manual control and City staff and contract crews applied spot or broadcast applications of herbicide as needed to control patches of nonnative grasses and forbs. In summer 2012, additional logs were added to the Ha-Yaba unit of the site as amphibian refugia. Contract planting staff was employed to install 10 shrub “islands” in the prairie in February 2012 and an additional willow patch has established on its own. Vernal pool stability and site-wide drainage and erosion issues were assessed and erosion control actions and replacement of a failed culvert were undertaken along the site’s east boundary. City staff completed additional plantings of forbs that had not yet establish from the initial seeding.

Management

1. Staff scouted and mapped locations of nonnative invasive plant species and implemented ongoing manual and chemical control throughout 2012. The nonnative annual *Lythrum hyssopifolia* is diminishing due to control efforts and increasing native perennial vegetation. Control of this species was prioritized where it occurred in the upper reaches of the site and in vernal pools where native annual species were establishing well. *Polygonum persicaria* and *Echinochloa crus-gali* occurred in patches in the lower regions of the site, but were largely restricted to narrow ranges with suitable hydrology. Control of these species continued, as well as of perennials such as *Mentha pulegium*, *Hypochaeris radicata*, *Rumex crispus*, and *Daucus carota*. The handweeding crew pulled *Echinochloa crus-gali* where it occurred adjacent to seasonal flows and in some vernal pools.
2. In January 2012 wetland staff noted that a culvert that delivers water into Coyote ditch from the adjacent property on the east was functioning poorly – the culvert’s collapse was causing water to back up and reroute overland, resulting in a substantial head cut erosional channel extending east from Coyote ditch. In summer 2012, the City replaced the collapsed culvert and conducted initial stabilization of the erosion channel to reduce further head cutting until planned hydrologic work to convert the ditch to a shallow swale occurs.
3. In 2012 the native plant community was enhanced without the need for additional widespread seeding, by continued removal and control of invasive nonnative species and repair of erosion features. Seed mixes were distributed over about 6 of the 84 acres in the following situations: (1) competitive native species were used to encourage

natives where nonnative invasive species were removed (Tables 3.2 and 3.3), (2) *Carex densa* and *C. unilateralis* were seeded into areas where drainage was concentrated to reduce the potential for erosion and, (3) species that we wanted to track more closely, such as *Pyrracoma racemosa* and *Dichanthelium acuminatum*, were seeded into specific plots for tracking.

4. In February 2012 the City installed 10 small (approximately 0.15 acre each) shrub 'islands' in the prairie to increase habitat variability for birds and other wildlife. The 5 species included in the planting are shown in Table 3.4. In addition, in November 2012 staff planted 1600 plants of 4 species across both units to increase diversity of those species which are slow to establish from seed (Table 3.5).
5. In September we placed 8 cottonwood logs in the Ha-Yaba Unit to provide sheltering locations for amphibians and reptiles.
6. In September we mowed about 10 acres of the restored prairie in a meandering pattern to reduce graminoid standing thatch and provide greater sunlight to low-growing forbs.

Table 3.2 Coyote Prairie East Phase Vernal Pool Seed Additions

Seed was distributed in small patches in 5 vernal pools or vernal pool regions where nonnative invasive species, primarily *Echinochloa crus-galli*, were removed. The table includes the species seeded and the number of grams per acre used in the mixes.

| | Species | Vernal Pool 3 | Vernal Pool 7 | Vernal Pool 12 | From Vernal Pool 12 to Phase 2 | Vernal Pool 13 |
|----|----------------------------------------------------------|---------------|---------------|----------------|--------------------------------|----------------|
| | Acres | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 1 | <i>Beckmannia syzigachne</i> | | | | 1500 | 1200 |
| 2 | <i>Carex unilateralis</i> | | | | 400 | |
| 3 | <i>Dichanthelium acuminatum</i> var. <i>fasciculatum</i> | | 750 | 360 | 1200 | |
| 4 | <i>Eleocharis obtusa</i> | | 400 | 150 | | |
| 5 | <i>Eleocharis palustris</i> | | | | 790 | |
| 6 | <i>Eryngium petiolatum</i> | 600 | 400 | | | |
| 7 | <i>Juncus effuses</i> var. <i>pacificus</i> (older seed) | | | | | 300 |
| 8 | <i>Juncus nevadensis</i> var. <i>nevadensis</i> | | | | 50 | 80 |
| 9 | <i>Lathenia glaberrima</i> | 400 | | | | |
| 10 | <i>Grindelia integrifolia</i> | | | | | |
| 11 | <i>Plagiobothrys figuratus</i> | | | 300 | | |

| Table 3.2 Coyote Prairie East Phase Vernal Pool Seed Additions | | | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------------|----------------------|-----------------------|---------------------------------------|-----------------------|
| Seed was distributed in small patches in 5 vernal pools or vernal pool regions where nonnative invasive species, primarily <i>Echinochloa crus-galli</i> , were removed. The table includes the species seeded and the number of grams per acre used in the mixes. | | | | | | |
| | Species | Vernal Pool 3 | Vernal Pool 7 | Vernal Pool 12 | From Vernal Pool 12 to Phase 2 | Vernal Pool 13 |
| 12 | <i>Rumex salicifolius</i> | | | | 4650 | |
| 13 | <i>Rorippa curvisiliqua</i> | | | 380 | | |
| 14 | <i>Veronica peregrine var. xalapensis</i> | 250 | | | | |

