Metro and the City of Hillsboro

Orenco Woods Savannah Restoration Plan

Prepared for Metro and the City of Hillsboro
By Institute for Applied Ecology

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This document was prepared for Metro and the City of Hillsboro by staff at the Institute for Applied Ecology (IAE):

Ben Axt
Guy Banner

The Institute for Applied Ecology is a non-profit 501(c)(3) organization whose mission is to conserve native ecosystems through restoration, research, and education.

563 SW Jefferson Ave.
Corvallis, OR 97333
(541)753-3099
www.appliedeco.org

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Metro
Brian Vaughn – Natural Resource Scientist
Jonathan Soll – Science & Stewardship Division Manager

Institute for Applied Ecology
Rebecca Currin – Habitat Restoration Program Director
Andy Neill – Restoration Technician

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Project Background

In the spring of 2015, the Institute for Applied Ecology (IAE) was contracted by Metro and the City of Hillsboro to prepare a restoration plan for oak savannah habitat areas of the Orenco Woods Nature Park (OWNP). This restoration is essential to achieving goals on site. This plan builds on the Orenco Woods Site Conservation Plan (2013) to expand oak savannah habitat at OWNP.

Portions of the site are described as savannah, but within that designation there will be a variety of ecotones. These ecotones include the edges of dense woodland cover and one area previously tiled for drainage that approaches wet prairie conditions. This restoration plan sets forth a restoration and implementation strategy specifically for the oak savannah area. The plan is intended to guide the expansion and enhancement of savannah habitat with the goal of increasing the abundance and diversity of native grass and forb species and decreasing the cover of non-native and invasive plant species.

