



COYOTE CREEK SOUTH – WET PRAIRIE RESTORATION



116 acres restored to benefit rare native plants, birds, and amphibians

Coyote Creek South wet prairie restoration site. *Photo by Aaron Zettler-Mann*

LANDSCAPE CHANGES

The Willamette Valley floodplain was historically maintained as a dominantly open prairie-savanna landscape by the Kalapuya peoples. Since Euro-American colonization in the 1850s, the majority of the valley bottoms have been converted to agriculture and residential/urban development. Combined with the exclusion of fire and control of flooding, the resulting habitat loss and fragmentation has imperilled a number of native species that depend on these ecosystems to live.



99% of wet prairies in the Willamette Valley are gone. Only 8 square miles remain.

WHAT'S IN A PRAIRIE

Wetland prairies are formed in poorly drained lowlands where seasonal rainwater collects, saturating the soil and leaving vernal (seasonal) pools that hold standing water into April or May. The pattern of natural flooding also creates complex landscape features, with small mounds (pedestals) and banks (berms) protruding above braided channels. This network of microtopography in wetland prairies support a high diversity of plant species—approximately 350—many of which will not grow in other places.

In one square meter of a wetland you can find up to 30 native plant species.

SENSITIVE SPECIES

Wet prairies host a diversity of species, some of which are at risk due to habitat loss. For example, the Streaked Horned Lark (federally listed threatened bird) depends on large expanses of sparsely vegetated grassland—such as those left by drying vernal pools in wet prairies—for nesting. It is estimated that there are only 1600 larks remaining. Red-Legged Frogs (federally listed species of concern) depend on seasonal pools with emergent plants for egg laying.



Essential habitat for waterfowl.



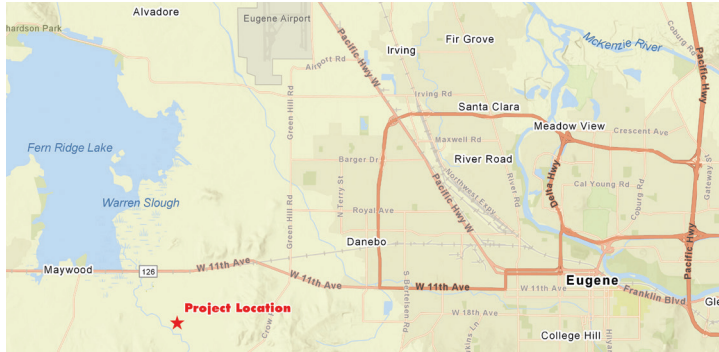
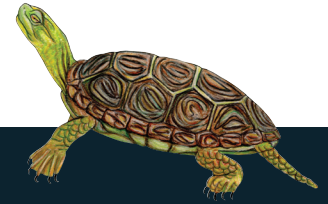
A pop of spring color.



Color-banded fledgling streaked horned lark. Photo by Lara Jones

PROJECT PROFILE: COYOTE CREEK SOUTH

Coyote Creek South, within the homelands of the native Kalapuya peoples, is managed by the Oregon Department of Fish and Wildlife (ODFW). The property was purchased in 2013 through the Bonneville Power Administration's Willamette Wildlife Mitigation Program, and is part of more than 8,500 acres of protected lands around Fern Ridge Lake that comprise the largest remaining acreage of wet prairie in the entire Willamette Valley.



VISIT THE SITE:

ODFW welcomes low-impact recreation. Foot traffic only, leave no trace, keep dogs on leash.

Seasonal closures are posted at the site entrance on Cantrell Road. More information on site access and regulations can be found at:

myodfw.com/fern-ridge-wildlife-area-visitors-guide

REVIVING A FUNCTIONAL LANDSCAPE

Low-lying, seasonally wet agricultural lands—both productive and degraded fields—are crucial sites for wetland prairie restoration. Coyote Creek South offers an example of how such sites can be reclaimed to provide critical habitat for rare species and revive the seasonal patterns of wet and dry that support a functioning ecosystem for all life.

