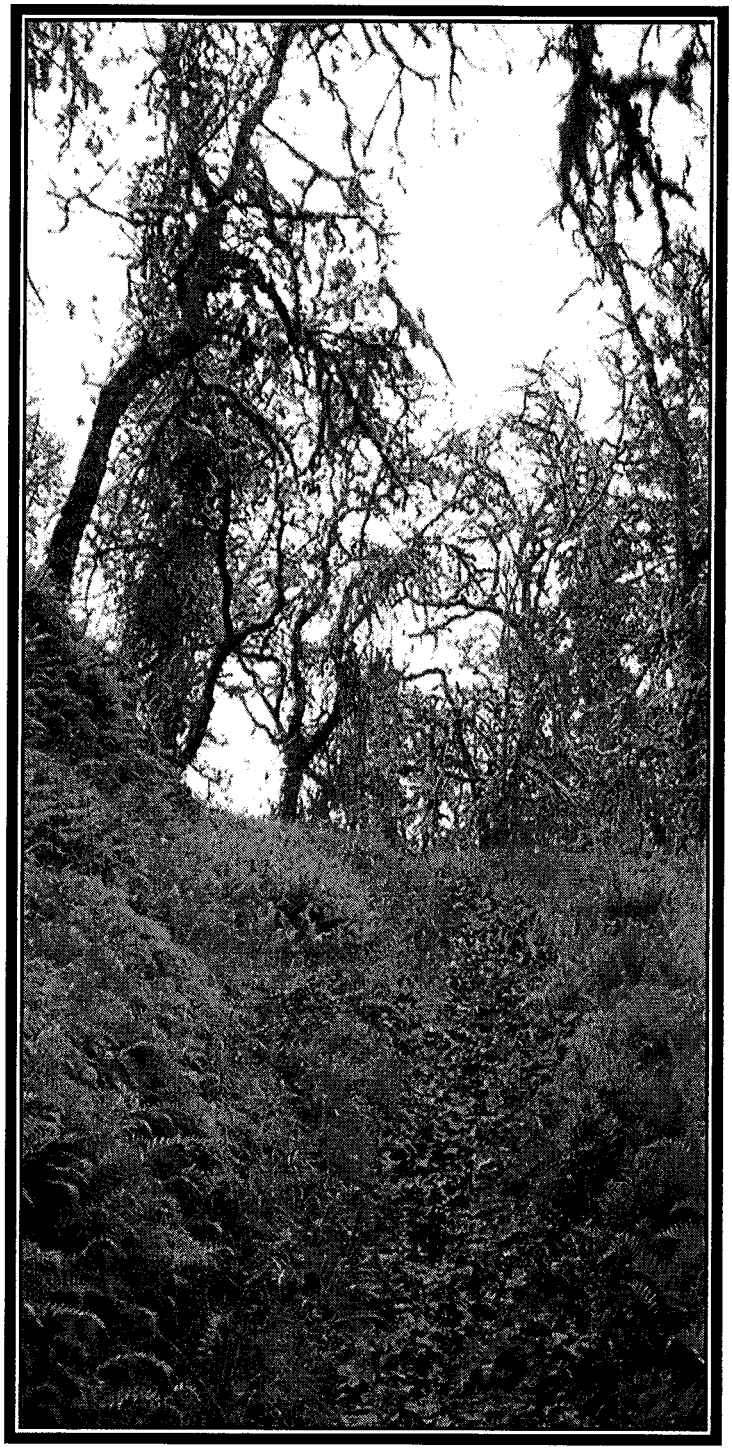

RESTORATION and MANAGEMENT ACTION PLAN

for the

Oak Forest Management Unit,
Hendricks Park, Eugene,
Oregon

Salix Associates
March 2006

With assistance from: **Jason Blazar** (contractor to the City of Eugene) and **Darin Stringer** (Integrated Resource Management).