| Table 3.3 Coyote Prairie East Phase Wet Prairie Seed Additions | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------------|----------------------------------|-----------------------|
| Seed was distributed in small patches throughout the East Phase where nonnative invasive species were removed. The table includes the species seeded and the number of grams per acre used in the mixes. | | | | |
| | Species | Ha-Yaba | Utility Pole Near Parking | Grasses Seeded |
| | Acres | 2 | 0.5 | 1 |
| 1 | <i>Achillea millefolium</i> | | 500 | |
| 2 | <i>Collomia grandiflora</i> | | 400 | |
| 3 | <i>Danthonia californica</i> | 340 | 1000 | 700 |
| 4 | <i>Dichanthelium acuminatum var. fasciculatum</i> | 400 | | 500 |
| 5 | <i>Elymus glaucus</i> | | 300 | 300 |
| 6 | <i>Grindelia integrifolia</i> | | 300 | |
| 7 | <i>Hordeum brachyantherum</i> | | 800 | |
| 8 | <i>Madia elegans</i> | | 50 | |
| 9 | <i>Potentilla gracilis var. gracilis</i> | | 200 | |
| 10 | <i>Prunella vulgaris var. lanceolata</i> | 307 | 460 | |
| 11 | <i>Rumex salicifolius var. salicifolius</i> | 1200 | 600 | |

Table 3.4 Shrub ‘islands,’ Coyote Prairie East Phase, Fall 2012. Shrub species planted in Coyote Prairie East Phase within ten 0.15 acre patches are listed with the approximate number of each species and container type.

| | Species | Plant Material Type | Total Number |
|---|------------------------------|-----------------------|--------------|
| 1 | <i>Spirea douglasii</i> | bare-root; 18 - 24" | 100 |
| 2 | <i>Spirea douglasii</i> | bare-root; 2 - 3 ft | 50 |
| 3 | <i>Salix scouleri</i> | cutting; 2 ft (.3/ft) | 100 |
| 4 | <i>Salix hookeriana</i> | cutting; 2 ft (.3/ft) | 100 |
| 5 | <i>Amelanchier alnifolia</i> | 6 - 12" | 50 |
| 6 | <i>Amelanchier alnifolia</i> | 2 - 3' | 50 |
| 7 | <i>Rosa nutkana</i> | 18-24" | 100 |
| 8 | <i>Rosa nutkana</i> | 2'/3' | 50 |

Table 3.5 Potted and bare-root material planted at Coyote Prairie East Phase, Fall 2012. Species of potted and bare-root starts planted in Coyote Prairie East Phase are listed with the approximate number of each species and container type.

| | Species | Plant Material Type | Total Number |
|---|------------------------------|----------------------------|--------------|
| 1 | <i>Danthonia californica</i> | 4" pots | 85 |
| 2 | <i>Saxifraga oregana</i> | Bare-root | 140 |
| 3 | <i>Symphiotrichum hallii</i> | Clumps of bare root plants | 700 |
| 4 | <i>Wyethia angustifolia</i> | Cone/Band pots | 694 |

Monitoring

Hydrology

East boundary swale assessment: The remaining hydrologic performance standards for the East Phase (Table 4.1) can be completed in either the third, fourth, or fifth monitoring year, due to the potential for below-normal rainfall in any single year. Due to low rainfall in the 2011-2012 rain year, we chose not to conduct the wetland ‘delineation lite’ for performance standard PSH1 in 2012. It will be conducted in 2013 or 2014. Therefore, the hydrologic assessments in February 2012 consisted of observations and photographs of surface water movement along the east boundary to confirm whether or not the dewatering of Cantrell Ditch and rerouting of flows across the East Phase was successful (map, Figure 3.2). A subset of the Feb 2012 photos are included below (Figures 3.3 – 3.7) to document water flowing through swales we constructed in 2009. The construction of the swales, documented in the as-built report, combined with hydrologic observations and photo documentation from February 2012, confirms achievement of hydrologic performance standards PSH2 and PSH5 (Table 4.1).