RESTORATION TECHNIQUES

The site was previously under cultivation for grass seed. Drainage ditches were installed and soil was levelled to reduce standing water, benefitting crops, but disrupting the natural movement of water and severely limiting habitat for many species. Starting in 2015 with funding from the Oregon Watershed Enhancement Board (OWEB) and Bonneville Power Administration, the Long Tom Watershed Council and ODFW restored the historic hydrologic function of the ecosystem across 116 acres using the following techniques:

- **SITE PREP:** removing agricultural grasses with herbicide to prepare for seeding native species
- **EARTHWORK:** creating shallow berms and depressions to hold water on site seasonally
- **SEEDING:** native plant mixes designed for eight different microhabitats through broadcast and drill seeding
- **MONITORING:** amphibian, plant, and bird surveys; seasonal pool depth and surface area

BENEFITS OF RESTORATION

HYDROLOGIC FUNCTION: Vernal (seasonal) pools are special features of wet prairies that provide valuable habitat for a diversity of plants and animals.

- Some pools hold water into June or July for amphibians to complete their reproductive cycle.
- Other pools dry in time for streaked horned larks to begin nesting in May.

HABITAT FOR RARE BIRDS: Welcome back streaked horned lark! 2018 saw larks establishing in the area. In 2019, five nests with fledgling birds were identified at Coyote Creek South. These birds create nests in bare ground that is exposed when shallow pools dry.

RARE AMPHIBIANS: Since 2018, native amphibians found on the site included rough skinned newt, long toed salamander, and Pacific chorus frog. Native amphibian presence significantly increased in 2019. The threatened Red-legged frogs have not yet been found on site, but they are nearby and expected to travel.

PLANT DIVERSITY: Over 60 species of plants were seeded to the site. Overall the plant establishment is quite successful. 89 plant species were counted in 2019.



Essential habitat for amphibians.



For 21 years the LTWC has worked on behalf of its *community* to build a culture of neighbors helping neighbors to do the right thing for *land* and *water* in the *home* we share through voluntary habitat restoration.

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COYOTE CREEK SOUTH – WET PRAIRIE RESTORATION RESULTS

PROJECT GOALS:

The goal of the 116-acre restoration project was to transform the property from agricultural wetlands to a mosaic of wet prairie and vernal pool habitat supporting diverse native species, including rare amphibians like the northern red-legged frog and grassland birds such as the federally-threatened streaked horned lark. To understand if the project is helping wildlife, LTWC set up a program to detect changes in hydrology, monitor amphibian and bird populations, and evaluate plant establishment. Trends over time in these areas will quantify the benefits of the project to increasing rare wildlife populations and help inform future wet prairie restoration. Early results are encouraging: Pacific chorus frogs have increased by an order of magnitude and streaked horned larks are now nesting at the site. Monitoring will continue for several years to further document ecological changes.



Chris Vogel (ODFW) installs a staff gauge in a pool at Coyote Creek South.



Allison Lightfoot, LTWC intern, checks water depth in a pool in 2019.