TABLE of CONTENTS

Executive Summary

The Friends of Hendricks Park, the City of Eugene, neighborhood residents, and other City residents favor restoration of native habitats in Eugene's wildland areas – as evidenced in the broad support and formal adoption of the Hendricks Park Forest Management Plan several years ago. The Oak Forest Management Unit of Hendricks Park represents a unique natural habitat that is greatly compromised by lack of vegetation management – particularly regarding the invasion by exotic species (English/Irish ivy, Armenian blackberry, etc.), and encroachment by native Douglas-fir trees. Both of these phenomena degrade the unique values of the rare oak woodland and associated habitats of the area.

This document prescribes treatments and management actions intended to nudge the vegetation and other habitat factors of the OFMU to a desired future condition similar to the more open, oak-dominated woodland and savanna habitats present around the time of EuroAmerican settlement in the mid 19th century. These treatments would reverse the exotic invasion and conifer encroachment , and restore rarer native habitat values associated with the oak habitats. The desired future condition of the area is one where there are no invasive exotic species present, and fewer Douglas-fir and oaks – and the remaining oaks would be larger in size. Prairies/savanna openings would be dominated by native prairie species, and woodland understories would be dominated by oak-associated, shade-loving herbaceous species. The complete Action Plan for restoration and management of the OFMU is in Attachment A.

The prescription goes farther by specifying additional native wildflower plantings that would exceed concentrations that might normally be found in such habitats. The purpose of the additional plantings is twofold: to stimulate a higher level of human interest and to increase the values of bird, herptile and invertebrate habitat.
The prescription for the area is summarized as follows:

1) Eradicate exotic, invasive tree, shrub and herbaceous species.
2) Reduce encroachment of coniferous trees.
3) Thin denser, small-diameter oaks to release the remaining ones.
4) Create snags and logs during tree thinning.
5) Eradicate the exotic grasses on the knoll, and replace with native prairie species.
6) Enhance plantings in all areas with showy species especially attractive to butterflies and birds.
7) Add two small rock piles for lizard/snake habitat enhancement.
8) Engage neighbors to reduce planting of invasive, and to assist in native habitat maintenance.
9) Utilize ongoing monitoring to assure habitat objectives are being met.

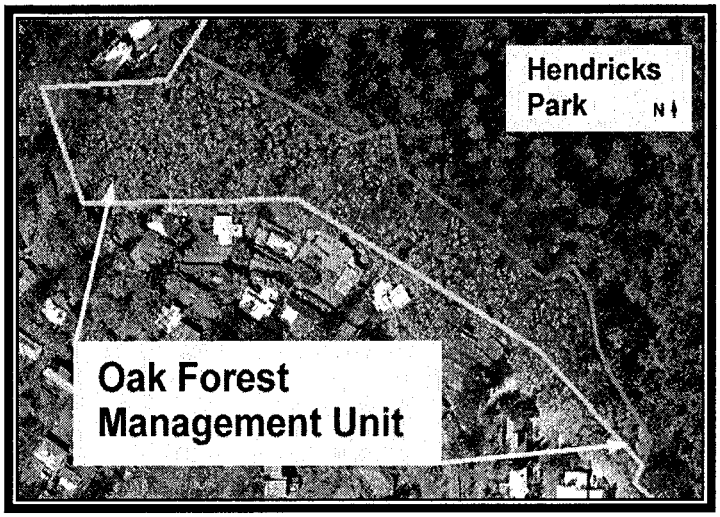

Figure 1. Oak woodland, savanna and prairie restoration areas in the Oak Forest Management Unit of Hendricks Park.

I. Background

The Friends of Hendricks Park (FoHP) contracted with Salix Associates to produce a restoration and management plan to implement the portions of the Hendricks Park Forest Management Plan (FMP) applicable to the Oak Forest Management Unit (OFMU). The OFMU consists of an area about 4 acres in size, lying along a ridgeline in the southwest portion of the Park. A map of the OFMU is on the previous page, and excerpts from adopted planning documents are contained here in Attachment D. Complete background information on the OFMU and Hendricks Park are available in the FMP and Supplemental Report.