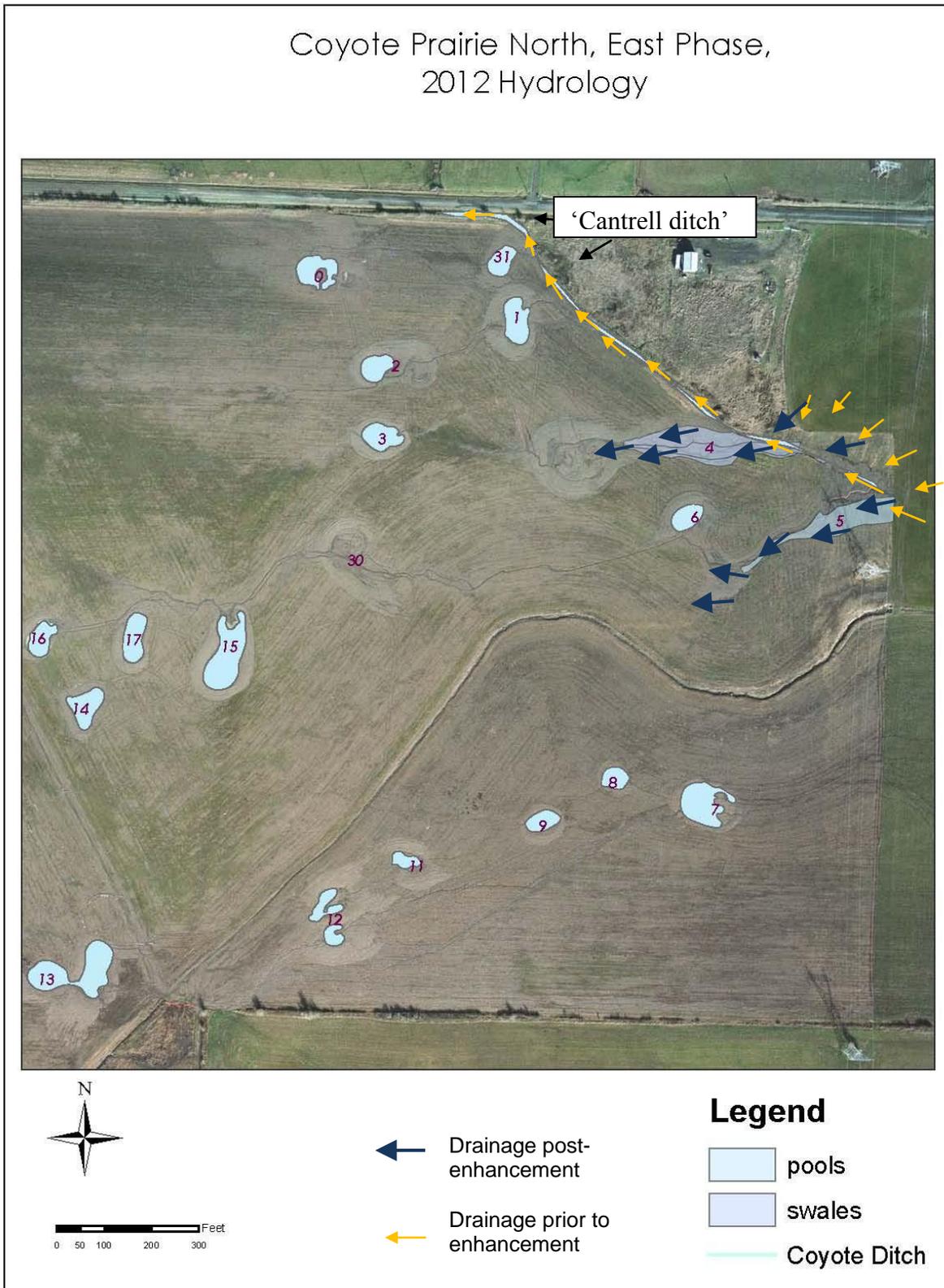


Figure 3.2. East Phase pre- and post-enhancement surface water flow on east boundary where constructed swales divert water to site’s center. Pools 30, 4, and 5 do not remain inundated in winter.



Figure 3.3 (*Before*) Surface water is captured by “Cantrell ditch” and redirected off site. Arrow above utility tower. *February 2007*



Figure 3.4 (*After*) Swale 4’s upper slopes now direct surface water to the center of the East Phase enhancement. Arrow above utility tower. *February 2012*



Figure 3.5 (*After*) Water spreads out broadly across the lower slope of swale 4 as it flows toward the center of the East Phase enhancement. *February 2012*



Figure 3.6. (After) Water from adjacent property that previously flowed NW down 'Cantrell ditch' (out of photo to left) is now diverted down swale 5 to the center of the East Phase. February 2012



Figure 3.7 (After) Broad region of surface water flow west down swale 5. February 2012

Vernal pools: In February 2012, the third rain year after construction, City staff used GPS to remap the size of the inundated area of all constructed vernal pools that consistently hold water in winter. On February 24 and April 26, we monitored pool inundation levels, the presence of amphibian larvae (April only), and noted development of vernal pool vegetation (April only). Results are shown in Table 3.6, below:

Table 3.6 Size and Depth of Constructed Vernal Pools in the East Phase, 2012.

| VP # | Unit (Walahan or Ha-Yaba) | Area (acres) Feb 2012 | Depth, Feb (feet) | Depth, April (feet) | Chorus frog larvae present |
|------|---------------------------|-----------------------|-------------------|---------------------------|-----------------------------|
| 0 | w | 0.10 | 0.3 | 0.3 | No |
| 1 | w | 0.10 | 0.3 | 0.3 | Yes |
| 2 | w | 0.07 | 0.4 | 0.5 | Yes (and salamander larvae) |
| 3 | w | 0.08 | 0.9 | 0.7 | Yes |
| 6 | w | 0.06 | 0.5 | 0.4 | Yes |
| 7 | h | 0.15 | 0.5 | 0.4 | Yes |
| 8 | h | 0.05 | 0.3 | 0.2 | No |
| 9 | h | 0.05 | 0.3 | 0.3 | Yes |
| 11 | h | 0.03 | 0.2 | 0.0 (saturated soil only) | No |
| 12 | h | 0.09 | 0.3 | 0.0 (saturated soil only) | No |
| 13 | w | 0.23 | 0.7 | 0.6 | Yes |
| 14 | w | 0.09 | 0.8 | 0.7 | Yes |
| 15 | w | 0.20 | 0.6 | 0.6 | Yes |
| 16 | w | 0.07 | 0.7 | 0.6 | Yes |
| 17 | w | 0.09 | 0.8 | 0.5 | Yes |
| 31 | w | 0.10 | 0.4 | 0.4 | Yes |
| | TOTAL Acres | 1.6 | | | |
| | TOTAL Acres Ha-Yaba Unit | 0.4 | | | |

The monitoring benchmark for the Ha-Yaba Unit (Table 4.3) indicates that the Unit should include at least 2 vernal pools, with a combined area of least 10,000 sq feet (0.23 acre), that are inundated to no more than 6 inches for at least two weeks continuously during December through March. At least one pool should be inundated into May. Our results indicate that this benchmark was met. Three pools in this Unit held water for 16 weeks and annual observations indicate that all hold water at least 2 weeks. When full, pools in the Ha-Yaba unit are between 0.2 and 0.5 feet (2 – 6 inches) deep and in three of them this is maintained for at least 8 weeks. Three pools typically hold water until at least the first of May.

Quantitative vegetation monitoring:

Site-wide quantitative vegetation monitoring for the third growing season after planting was conducted on June 25 and 29, 2012. Quantitative sampling involved measuring plant cover using the point-intercept method, where each point was an independent sample. In 2012, 343 sample points were collected systematically (with a random start) across the entire enhancement phase. Other than the sample size discussion, below, methods are described in detail in Appendix A. Results are presented in Table 3.7.