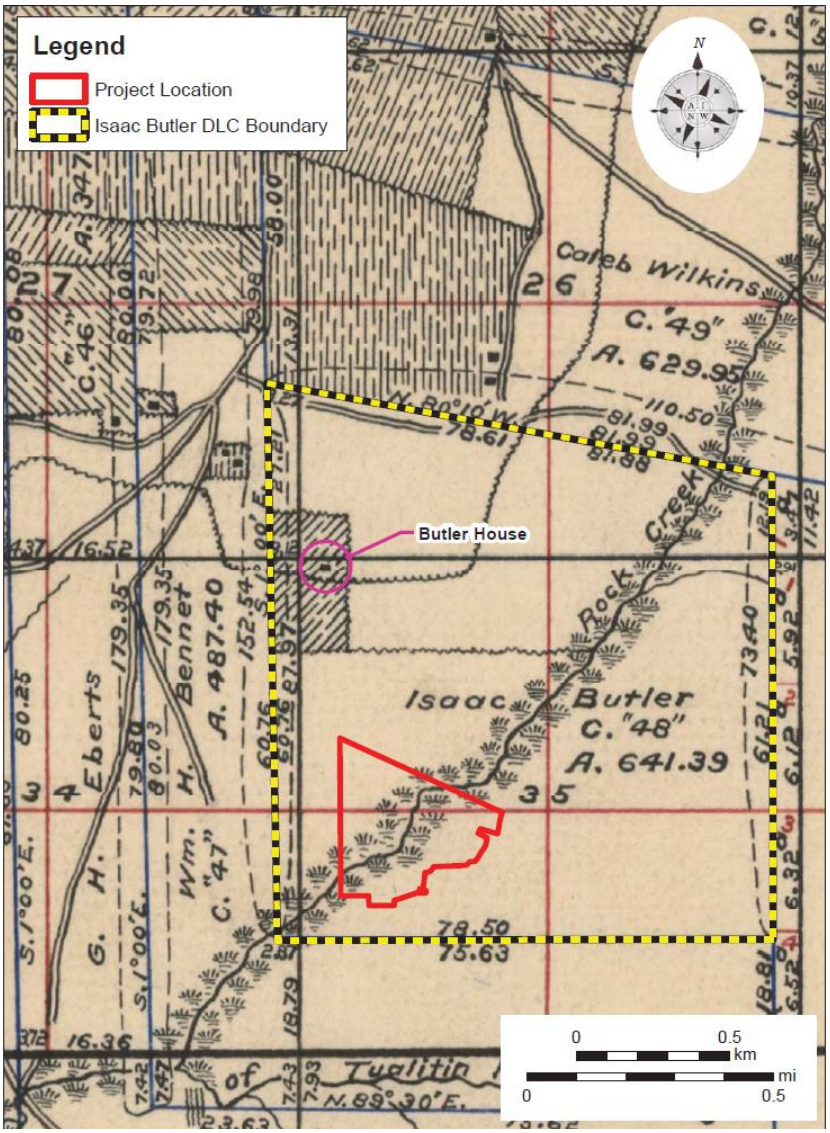

Figure 1. OWNP project boundary overlaid on the 1862 GLO map showing Isaac Butlers Donation Land Claim #48 (AINW 2013).

Restoration will be implemented over several years at OWNP and management will be ongoing. The vision of this plan is to transition the restoration area to oak savannah from a degraded golf course. To ensure the site objectives are met, this restoration plan integrates restoration activities with measurable and time bound objectives as well as long term management considerations. Techniques, timing, and goals should be re-evaluated and adapted to new conditions as the restoration progresses. Allowing for adaptive management and engaging all restoration partners will allow for informed modifications to the plan and will result in a higher quality product.

Habitats

Management Unit Delineation

The GLO record plat for a portion of Township 1N Range 3W (Figure 1) shows that Orenco Woods exists in what were described as alder bottoms and prairie. Douglas fir, alder (unspecified), willows, and white oak trees were used as marker trees in the land surveys of these areas. Large portions of the section were described as prairie. It is likely from these records that there were transitional savannah zones between prairie and riparian forest zones. The areas delineated as oak savannah are prime examples of this transitional habitat that was common on the landscape at the time of European settlement (Figure 2).

Figure 2. Restoration areas of Orenco Woods Restoration Plan.

A goal of OWNP's Site Conservation Plan (2013) is to achieve a general habitat state for each of the planned sections of Orenco Woods. Oak savannah restoration is the focus of this plan. These restoration areas will exhibit recognizable traits and provide a reference ecosystem in a park setting for public outreach. Goals for the restoration are paraphrased below.

Restoration Plan

The savannah management area includes of all upland grassland habitats in the restoration unit totaling 12 acres. There is an eastern portion and a western portion that are divided by the stream corridor (Figure 2). These areas occupy the open upland areas of the site and will offer open areas and visual access for visitors from planned walkways. Savannah is generally defined as grassland with 3 to 5 trees/acre. However, portions of the savannah area have existing patches with higher tree density. Some trees may be removed, but the patches can be augmented with Oregon white oak and shrubs to achieve diversity goals and savannah structure. It is also recommend to plant shrubs in there understory

of the remaining strips of trees to exclude weeds and to simplify maintenance. This will also create a shrub layer common to tree groupings in savannah ecosystems. A schedule of restoration actions is found in Table 1 (pg. 5).

Short-term targets 2015-2016

- Reduce non-native and invasive species cover.
- Establish and increase diversity of existing native grass and forb species.
- Create 12 acre area of oak savannah.
- Engage schools and the community in savannah restoration.
- Provide visitor experience and interpretive opportunities.

Long-term target

The primary goal for OWNP is to be a demonstration area of oak savannah ecology for an urban area. Auxiliary habitat benefits would include providing habitat for reptiles, amphibians, small mammals, birds, and native pollinators such as solitary bees and bumble bees. The biodiversity created in this space will serve as an educational and recreational opportunity to engage with native ecosystems. Traditional savannah goals of supporting imperiled wildlife and plants will not be possible at Orenco Woods because of its landscape context and small size. It will serve to raise awareness of the need for similar restorations in strategic locations.

Goal 1: Enhance native prairie and savannah habitat.