The identified components of this OFMU management plan include development of:

1. A desired future condition for the site, based on historic and scientific data
2. A strategy for managing non-desired trees that are encroaching on oaks, and "urgency" recommendations for timing of treatments
3. A strategy for managing noxious weeds (including *Acer platanoides, Aesculus hippocastanum, Brachypodium sylvaticum, Hedera hibernica/helix, Geranium robertianum, G. lucidum, Lapsana communis, Prunus avium, Rubus armeniacus*, etc.)
4. A strategy for revegetating the understory with native herbaceous (and some shrub) species
5. A phasing plan to accomplish the restoration strategies
6. A monitoring plan
7. A list of Best Management Practices applicable to the treatments
8. An approximate budget for implementing items 2-6; the budget should include costs necessary to complete professional tasks, and list other items which can be accomplished as volunteer tasks.

II. Project Purpose

As explained in detail in the FMP, the undeveloped habitats of Hendricks Park (and the entire Willamette Valley) have changed over the last 150 years of EuroAmerican settlement from more open prairies, oak savannas, and oak woodlands to a conifer forest ecosystem. The upland prairie, oak savanna, and oak woodland habitats and the species that depend on them have become rare, while the conifer forest habitats and associated species are common. Ecological restoration throughout the ecoregion, therefore, is being focused on protection and restoration of the rare prairie and oak habitats and the biodiversity that they house. This proposed restoration project in Hendricks Park is small in comparison to many public restoration projects, but because many natural elements remain, access is good, and a working partnership of City Park staff, FoHP and other neighborhood volunteers already is active, there is a solid base for a straightforward and successful restoration of rare habitats – including an outstanding opportunity for ongoing monitoring and maintenance often lacking in other projects. Many projects already have been completed in Hendricks Park involving similar joint efforts. Additionally, the central location provides an excellent opportunity for good public exposure and education regarding the larger issue of habitat change and benefits of restoration.

The relatively small size of the OFMU, and the proven availability of volunteer labor, make restoration of this area very different from large, remote sites where similar projects often occur. Volunteer labor, and park staff are available, which may allow for experimentation and implementation at the OFMU site that is not possible on many larger, privately-owned sites. Observed results from these restoration activities, therefore, should be posted on the FoHP and/or City of Eugene Hendricks Park web sites for use by others if possible.

III. Current and Desired Future Conditions

A description of the desired future condition was developed from information contained in the FMP and in the Natural Resources Assessment and Habitat Management Plan in the supplemental report. While the OFMU Vision and Management sections specifically address the unit, several other general management goals are applicable as well. Taken together, these pieces form the desired future condition, described below after the current condition and

proposed treatments.

A. Current Condition (2006)

The following paragraphs describe the existing habitats in the OFMU. Soil maps of the area (from the FMP Supplemental Report, originally from NRCS) show 108c Philomath cobbly silt clay as the primary type in the OFMU area. This soil is found on slopes from 3% - 12%, is well-drained, with slow permeability, and shallow depth to bedrock.

OVERSTORY

Oregon white oak trees dominate the ridge line, but occur with less frequency descending down the north slope, where they are being overtopped by conifers, declining, and dropping out of the stand. Douglas-fir is somewhat the reverse, common lower on the north slope, but some are encroaching into the oak stand. Some oak snags are present, most commonly resulting from Douglas-fir competition, but also occasionally from competition with other oaks or invasive cherries. A few California black oak trees are present. No ponderosa pine currently exist in the OFMU, but quite a few bigleaf maple are present.

MIDDLE STORY

Many young exotic tree species have invaded, including (in approximate order of occurrence frequency) sweet cherry, Norway maple, horsechestnut, and other exotic cherries. Invasive, exotic, evergreen shrubs are common in places, including: English holly, English laurel, Portugal laurel, spurge laurel, and California bay laurel. Some Scot's broom is present at the top "Oak Knoll," but most of that has been removed recently. Native shrubs are present in some areas, with osoberry and oceanspray being the most common.