Sample Size: In 2011, the first year of quantitative monitoring for the East phase, we collected 679 points (samples). Collecting this large sample size in the first year of quantitative monitoring allowed us to compare how the results would change as the number of samples collected is reduced. We compared the full 679 points to a sample size half that large (340 points) and one-quarter that large (170 points). We did this by analyzing every other point or every 4th point of the full data set, while maintaining the entire phase as the sampling area, to replicate how sampling would occur in the field.

When we reduced the sample size to one-half (340 points), we found:

- A. 16 species (25%) disappear from the data set (aren't hit). 49 species are hit (of the full data set's 64 species).
- B. All the same species are recorded as having 5 percent or greater cover.
- C. One species among the top 10 with the highest cover values differs between the two data-sets.

When we reduced the sample size to one-fourth (170 points), we found:

- A. 19 species (30%) disappear (aren't hit) as compared to the full data set.
- B. One fewer species is recorded as having 5 percent or greater cover (*Bidens frondosa*).
- C. All species among the top 10 with the highest cover values are the same as under the full dataset.
- D. The absolute 80% confidence interval width for a cover value of 50% would not meet the DSL's performance standard (that is, the interval would exceed 10 units on either side of the mean value).

Based on these results we decided that a sample size of approximately half that collected in 2011 (340 points) would provide appropriate detail about the developing plant community and achieve the desired confidence levels for monitoring 2012 – 2014.

Plant cover in the East Phase continues to be high and primarily native. Total native plant cover (absolute) was 163% and nonnative plant cover (absolute; all nonnative species) was just under 10% (Table 3.7). Eight native species had cover greater than 5%. Three of these were graminoids (1 *Juncus*, 1 *Carex*, 1 grass) and 5 were forbs. *Juncus occidentalis* continues to be the dominant native species across the site, at 60% cover, similar to 2011.

Comparisons of the 2011 and 2012 monitoring data suggest that several of the early colonizing, low-growing, annual forbs that were not seeded by the City, such as *Juncus bufonius*, *Gnaphalium palustre*, and *Plagiobthrys scouleri* var. *scouleri*, are no longer present at 5% or greater cover (although they likely remain in the soil seedbank). At the same time, cover of perennials such as *Grindelia integrifolia*, *Lotus purshianus* (*L. unifoliolatus*), and *Carex densa* have increased. In 2012, twenty native species had cover greater than 1%, of which 14

were seeded and 6 were not (unseeded species were *Epilobium ciliatum*, *E. brachycarpum*, *Bidens frondosa*, *Alopecurus geniculatus*, *Juncus bufonius*, *Plagiobothrys scouleri* var. *scouleri*). Only 6.3% of the site did not support vascular plant cover and was classified as bare ground. In compiling species lists, botany staff identified 78 native and 27 nonnative vascular plant species in the East Phase.

Two of the nonnative species recorded by the point-intercept monitoring are included in the Department of State Lands (DSL) definition of invasive nonnative species for mitigation bank sites: *Lolium multiflorum* (the last crop species on the site) and *Holcus lanatus*. We also analyzed our 2011 and 2012 data to determine if any species met the definition of invasive identified in our Mitigation Bank Instrument (patterned after the DSL standard), which is: 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. We analyzed two sets of 35 samples (each set >10% of the total samples), from the north and south ends of the site, to determine if cover values for any nonnative species met this standard. We chose the first set of samples (north end of site) and the last 35 samples (south end of site) because nonnative grasses and nonnative *Lythrum hyssopifolium* seem most abundant in these regions. Even within these limited regions, no nonnative species achieved over 6% cover. Therefore, no other nonnative species meet the definition of invasive at this site. This assessment to identify additional species considered invasive will be conducted annually.

In summary, the enhancement has met all of its third year vegetation performance standards (Table 4.2), by having greater than 40% native vascular plant cover, less than 40% bare ground, 6 or more native species having greater than 5% cover, and nonnative invasive vascular plant cover of less than 10%.

Shrub islands:

Planting the shrub islands met the 2012 benchmark for the Ha-Yaba Unit (Table 4.3). Preliminary assessments in fall 2012, about 6 months after planting, indicate that *Rosa nutkana* plants had survival near 100%, while the willows had uneven survival across the site and the *Spirea* survival may depend on the density of surrounding native competing vegetation, due to the initially small stature of the planted *Spirea* shrubs. Shrub survival will be assessed by the end of the 5-year monitoring period.

Table 3.7 Coyote Prairie East Phase Point-intercept Monitoring Results, 2012.

Point-intercept percent cover monitoring results are presented for the entire phase (both units combined). Percent cover results are shown (with 80% binomial confidence intervals (CI)) for several guild types as well as each species detected during monitoring.