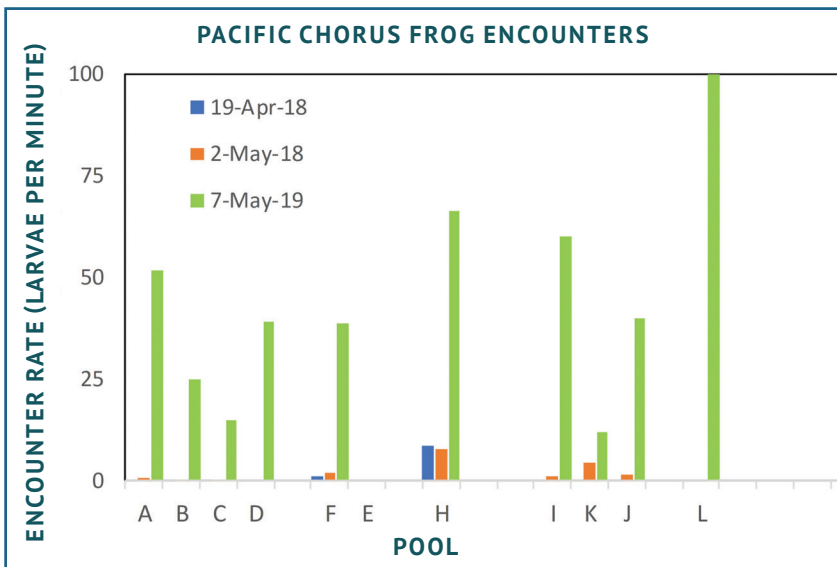
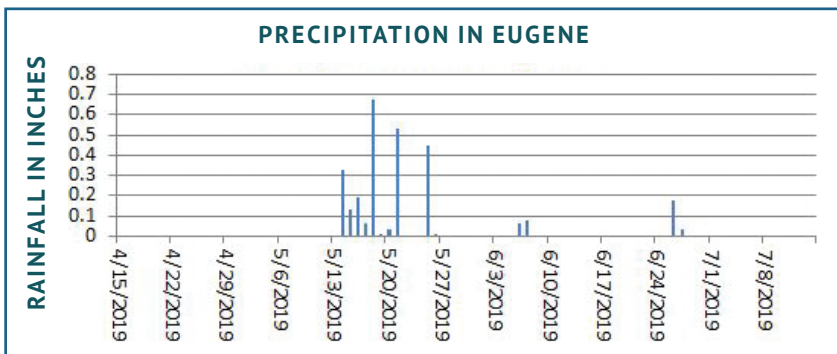
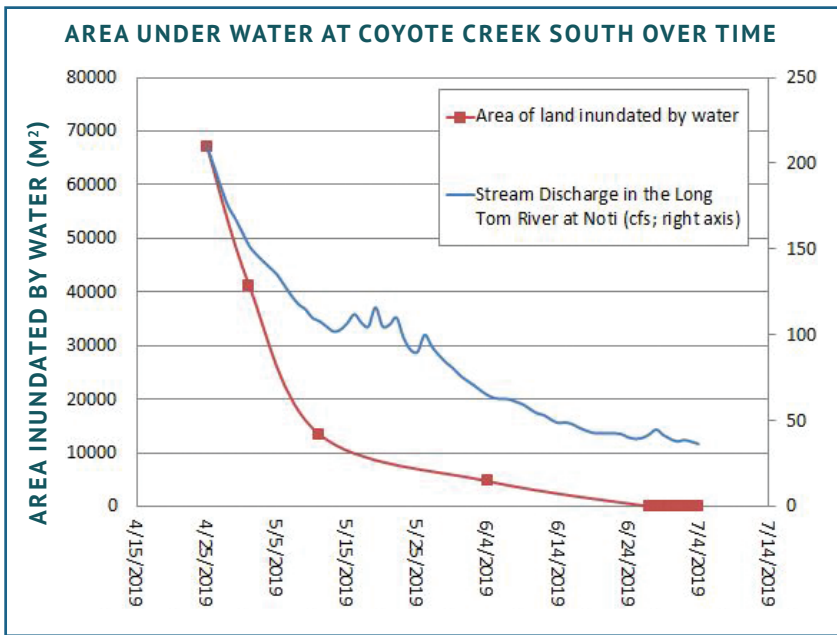
HYDROLOGY

Since completion of earthwork in 2017, LTWC and ODFW personnel are monitoring the changing depth and surface area extents of pools across the site using staff gauges for pool depths and a combination of unmanned aerial vehicle flights and high-accuracy GNSS for pool areas. **The map above shows the locations of staff gauges and the extent of spring pools at four different dates throughout the spring of 2019.**

POOLS FOR AMPHIBIANS: To support the habitat and breeding needs of native amphibians, pools were designed around the edges of the site, with the goal of persisting through June to support breeding of native amphibians but drying in the summer to discourage breeding by invasive bullfrogs and use by invasive fish like carp, both of which predate on native amphibians

So far, hydrology monitoring shows that amphibian pools hold water through breeding season for at least most of the target amphibians, then dry in late May and June. Graphs showing gauge readings throughout spring 2018 and 2019 for each gauged pool can be found in the appendix.