GROUND LAYER

Much of the area below (i.e., north of) the knoll trail has been cleared of ivy, except the western portion. Native vegetation recovering in the cleared area includes trailing blackberry, sword fern, sweet cicely, and other shade-loving, forest-dwelling species. Above the trail, exotic invasives still dominate in the eastern 2/3 of the OFMU. These consist primarily of Irish/English ivy, Armenian blackberry, and greater and lesser periwinkle.

An uncommon plant community of Oregon white oak with an understory of licorice fern is present over much of the north side of the knoll, and it extends around to the west and southwest slopes. This community is not described in published literature, but it exists also at Skinner Butte Park in a similar landscape position. Leichtlin's camas, wild cucumber and bedstraw are also fairly common in this understory community. The licorice fern is seasonally dominant over large areas of the ground surface during winter and spring, and it also occurs on hardwood tree boles and limbs -- where it is more typically seen in other areas. It becomes nearly invisible during much of the warm, dry growing season, and other native plants listed above, in addition to many weedy grasses and other exotic species (especially in the most open areas) become seasonal, replacement dominants. Bedstraw and wild cucumber dominate in some areas of oak savanna understory on the slopes of the knoll, and although they are native species, they physically overwhelm much of the shorter vegetation – both native and exotic. The opposite growing seasons of licorice fern vs. bedstraw/wild cucumber can produce two very different understory plant community compositions in the same place, apparent at different times of the year.

SUCCESSIONAL TRAJECTORY

Invasion by exotics and encroachment by native conifers are the two most obvious trends in plant succession. Without intervention, increased invasion by shade-tolerant species such as sweet cherry and Norway maple likely will result in their long term dominance in the middle story, and eventually, they may become the dominant overstory species. Grand fir and bigleaf maple, shade-tolerant natives, are present nearby, and also could become dominant over time. Shade-tolerant, exotic shrubs likely will continue to increase and dominate shady understories.

Armenian blackberry will continue to expand on the edges and in sunny openings. Overall, native species composition of the understory is declining in favor of a simpler, shade-tolerant, exotic tree, shrub and ground layer community. Wildlife species tolerant of shady, exotic plant communities would survive, but those that rely on more open habitats with native plant species would decline. In general, species of the former situation are more common throughout the region at present, and those needing the latter habitat type are becoming increasingly rare.

OTHER PROCESSES AND IMPACTS

Some oak snags are present, and are used by red-breasted sapsuckers, black-capped chickadees, and other resident birds (fide Don DeWitt, neighborhood resident, active birder). Some large and medium sized Douglas fir show evidence of parasitic fungi infection (butt rot, *Phaeolus schweinitzii* - probable; red rot conk, *Phellinus pini* - visible). Some large Douglas fir have pileated woodpecker excavations on lower trunks, possibly indicating presence of carpenter ants and/or termites (or other insects) inhabiting trees infected with one of the fungi species. Western gray squirrels forage and roost in the area, but it is not known if they reproduce in the OFMU.

Heavy use by joggers, walkers (often with dogs on or off leash) and occasional mountain-bikers causes three primary impacts: disturbance to wildlife, compaction of soils and some erosion (especially from deep tire ruts and cutting corners), and occasional introduction of seeds of exotic species.

B. Proposed Treatments

To nudge the OFMU habitat from the Current Condition and trajectory to the Desired Future Condition, the following treatments and activities are proposed. They are summarized here, and explained in greater detail in later sections, and listed in table form in the Action Plan in Attachment A.