| | Area Sampled | East Phase, 84 acres | | |
|---------------------|-----------------------------------------------------------|----------------------|--------|---------|
| | Sample Size | 343 | | |
| | Plant Community | Wet Prairie | | |
| Origin ¹ | Species or Guild (all herbaceous) | % Cover | CI Low | CI High |
| | Native (absolute cover) | 163.0 | | |
| | All Nonnative (absolute cover; includes invasives) | 9.6 | | |
| | Invasive Nonnative (absolute cover) | 1.5 | | |
| | Total Plant Cover (absolute cover) | 172.6 | | |
| | Bare ground (no vascular plants, moss may occur) | 5.2 | | |
| | Native² (a relative cover value) | 93.0 | 90.8 | 94.7 |
| | All Nonnative² (a relative cover value) | 7.9 | 6.0 | 10.0 |
| | | | | |
| Native | <i>Juncus occidentalis</i> | 60.1 | 56.5 | 63.5 |
| Native | <i>Grindelia integrifolia</i> | 13.7 | 11.3 | 16.4 |
| Native | <i>Prunella vulgaris</i> var. <i>lanceolata</i> | 11.7 | 9.5 | 14.2 |
| Native | <i>Epilobium ciliatum</i> | 9.9 | 7.9 | 12.3 |
| Native | <i>Epilobium brachycarpum</i> | 9.3 | 7.4 | 11.7 |
| Native | <i>Lotus unifoliolatus</i> var. <i>unifoliolatus</i> | 8.2 | 6.3 | 10.4 |
| Native | <i>Carex densa</i> | 7.0 | 5.3 | 9.1 |
| Native | <i>Agrostis exarata</i> | 5.2 | 3.8 | 7.1 |
| Native | <i>Eriophyllum lanatum</i> var. <i>leucophyllum</i> | 4.4 | 3.0 | 6.2 |
| Native | <i>Bidens frondosa</i> | 3.8 | 2.5 | 5.5 |
| Native | <i>Potentilla gracilis</i> var. <i>gracilis</i> | 3.8 | 2.5 | 5.5 |
| Native | <i>Carex unilateralis</i> | 3.5 | 2.3 | 5.1 |
| Native | <i>Plagiobothrys scouleri</i> var. <i>scouleri</i> | 2.9 | 1.8 | 4.5 |
| Native | <i>Alopecurus geniculatus</i> | 2.6 | 1.6 | 4.1 |
| Native | <i>Deschampsia cespitosa</i> | 2.6 | 1.6 | 4.1 |
| Native | <i>Rumex salicifolius</i> var. <i>salicifolius</i> | 2.6 | 1.6 | 4.1 |
| Native | <i>Epilobium densiflorum</i> | 1.7 | 0.9 | 3.1 |
| Native | <i>Juncus bufonius</i> | 1.2 | 0.5 | 2.3 |
| Native | <i>Madia sativa</i> | 1.2 | 0.5 | 2.3 |
| Native | <i>Plagiobothrys figuratus</i> | 1.2 | 0.5 | 2.3 |
| Native | <i>Gnaphalium palustre</i> | 0.9 | 0.3 | 1.9 |
| Native | <i>Microseris laciniata</i> | 0.9 | 0.3 | 1.9 |

Table 3.7 Coyote Prairie East Phase Point-intercept Monitoring Results, 2012.

Point-intercept percent cover monitoring results are presented for the entire phase (both units combined). Percent cover results are shown (with 80% binomial confidence intervals (CI)) for several guild types as well as each species detected during monitoring.

| | Area Sampled | East Phase, 84 acres | | |
|---------------------|-------------------------------------|----------------------|--------|---------|
| | Sample Size | 343 | | |
| | Plant Community | Wet Prairie | | |
| Origin ¹ | Species or Guild (all herbaceous) | % Cover | CI Low | CI High |
| Native | <i>Rorippa curvisiliqua</i> | 0.9 | 0.3 | 1.9 |
| Native | <i>Achillea millefolium</i> | 0.6 | 0.2 | 1.5 |
| Native | <i>Madia elegans</i> | 0.6 | 0.2 | 1.5 |
| Native | <i>Panicum capillare</i> | 0.6 | 0.2 | 1.5 |
| Native | <i>Carex ovalis</i> | 0.3 | 0.0 | 1.1 |
| Native | <i>Downingia yina</i> | 0.3 | 0.0 | 1.1 |
| Native | <i>Eleocharis palustris</i> | 0.3 | 0.0 | 1.1 |
| Native | <i>Galium trifidum</i> | 0.3 | 0.0 | 1.1 |
| Native | <i>Juncus effusus var pacificus</i> | 0.3 | 0.0 | 1.1 |
| Native | <i>Madia glomerata</i> | 0.3 | 0.0 | 1.1 |
| Native | <i>Phlox gracilis</i> | 0.3 | 0.0 | 1.1 |
| | | | | |
| Invasive | <i>Lolium multiflorum</i> | 1.2 | 0.5 | 2.3 |
| Invasive | <i>Holcus lanatus</i> | 0.3 | 0.0 | 1.1 |
| | | | | |
| Nonnative | <i>Lythrum hyssopifolium</i> | 1.5 | 0.7 | 2.7 |
| Nonnative | <i>Vulpia myuros</i> | 1.2 | 0.5 | 2.3 |
| Nonnative | <i>Parentucellia viscosa</i> | 0.9 | 0.5 | 2.3 |
| Nonnative | <i>Briza minor</i> | 0.6 | 0.3 | 1.9 |
| Nonnative | <i>Centaureum erythraea</i> | 0.6 | 0.2 | 1.5 |
| Nonnative | <i>Daucus carota</i> | 0.6 | 0.2 | 1.5 |
| Nonnative | <i>Leontodon taraxacoides</i> | 0.6 | 0.2 | 1.5 |
| Nonnative | <i>Vicia tetrasperma</i> | 0.6 | 0.2 | 1.5 |
| Nonnative | <i>Bromus sp</i> | 0.3 | 0.2 | 1.5 |
| Nonnative | <i>Galium divaricatum</i> | 0.3 | 0.0 | 1.1 |
| Nonnative | <i>Hypochaeris radicata</i> | 0.3 | 0.0 | 1.1 |
| Nonnative | <i>Lactuca serriola</i> | 0.3 | 0.0 | 1.1 |
| Nonnative | <i>Polygonum persicaria</i> | 0.3 | 0.0 | 1.1 |
| Nonnative | <i>Sonchus oleraceus</i> | 0.3 | 0.0 | 1.1 |

1 In Origin column, invasive is as defined by DSL for mitigation monitoring (Oregon Dept of State Lands. 2009. Routine Monitoring Guidance for Vegetation. Interim review draft version 1.0).