Objective 1: Control aggressive invasive weeds.

- 2015 (Fall): Remove exotic grasses and forbs with a broadcast treatment of broad spectrum herbicide.
    - Mow to remove thatch.
    - Broadcast spray of non-selective herbicide (glyphosate) to remove exotic grasses and forbs.
    - Disc to break up non-native sod and disable drain tile.
    - (Optional) Second broadcast non-selective herbicide treatment or discing to treat any herbicide
    - The northwest corner of the eastern section has an area of soil dumping mounds with a high number of aggressive invasive weeds including reed canarygrass. Treating these weeds should be a priority. If the soil is to be used in construction on site, weed should be eliminated before they are spread.
- 2016 (Spring, Fall): Treat new growth of exotic cover from seed bank using 2-3 broadcast applications of a broad spectrum herbicide.
    - Treat once in March and once in October.
    - Plan for a contingency 3rd treatment in June to treat any problematic species that emerge after the initial spring treatment
    - (Optional) Till in Fall if needed to control new weed seed germination.

Objective 2: Establish native herbaceous species.

- 2016 (Fall): Following broadcast herbicide treatment, broadcast seeding and roll native herbaceous species to ensure proper planting depth for forb seed while providing soil contact for seeds. A preliminary seed list is attached as Appendix 1, final seed list to be determined by March of 2016.

- Proceed if seed bank levels of weedy species will not threaten native establishment above acceptable levels. Weedy species are not under control continue broadcast herbicide treatments through 2017.
- Broadcast seed with tractor or ATV pull behind spreader.
- Follow with tractor or ATV mounted roller.
- Plant plug, bulbs and bare root stock when available.
    - Plant in the areas of highest seedling establishment and/or lowest weed densities.
    - Plant in patches of high density to mimic natural savannah structure.
    - Consider using students to grow, plant, and monitor.
- Areas of special concern are planting zones along pathways, areas can be targeted for more assertive prairie species to provide a barrier to additional invasive plant materials transported on visitors' clothing and through other vectors. Species used in this area can be chosen for short stature as well as strong ability to establish and prevent weed invasion. These species include Roemer's fescue (*Festuca roemeri*), Oregon sunshine (*Eriophyllum lanatum*), and common self-heal (*Prunella vulgaris*).
- The western section has an area where drainage tile is recommended to be removed along with the irrigation system and other alterations from the former golf course operation. The area may offer an opportunity for inclusion of some species that thrive in wetter prairie conditions. Some examples would be western goldenrod (*Solidago lepida var. salebrosa*), and Hall's aster (*Symphyotricum hallii*) that offer late season nectar and aggressive spreading habits in wetter conditions, and assertive native grasses like Roemer's fescue (*Festuca roemeri*) that establish well and can prevent invasion by weeds.

Objective 3: Maintain native cover.

- 2017 (Spring, Summer, Fall) Monitor success of planting qualitatively.
    - Gauge native seedling establishment.
        - Should be of sufficient density of natives to shade competition at maturity.
        - Observe individual species establishment.
            - Note approximate relative cover of each.
            - Compare relative cover to the intended species composition presented in planting plan.
- 2017 (Fall) Use areas of poor establishment to enhance diversity.
    - Areas where initial seeding is unsuccessful can be used to introduce species that were not included in the original seed mix.
        - Identify areas that have poor seedling establishment.
        - Select appropriate species for site conditions.
        - Broadcast at high rate to ensure establishment
        - These sites will be candidates for outplanting from school environmental education programs.
    - Technique can be applied to areas that have been treated with broad spectrum herbicide to control priority weeds.
- Monitor for weed problems focusing on early detection of weed species with a rapid response to high priority weeds.
    - Monitor at least twice yearly.

- Guidance on prioritization is provided in Appendix 2.

Goal 2: Establish oak savannah woody structure.

Objective 1: Plant trees.