10) Eradicate exotic, invasive tree, shrub and herbaceous species.
11) Reduce encroachment of coniferous trees.
12) Thin some denser, stressed, small-diameter oaks to release the remaining ones.
13) Create some snags and logs during tree thinning.
14) Eradicate the exotic grasses on the knoll, and replace with native prairie species.
15) Enhance plantings in all areas with showy species especially attractive to butterflies and birds.
16) Add two, small rock piles for lizard/snake habitat enhancement.
17) Engage neighbors to reduce planting of invasive ornamentals and assist in native habitat maintenance.
18) Utilize ongoing monitoring to assure habitat objectives are being met.

C. Desired Future Condition (2026)

The section describes how the OFMU would appear and function 20 years after implementation of the proposed treatments and monitoring. In general, two habitat types are targeted for establishment and maintenance over time: oak savanna (approximately 1.5 acres), and oak woodland (approximately 2.5 acres). The savanna is intended generally for the southwestern part of the unit, and the woodland for the northeastern portion. There is no plan to have distinct lines between these habitats. Rather, habitats will be comprised of a mosaic of patches that transition between each other in most places. It is expected that the woodland will transition into more conifer-dominated forest on the north side of the ridge. Some gaps will be present in the woodland, and may be shrub-dominated. Gaps in the savanna area will be dominated by prairie species.

OVERSTORY

Oregon white oaks dominate, and ponderosa pine (Willamette Valley type), California black oak, and Douglas-fir are scattered throughout. Some nurtured, natural (or planted) regeneration of all these species is present. Release of oaks and other native trees was accomplished by the prescribed treatments, so many of the remaining native trees are developing larger diameter trunks. These larger trees have been identified as key habitat components for many

declining oak-dependent species. Large, well-spaced Oregon white oaks are developing in the prairie/savanna area, and a few are in the woodland among the smaller oaks.

MIDDLE STORY

Very few plants are present in the middle story. In gaps and on edges are some shrubs and a few young, native trees. Two large clumps of buckbrush at the very top (where the former exotic cherry was), provide a haven for spotted towhees, Bewick's wrens and numerous invertebrates. Pollinators are very active on the white flower clusters in spring, and hummingbirds regularly visit the red flowering currant clumps scattered along the edges. Some shrub clusters were planted along the southern edge to provide a visual buffer to adjacent residences.

GROUND LAYER

The ground layer in the woodland continues to be dominated by shade-loving, understory species of oak woodland habitats. In the savanna area of the knoll, the licorice fern and camas understory is thriving, and the open, warmer areas formerly dominated by exotic grasses and ground covers now contains a diverse and showy mix of native graminoids and forbs, with a few shrubs on the edges. Birds and insects (particularly bees and butterflies) are attracted to the area by the concentration of wildlife-friendly plants.

SUCCESSIONAL TRAJECTORY

Vigilant weed surveys and eradication keep the composition of the OFMU almost entirely native. No invasive trees or shrubs are allowed to survive beyond the seedling stage. Colonization by invasive, herbaceous species is met with spirited attack by neighborhood park stewardship crews. New herbaceous species are occasionally, intentionally introduced into the prairie/savanna area to increase diversity for insects, birds and other wildlife. Every year, a hand-operated flame unit or mower knocks back herbaceous vegetation in about a third of the prairie/savanna area just after the wet season begins in early fall. The structure of the habitats is stable, but within that structure, there is occasional mortality of trees, shrubs and other plants. Where natural regeneration does not occur, human management intervenes to continue to nudge the vegetation towards the rare prairie, savanna and woodland habitat types which are now even more rare than they were when the treatments began in 2006.

OTHER PROCESSES AND IMPACTS

Visitation to the area has continued to increase, however all dogs are on leads and kept calm during their time in the special habitat of the knoll trail area. The installation of educational signage at the trailhead and intersections leading to the knoll trail have encouraged people to stay on the trails, walk quietly, and either leave pets behind, or keep close on a lead to protect native plants and wildlife. Working with adjacent owners has been successful, as plant invasion into the park from neighboring yards has completely stopped, and many abutting yards have planted natives that extend the valuable native habitat of the Oak Knoll area into their yards. Western gray squirrels have become even more common in the area, and are now known to breed there. White-breasted nuthatches and propertius duskywing butterflies have taken up permanent residence. Myriad other native butterflies, bees, syrphid flies, beetles and other insects also make the area their home. Vigilant neighborhood volunteers have done an excellent job at early detection and removal of invasive species, although non-invasive exotic species are present in all areas to some degree.