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%.

Wildlife Utilization at Coyote Prairie, 2012:*Invertebrates:*

A variety of caddisfly larvae and other aquatic macroinvertebrates (e.g. ostracods, copepods, daphnia) continue to be present in pooled and flowing water in the East Phase of Coyote Prairie. A citizen science project has collected samples of aquatic invertebrates for 2 years from the East Phase vernal pools, although samples have not yet been analyzed. A group of North American Butterfly Association volunteers collected butterfly use data from Coyote Prairie in 2011 and 2012. The surveyors documented over 700 individuals of 14 species using the East phase enhancement from April through September 2012. See their report at <http://www.naba.org/chapters/nabaes/>.

Reptiles and amphibians:

Adult long-toed salamanders have been observed in the north part of the East Phase of Coyote Prairie and salamander larvae (probably long-toed salamanders, although identification was not confirmed) were documented in Pool 2 on April 26, 2012. Garter snakes were observed in the East Phase enhancement in 2011. Pacific chorus frogs continue to use the East Phase pools for breeding. Frog larvae were present in 12 of the vernal pools created in the East Phase in April 2012 and adult frogs are often seen in wet prairie vegetation in spring.

Birds:

Raptors (e.g. hawks, kites, owls) and songbirds continue to be sighted foraging in every Coyote Prairie restoration phase. In particular, in the East Phase, raptors continue perching on the wooden grid stakes to feed, as evidenced by rodent remains and raptor pellets around stakes throughout the site. Bald eagles were spotted by volunteers conducting aquatic monitoring in 2010. In winter 2010-11, three short-eared owls were observed repeatedly in the East Phase and in January 2012 they were present again. Western meadowlarks have been documented frequently in winter foraging flocks of 10 to 20 and in spring 2012 males were again observed singing from stakes and cottonwood logs. Ground-nesting birds, such as California quail, killdeer, and savannah sparrows were documented to nest in the East phase in 2009 -2012. Waterbirds are occasionally seen feeding in the vernal pools in winter.

Mammals:

Voies are present throughout the East Phase enhancement. Herds of elk occasionally cross the enhancement areas, as evidenced by tracks and scat found across the site. Bear and bear sign have been spotted in nearby enhancement Phase 1 of the Coyote Prairie site.

Chapter 4. Progress Toward Meeting Performance Standards

Monitoring and assessment to verify progress toward meeting performance standards in the East Phase, as described in the Coyote Prairie North Mitigation Bank Instrument, are summarized in Tables 4.1, 4.2 and 4.3 below. Tables 4.1 and 4.2 show progress toward meeting performance standards in the Walaan Unit (Unit 2). Table 4.3 shows progress toward meeting benchmarks in the Ha-Yaba Unit (Unit 1) which will be assessed in year 5 using an HGM-based functional wetland assessment.

Table 4.1. Progress of the Coyote Prairie North, East Phase Enhancement, Walahan Unit (Unit 2), Toward Meeting the Hydrologic Performance Standards Identified in the MBI.

The most recent data for the active mitigation bank phase are compared to their relevant performance standards. The number in the 'Monitoring Yr' column indicates the year in which data will be collected to evaluate the site's success in meeting the associated standard. A corresponding year in the 'East Phase Data' column indicates the calendar year data will be collected to evaluate the site's success in meeting the associated standard.

| Monitoring Yr | Hydrologic Performance Standards | Monitoring and Reporting Method | East Phase Data | Goal Met? |
|---------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-----------|
| 0, 1 | PSH2, PSH5: excavate vernal pools and swales and remove Cantrell ditch | As-built report | Excavation occurred summer 2009; as-built report submitted November 2009 | Y |
| 1, 2 | PSH5: ≥ 10 vernal pools are holding water for at least 8 weeks between January and April. At least 10 pools are in Unit 2. | November – May pool fill dates and depths | 14 pools inundated for at least 8 weeks (2011 report) | Y |
| 3, 4, or 5 | PSH2: released flows from Cantrell Ditch cross site. | Photo documentation of released Cantrell Ditch flows and hydrologic mapping | Surface water flows diverted from ditch by constructed swales (Feb 2012 map and photos, this report) | Y |
| 3, 4, or 5 | PSH1: 84 acres exhibit wetland hydrology | Modified wetland delineation | 2014 or earlier, during year of near normal rainfall | TBD |

Table 4.2. Progress of the Coyote Prairie North, East Phase enhancement, toward meeting the Vegetation Performance Standards Identified in the MBI.

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

| Monitoring Year | Phase/ Unit | Vegetation Performance Standards | Monitoring method | East Phase Data (Calendar Yr Collected) | Goal Met? |
|-----------------|-------------|-------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------|-----------|
| 1 | All | Seeding assessment will document initial vegetation establishment | Qualitative seeding assessment | Tables 3.10 & 3.11, this report (2010) | Y |
| 2 | All | Native vascular plant cover > 40% | Point Intercept | Native cover = 143% (Table 3.17, this report, 2011) | Y |
| 2 | All | Bare ground < 40% | Point Intercept | Bare ground = 6% (Table 3.17, this report, 2011) | Y |
| 2 | All | Nonnative <i>invasive</i> vascular plant cover is less than 10% | Point Intercept | Nonnative invasive cover = 0.2% (Table 3.17, this report, 2011) | Y |
| 3 | All | Native vascular plant cover > 40% | Point Intercept | Native cover = 163% (Table 3.7, this report, 2012) | Y |
| 3 | All | Bare ground < 40% | Point Intercept | Bare ground = 5.2% (Table 3.7, this report, 2012) | Y |
| 3 | All | Nonnative <i>invasive</i> vascular plant cover is less than 10% | Point Intercept | Nonnative invasive cover = 1.5% (Table 3.7, this report, 2012) | Y |

Table 4.2. Progress of the Coyote Prairie North, East Phase enhancement, toward meeting the Vegetation Performance Standards Identified in the MBI.