- After herbaceous layer is established (2017), stock oaks and other native tree species at appropriate savannah spacing and density.
  - Plan for 3 additional oaks/other trees at maturity in western section and 1 additional oak at maturity in eastern section.
    - Plant seedling/saplings in clumps of 3 to 5 trees and thin when their canopies begin to compete.
    - This planting could be an educational opportunity.

Objective 2: Plant native shrubs within clumps of established trees.

- Plant shrubs after surrounding native herbaceous vegetation is established (variable timing).

Table 1. Shrubs appropriate for Savannah restoration at OWNP.

Kinnikinnick	*Arctostaphylos uva-ursi*
Hairy manzanita	*Arctostaphylos columbiana*
Pacific serviceberry	*Amelanchier alnifolia var. semiintegrifolia*
Redstem ceanothus	*Ceanothus sanguineus*
Ocean spray	*Holodiscus discolor*
Orange honeysuckle	*Lonicera ciliosa*
Twinberry	*Lonicera involucrata*
Tall Oregon grape	*Mahonia aquifolium*
Dwarf Oregon grape	*Mahonia nervosa*
Pacific ninebark	*Physocarpus capitatus*
Snowberry	*Symphoricarpos albus*

Objective 3: Remove trees and landscaping that are not in keeping with savannah structure.

- Remove non-native shrubs and trees that do not have cultural importance to maintain.
- Remove native shrubs and trees that conflict with savannah structure.

Table 2. Schedule of restoration activities.

	2015							2016											2017										
Activity	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Weed and planting assessments				X						X						X						X		X				X			
Broadcast herbicide treatment with glyphosate to reduce nonnative understory					X						X		X				X														
Seeding																	X											X	X		
Spot treament of nonnative weeds in high quality areas																							X		X				X		
Herbaceous planting																													X	X	
Plant oak trees and shrubs																						X									
Optional discing						X												X													

Outreach & Education

The OWNP savannah restoration goals include outreach and engaging the public. Many opportunities exist for involving the public in the restoration process. The resulting natural area will also create a diverse set of resources to engage visitors.

Goal 1: Provide public recreational and educational opportunities for viewing wildflowers, grassland birds, mammals, reptiles, and amphibians.

Objective 1: Coordinate restoration efforts with public trail system.

- Consider signage that illustrates the habitat restoration process and describes target habitats and species to benefit.
- Work to incorporate volunteers into restoration work. Tasks that are well suited to volunteers are planting, seed collection, light weeding, and monitoring (for qualified volunteers). Orenco Elementary School and the local neighborhood offer potential pools of volunteers connected to the site.

Objective 2: Collaborate with K-12 education programs on habitat restoration projects.

- Coordinate with ecological education programs to provide field work days and field trips.
- Designate an area where students will receive hands-on habitat restoration experience through planting native species. Planting should be done after seeding in 2016-2018. Plants can be planted in clumps to mimic the patchy composition of natural savannahs. Species that are ideal for planting by students include: tough-leaved iris (*Iris tenax*), checker mallows (*Sidalcea virgata*, *S. campestris)*, river lupine (*Lupinus rivularis*), harvest brodiaea (*Brodiaea coronaria*), strawberry (*Fragaria virginiana*), forktooth ookow (*Dichlostemma congestum*), yampah (*Perideridia gairdneri*), and foothill sedge (*Carex tumulicola*).
- Give students hands-on habitat restoration experience through growing and outplanting native prairie species, as age appropriate.

- Milkweed and lupine introductions could be suggested for their ease of propagation and both visual and ecological beneficial impacts.
- Where possible, use students in monitoring tasks. For example, they can monitor bloom times, seed production, planting success. They can also record presence of various wildlife including birds and herptiles and map weeds.

Objective 3: Coordinate interpretive opportunities and signage with nature park development.

- Host interpretive events highlighting restoration activities and natural communities.
  - Schedule interpretive opportunities with a variety of topics to engage a diverse cross-section of the community.
- Share information, schedule, photos, and maps to help to create meaningful signage for park goers.