HYDROLOGY CONTINUED



POOLS FOR LARK AND OTHER GRASSLAND BIRDS:

To support habitat and breeding needs of grassland birds, pools were designed at the center of the site with the goal of persisting through April and drying in time for May breeding (and hopefully creating dry, but sparsely-vegetated zones available for nesting)

The graphs to the left show overall surface water drying rates across the site compared to spring weather conditions in 2019. The red line representing the amount of the site underwater drops steeply downward in early spring, meaning that many of the pools are rapidly receding during this time. The line then levels off, meaning that the remaining, deeper, pools are not as quickly receding.

Although pools at the site's center were not as extensive as those in the original design, their hydrologic patterns so far seem to support use by grassland birds.

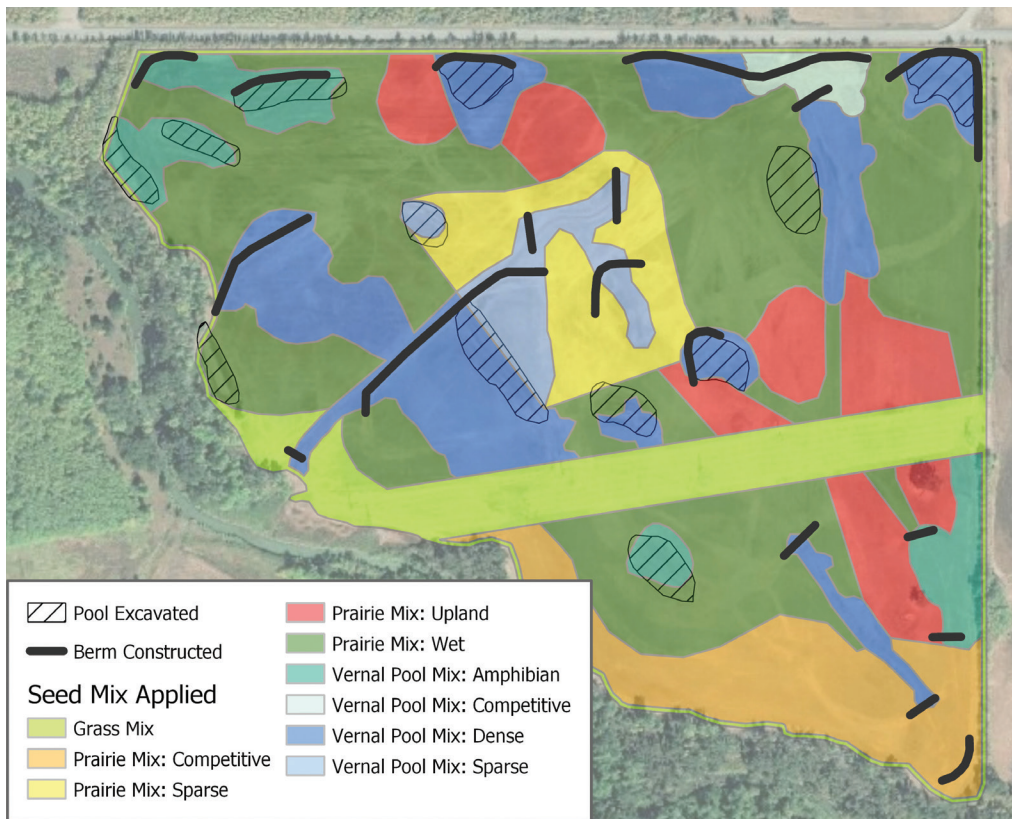
AMPHIBIAN MONITORING:

In 2018, a total of 3 native amphibian species were detected in 17 pools, including Pacific chorus frog adults and larvae (*Pseudacris regilla*), Long-toed salamander larvae (*Ambystoma macrodactylum*), and Rough skin newt adults (*Taricha granulosa*). Amphibians were most abundant in pools close to the riparian forest. No non-native predators were observed in the pools during the spring surveys although American bullfrogs (*Lithobates catesbeianus*) inhabit the ditch along Cantrell Road.

In 2019, the population of Pacific chorus frogs increased by an order of magnitude from 2018—a good sign! Chorus frogs are a food source for other native birds and amphibians, so their abundance many help support a thriving native ecosystem.

The Pacific chorus frog bar graph (left) shows the encounter rate of Pacific chorus frogs on two dates in 2018 (April 19 and May 2) and one in 2019 (May 7). The encounter rates in 2019 were an order of magnitude higher than those in 2018.