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

| Monitoring Year | Phase/ Unit | Vegetation Performance Standards | Monitoring method | East Phase Data (Calendar Yr Collected) | Goal Met? |
|-----------------|-------------|--------------------------------------------------------------|-------------------|---------------------------------------------------|-----------|
| 3 | All | 6 native species have \geq 5% cover in 10% of area sampled | Point Intercept | 8 native species have >5% cover over entire phase | Y |
| 4 | All | Native vascular plant cover > 60% | Point Intercept | 2013 | TBD |
| 4 | All | Bare ground < 40% | Point Intercept | 2013 | TBD |
| 4 | All | Nonnative invasive vascular plant cover is less than 10% | Point Intercept | 2013 | TBD |
| 4 | All | 6 native species have \geq 5% cover in 10% of area sampled | Point Intercept | 2013 | TBD |
| 5 | All | Native vascular plant cover > 75% | Point Intercept | 2014 | TBD |
| 5 | All | Bare ground < 20% | Point Intercept | 2014 | TBD |
| 5 | All | 6 native species have \geq 5% cover in 10% of area sampled | Point Intercept | 2014 | TBD |
| 5 | All | Nonnative invasive vascular plant cover is less than 10% | Point Intercept | 2014 | TBD |

Table 4.2. Progress of the Coyote Prairie North, East Phase enhancement, toward meeting the Vegetation Performance Standards Identified in the MBI.

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

| Monitoring Year | Phase/ Unit | Vegetation Performance Standards | Monitoring method | East Phase Data (Calendar Yr Collected) | Goal Met? |
|-----------------|-------------|-------------------------------------------------------------|-------------------|-----------------------------------------|-----------|
| 5 | All | Nonnative plant cover is less than 15% of total plant cover | Point Intercept | 2014 | TBD |
| 5 | All | At least 50 native vascular plant species are present | Walking surveys | 2014 | TBD |

Table 4.3. Progress of the Coyote Prairie North, East Phase Enhancement, Ha-Yaba Unit (Unit 1), Toward Meeting Monitoring Benchmarks Identified in the MBI.

The performance of the Ha-Yaba Unit will be measured by conducting an HGM-based functional wetland assessment by the completion of year 5 to determine if the unit has achieved the level of ecological enhancement anticipated and described in the Mitigation Bank Instrument. Although the actions below are not performance criteria, the City is documenting them to ensure the unit is on track to meet anticipated enhancement levels by year 5.

| Monitoring Yr | Monitoring Benchmark | Monitoring and Reporting Method | East Phase Data | Benchmark Met? |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------|
| 3 | Plant at least 0.5 acre of shrub patches, with at least 3 native wetland shrub species. | Planting date, species, and mapped locations of shrub patches. | Planted 1.5 acres with 4 native species (2012, this report) | Y |
| 5 | Majority of plants in the shrub patches have new stems emerging, indicating that they are established and expanding. | Shrub survival and area occupied (all shrubs within 15 m of one another are considered to be part of the same patch). | 2014 reporting | TBD |
| 5 | Place multiple logs over 6 ft in length in the Ha-Yaba Unit to provide sheltering locations for wildlife. | Location and number of logs. | 8 cottonwood logs placed in the Ha-Yaba Unit (2012 management activity, this report) | Y |
| 3, 4, or 5 | At least 2 vernal pools, with a combined area of least 10,000 sq feet (0.23 acre), are inundated to no more than 6 inches for at least two weeks continuously during December through March. At least one pool is inundated into May. | Duration, depth, and size of vernal pools between January and May. | Vernal pool data (2012, this report) | Y |

Appendix A. 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 (not started) and the East Phase (currently active phase). The East Phase is further divided into two units: the Ha-Yaba Unit (Unit 1) and the Walahan Unit (Unit 2), which have different performance criteria. The monitoring is designed to document development of the enhancements and determine if performance criteria area being met.

Photo documentation, hydrologic monitoring, and vegetation monitoring are conducted in both of the east units, although because the performance standards for the units vary, the type of monitoring conducted at each Unit is not identical.

Photopoints

Purpose: Photo document surface hydrology and vegetation structure. 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 landmarks).
3. A complete set of photos are stored with the City of Eugene, Parks and Open Space Division and are available upon request.

Hydrology

Purpose: Assess whether wetland hydrology is established within the enhancement site. The extent of soil saturation during the growing season (March 3 – November 21; NRCS data for Lane County) 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. The timing of the spring visit should extend at least 2 weeks into the beginning of the growing season.
3. Water depth is recorded in November, December, or January and again in April or May from the 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.
4. A modified wetland delineation (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). is conducted in year 3, 4, or 5, when precipitation is near normal.

Vegetation Monitoring

The standard protocol for quantitative vegetation monitoring at West Eugene Wetlands Mitigation Bank sites was developed in 1994 and further expanded and revised in 1997 and 1998. 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 vegetation within enhancement sites.

Species Lists

Purpose: Annually assess the status of each site 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 (early to mid-August).
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.