Monitoring and Adaptive Management

Monitoring may include:

- Locate and map invasive species and assess success of invasive species control efforts.
- Evaluate the establishment rates of plantings and the intensity of wildlife browse to plantings.
- Assess the effects of habitat restoration, management and enhancement tools on plant community composition.
- Inform adaptive management.

Adaptive management is a process that allows land managers and restoration practitioners to incorporate new information in their practices as it becomes available. Information learned from long-term monitoring is especially useful to modify management at a site and help reach project goals. Upland prairie/oak savannah restoration is a relatively novel process, and new information is constantly being acquired.

The schedule and techniques presented in this plan may be modified through the adaptive management process. Monitoring results will be reviewed as monitoring is completed, and used to modify upcoming management processes. Examples may include, but are not limited to:

- If a flush of a new weed species arises following spray out, additional spot spray may be required and application of additional native cover crop.
- If prairie species establish poorly from seed, restoration plan may be modified to add additional site preparation for future plantings, and planting plugs may be considered.
- If thatch builds more slowly than expected the plan schedule may be modified to delay the maintenance regime.
- If flooding causes poor seed establishment in the swales, planting of divisions, bulbs, and plugs may be considered in areas of limited success.

Restoration and Management Considerations

Local perception

The initial stages of restoration often are perceived negatively by concerned parties. Efforts to engage and inform the surrounding community before beginning restoration will not only prevent objections to particular restoration stages but can serve to recruit interested parties to help in restoration and monitoring.

Recreation/Trails

Metro and the City of Hillsboro plan to develop trails that will promote passive recreation at OWNP. This will provide opportunities for interpretive signs or other educational materials with information about habitat restoration. Trail locations may be able to complement restoration by providing a border that can serve as a fire break and weed barrier. There may be times when public access may need to be diverted, such as during herbicide treatment.

Chemical Limitations

All herbicides used in restoration activities will be used within the guidelines of their labeling, particularly relative to required setbacks from water courses. Suggested Integrated Pest Management (IPM) guidelines specific to the species at OWNP savannah restoration are included in the Metro IPM and relevant USFWS-NOAA Biological Opinions for fish species (National Marine Fisheries Service 2009).

Future Management

Best Management Practices

The following best management practices include those recommended by the U.S. Fish and Wildlife Service for use in areas with sensitive species of the Willamette Valley in the programmatic formal consultation on Western Oregon prairie restoration (USFWS 2008) and the USFWS programmatic restoration biological opinion for the Partners for Wildlife Program (USFWS 2010a). Following best management practices will help to avoid damaging rare resources.

Chemical Treatment

Chemical treatments may be used to control aggressive exotic species for which manual control is not logistically efficient or has not proven successful.

- Herbicides will be applied by a licensed applicator, using appropriate equipment and best management practices.
- Exposure of non-targeted species to herbicides associated with drift, leaching to groundwater, and surface runoff will be avoided or minimized.
- Chemical treatments will follow labeled restrictions, including limitations for use near water.

Controlling Herbicide Drift

The following procedures will be used to control herbicide drift:

- The lowest effective nozzle pressure and minimum effective nozzle height recommended by the nozzle manufacturer will be used.
- Droplet size shall be at least 500 microns.

- Spraying will not occur where winds exceed the wind limits specified by the manufacturer and in no event shall winds exceed 11 km (7 mi) per hour.
- Spraying shall occur when temperatures are below 30° C (85° F).
- Drift retardant adjuvants may only be used for boom spray applications and must be non-toxic.
- Dyes may be used for applications to ensure complete and uniform application.