VEGETATION MONITORING



The map above shows the seed mixes applied across the project site. Seed mixes were designed according to expected post-restoration conditions (e.g. variations in elevation and soil moisture), to facilitate site maintenance (including the need for an easily-managed weed buffer around the perimeter of the site), to meet habitat requirements for native species such as streaked horned lark (who require ample bare or sparsely-vegetated ground), and to incorporate a large diversity of native species across the site as a whole. Complete seed mix lists are included in the appendix.

In June 2019, staff from LTWC and the City of Eugene conducted point-intercept monitoring, a quantitative method of assessing plant cover by species. A complete species list was also developed from meandering surveys across the site in May and July.

SOME KEY FINDINGS INCLUDE:

- 75% of the site has native plant cover
- Nearly 10% of the site remains unvegetated (habitat for lark)
- 40 of 59 seeded species were observed on site in 2019
- 11 native species that were not seeded (“volunteers”) were observed, including the two most abundant natives (*Juncus bufonius* and *Alopecurus geniculatus*)

Complete methods and results can be found in the 2019 vegetation monitoring report in the technical appendix.



BIRD MONITORING

Streaked Horned Lark Survey Results			
	2017	2018	2019
# Nests found	0	0	3
# Fledglings	4	12	14
# Breeding pairs	3	4-5	5-6

Avian biologists conducted streaked horned lark surveys during the breeding season (April through August) in 2017 through 2019. When nests were located, they were checked every 1-4 days until either the young fledged or the nest failed. At 5-6 days of age, each nestling was uniquely color-banded. In addition, all bird species in the restoration area were documented during 5-minute listening periods at three point-count stations periodically throughout the season.



*Streaked Horned Lark eggs and nestling
Photo by Lara Jones*

Larks likely colonized the site starting in 2017, arriving from an existing population on a neighboring grass seed field, finding suitable habitat in the disturbances that created bare and sparsely vegetated ground at the beginning of the restoration project. Since then, the lark population has increased and is expected to remain stable at about 2-4 breeding pairs. As the vegetation establishes and fills in over time, suitable lark habitat may be reduced, but will vary depending on the timing of annual pool dry-down and the degree of sedimentation and seed sources within the vernal pools. Streaked Horned Larks continue to be at great risk of extirpation from their southernmost range in the Willamette Valley.

Bird species identified at CCS 2017-2019		
American Goldfinch	Great-blue Heron	Song Sparrow
American Robin	Great Egret	Tree Swallow
Barn Swallow	*Streaked Horned Lark	Western Kingbird
Canada Goose	Killdeer	*Western Meadowlark
Dunlin	Mallard	Western Sandpiper
European Starling	Savannah Sparrow	Yellowlegs
*Grasshopper Sparrow		
* ODFW Strategy Species, Oregon Conservation Strategy		

Complete methods, results, and discussion can be found in Bob Altman's 2017, 2018, and 2019 Streaked Horned Lark reports in the technical appendix.

EXPLORE THE STORY MAP!

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SUMMARY AND APPRECIATION

TAKE-HOME POINTS FROM COYOTE CREEK SOUTH WET PRAIRIE RESTORATION PROJECT:

- The constructed earthworks are effective in retaining more water on site longer into the dry season and support a larger amphibian population.
- Strategic multi-year site preparation and ongoing weed maintenance resulted in relatively successful establishment of seeded native plants. Plant composition and overall cover is expected to change over time.
- Ongoing monitoring and maintenance for many years beyond project implementation is required for the continued success of the project.

THANK YOU TO OUR PARTNERS AND CONTRACTORS!

Oregon Department of Fish and Wildlife
(property owner, project co-lead, funding)

Oregon Watershed Enhancement Board (funding)

U.S. Fish and Wildlife Service Partners Program
(technical assistance)

City of Eugene (plant surveying)

RTF Consulting (technical assistance and drill seeding)

Avifauna Northwest (bird monitoring)

Chris Pearl (amphibian monitoring)

Heritage Seedlings Inc, Pacific Northwest Natives, River Refuge, and Institute for Applied Ecology (seeds)