Planting 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 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+% cover, Common = 10 – 39% cover, Occasional = 2 -9% cover, Trace = present, but less than 2% 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 are 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.
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.
4. The number of samples collected should be at least 200 in the first monitoring year of an 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.
5. In 2011, at Coyote Prairie North, East Phase, a large number of sample points (679) were collected, so that the effects of future changes in sample size could be evaluated. Based on an analysis of the 2011 data, in 2012 the sample size was halved. The detail in the following discussion of sample points (number per grid square, total number) is for the 2011 sample size (8 points per grid square). The change in 2012 reduced the number of points per grid square from 8 to 4. Location of sample points were identified in the following way:
 - a. The sampling method uses the grid system that the City installed in the East Phase and which divides the 84-acre site 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 70 meters throughout the site.
 - b. 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 transect on the x-axis is identified to be a random number between 1 and 10 (assigned via random number table). Based on the 2011 randomly chosen start point of 9 meters and the desire for at least 600 sampled points, the 2011 sampling locations were as follows: 4 points were sampled in the north half of the each grid square at 9 m, 27 m, 45 m, and 63 m east of each grid line (Fig. A-1). This was repeated, using the same x-coordinates along a second transect in the south half of each grid. .
 - c. The start point for the two east-west transects, described above, were established for each grid using two random numbers (one in the north and one in the south half of the square) chosen along the north-south axis (y-axis). On the y-axis, two transects were run within each 1-acre grid square at points 17 m and 47 m south of the north grid lines. Thus, within each of the 84 one-acre squares, sampling occurred at the following x-y coordinates: 9-17, 27-17, 45-17, 63-17, 9-47, 27-47, 45-47, and 63-47,

except within partial squares. (Fig. A-1).

- d. All distances were paced by the monitoring crew after equating their paces to actual distances measured with a measuring tape.
 - e. The site is slightly larger than 84 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, 679 total samples were collected.
 - f. To reduce bias in arriving at the exact sample location, the monitoring crew uses a meter stick and measures off the tip of their boot to locate it, once they have paced to within 1-meter of their sample location.
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 on its route to the ground at that location. The pole is held vertical during lowering by assessment and adjustment of a level on a specially modified camera tripod.

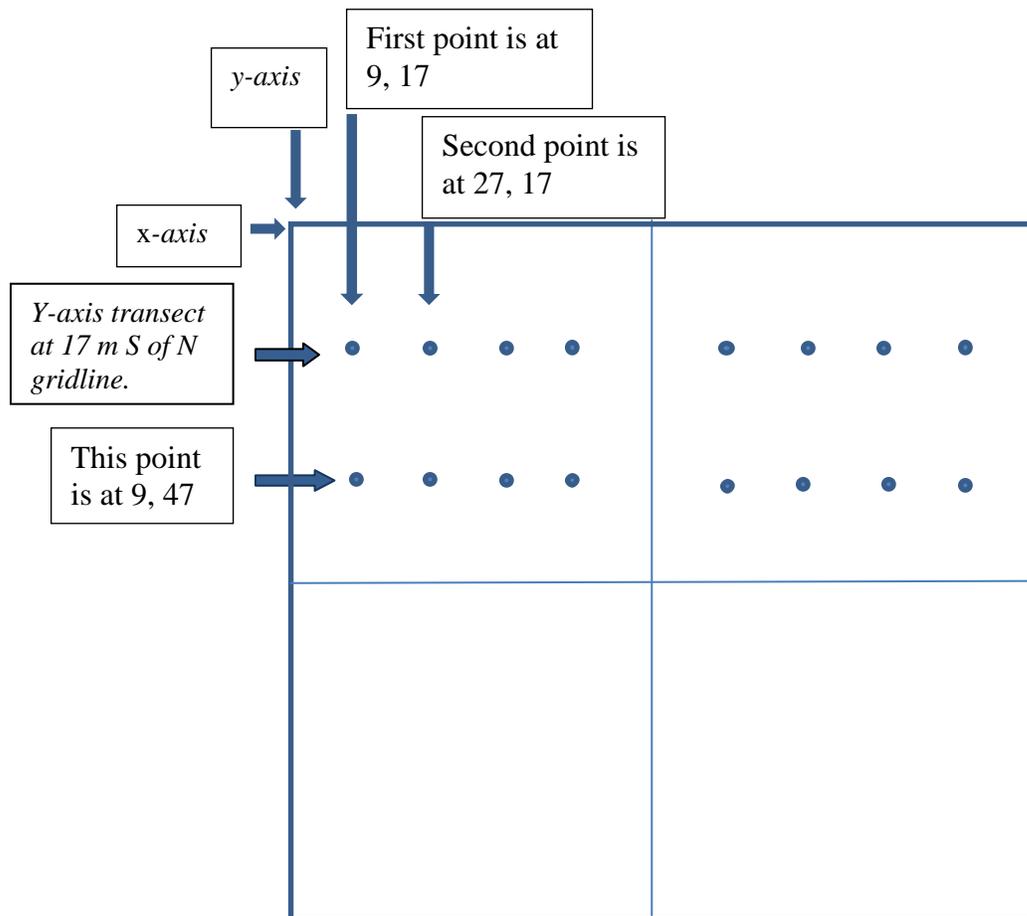


Figure A-1. Coyote Prairie, East Phase grid-based monitoring strategy. Four example one-acre grid squares are shown (points shown only in two). Dots represent sampled points, based on 2011 sample size needs and random start number. In each grid square 8 sample points were collected (4 on each of two transects).

7. Ground cover is identified at each sample point as either bare, moss, or litter. Although this data is collected at each point, only samples that record no plant cover are included in the calculation of percent bare ground. The data collected on litter may be used in future years in determining how rapidly thatch build-up occurs in newly enhanced wetland prairies.
8. The habitat type of each point is also noted (emergent, vernal pool, wet prairie).
9. The percentage of ground covered by each species is calculated by dividing the total number of observations of each plant by the total number of sample points. Cover estimates are given with 80% binomial confidence intervals, unless otherwise indicated.
10. The data is summarized and reported using the following definitions:

Native Cover: *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%*

Nonnative Cover: *the sum of all individual nonnative vascular plant species cover values; an absolute value that can exceed 100%*

Invasive Nonnative Cover: *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.*

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.*