On-going Maintenance Activities

Primary maintenance activities in the restoration area, in 2018 and beyond, will include mowing, haying or grazing, removal of encroaching conifers, and control of invasive species. The best management practices described above should be followed. General maintenance activities will include the following:

- Fall mowing between October 15th and 30th of the savannah will occur each year to reduce competition for native species and minimize tree and woody shrub species encroachment. These activities should only occur on 1/2 of the entire site area in any given year. This will result in a two year disturbance interval for any given area which will allow refugia for plants and animals.
- Any small conifers that are not eliminated through mowing should be removed annually.
- Weed control will need to be ongoing. Searches for new exotic species and spot-spraying with herbicide should occur on a semi-regular basis. Weed surveys should be completed at least once yearly to inform control efforts.
- Any areas of bare soil created through tree removal, weed control, or other disturbance should be seeded in September or October using the species designated for the habitat in the seeding list.

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National Marine Fisheries Service. 2009. Programmatic Biological and Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for restoration actions funded or carried out by the U.S. Fish and Wildlife Service in Oregon and Southwest Washington using the Partners for Fish and Wildlife, Coastal, and Recovery Programs. NMFS No. 2008/03791, National Oceanic and Atmospheric Administration, Seattle, Washington. 101 pp.

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Appendix 1. Draft seeding list.

Common Name	Scientific Name	Seeds/lb	Desired future cover	Seeds/ sqft	Total PLS
common yarrow	*Achillea millefolium*	1,418,950	6.00%	1.2	0.44
large camas	*Cammassia leichtlinii*	47,890	1.20%	0.8	8.68
splitawn sedge	*Carex tumulicola*	324,000	3.60%	1.2	1.92
farewell-to-spring	*Clarkia amoena*	1,032,820	Cover	2.5	1.27
winecup clarkia	*Clarkia purpurea*	1,890,000	Cover	2.5	0.69
woolly sunflower	*Eriophyllum lanatum*	1,169,050	9.50%	2.1	0.95
American bird's-foot trefoil	*Acmispon americanus (syn. Lotus unifoliolatus)*	86,800	2.40%	4.8	28.74
riverbank lupine	*Lupinus rivularis*	31,000	6.00%	1.2	20.12
showy tarweed	*Madia elegans*	213,140	3.60%	0.9	2.19
slender cinquefoil	*Potentilla gracilis*	1,417,460	6.00%	1.7	0.63
common selfheal	*Prunella vulgaris*	400,220	9.50%	9.5	12.46
western buttercup	*Ranunculus occidentalis*	200,000	3.60%	3.6	9.35
meadow checkermallow	*Sidalcea campestris*	100,000	4.80%	1.2	6.24
rose checkermallow	*Sidalcea virgata*	133,000	2.40%	0.8	3.13
California brome	*Bromus carinatus*	71,000	3.60%	0.8	5.86
California oatgrass	*Danthonia californica*	140,000	3.60%	1	3.82
blue wildrye	*Elymus glaucus*	120,000	6.00%	1.2	5.2
Roemer's Fescue	*Festuca roemeri*	500,000	28.60%	7.1	7.48
			100.00%	44	119.16

Appendix 2. Weed Action Thresholds

Target	Symptom	Solution
> 50% native cover	Poor seedling establishment	Reseed areas after examining planting techniques and seed list. Consider grow out for species that did not establish.
< 50% Invasive species cover	Encroachment of aggressive exotic species	See below for individual species.
< 20% cover of oxeye daisy		Treat according to IPM. Reseed appropriate seed into large disturbance areas.
< 10% cover of velvet grass		Treat according to IPM. Reseed appropriate seed into large disturbance areas.
< 10% cover of nonnative blackberry		Treat according to IPM. Reseed appropriate seed into large disturbance areas.
< 10% cover of tansy ragwort		Reseed appropriate seed into large disturbance areas. Do not use chemical control if cinnabar moth (biological control) is present.
< 5% cover of reed canarygrass		Treat according to IPM. Reseed appropriate seed into large disturbance areas.
< 5% cover of nonnative thistles		Treat according to IPM. Reseed appropriate seed into large disturbance areas.
0% cover of Scotch broom		Treat according to IPM.
0% cover of new noxious weeds	Seed or plant materials vectored to the site.	Rapid response to eliminate small unestablished populations.