IV. Tree Management Strategy

Darin Stringer of Integrated Resource Management (IRM) assessed the condition of all trees within the OFMU (Attachment E). He noted that Oregon white oaks on the north slopes are most subject to suppression and declining health from conifer overtopping, and that oaks on the south slopes generally are in better condition. In addition to the overtopping by conifers, he noted some competition between oaks, resulting in smaller diameters. The IRM prescription addresses both of these conditions, and calls for the topping of some trees to produce snags to benefit wildlife. The total number of trees to be felled or topped for snag creation is 123: 18 are Douglas fir, and 105 are

Oregon white oak.

The use of the site by western gray squirrels was noted during the stand assessment. Their preference for oak-conifer "interface" habitat, such as that present in the OFMU, is noted in the IRM report. The IRM overstory prescription stresses a goal of maintaining canopy connections wherever possible to facilitate squirrel movement.

V. Noxious Weed Management Strategy

Management of invasive, exotic weeds hinges on effective *education*, *prevention* and *survey*. These steps are repeated indefinitely. If populations of invasive exotics are found, the next steps are *assessment, control* and *follow-up*. *Survey, control* and *follow-up* efforts should be targeted at certain times of the year to minimize negative and maximize positive impacts.

Education and prevention are closely linked. Education efforts should be targeted at park staff and users, and neighborhood residents. They can include workshops, printed information, notices and signage posted in critical places, and other efforts. Education regarding the prevention of introduction of weed seeds is perhaps one of the most critical needs in the OFMU: both regarding human and pet visitation ("hitchhiking" seeds). Education of visitors so that they clean their boots, socks and dogs before entering and leaving the park addresses the problem of seed introduction by humans.

In the Hendricks Park area — even more than in peripheral urban parks – education regarding ornamental plant escapes from nearby yards is needed. Transportation of ornamental plant seed by birds into forest interiors is common, and has resulted in most of the exotic tree and shrub invasions in Hendricks Park. Once seeds are present, their movement by birds cannot be controlled. However, encouraging the cessation of planting of exotic species which appeal to birds – and hopefully, removal of existing ones – also can be addressed through education.

Surveys should be performed at least annually, particularly along road and trail margins which function as weed invasion corridors for many species. Surveys in adjoining habitats with no trails ideally should occur at least once per year, but once every other year usually is acceptable. In particular, false brome and shining geranium have the potential to spread rapidly once established, so surveyors need to be trained to recognize these species, as well as others present in and near the OFMU.

Assessment of noxious weed invasions should entail both an analysis of invasion characteristics and potential impacts of a particular exotic species on native habitats, and an assessment of potential control impacts. Prioritization of treatments based on threat is a logical step during this stage, because different species invade at different rates and affect native habitats differently.

Control of exotic vegetation should address trees, shrubs and herbaceous plants. In general, the control strategy should be to kill in place or remove invasive, exotic species and to replace them with native species. Killing or removal should be a combination of cutting (with topical herbicide application if needed), girdling and topping for trees, and for smaller shrubs and herbaceous plants, hand pulling, and/or limited, intelligent use of herbicides, with mulching and/or solarization used where feasible. If access permits, repeated mowing can at least suppress, if not eradicate, some weeds. All removal resulting in disturbed, bare soil should be followed by planting of competitive native vegetation, with the intent that well-established native plants will provide a barrier to weed invasion.

The two most common weeds within the OFMU are ivy and blackberry. Although English ivy (*Hedera helix*) has been recorded as the dominant ground cover throughout Hendricks Park for decades, the majority (if not all) of this may be Irish ivy (*Hedera hibernica*). Regardless of the species present, removal of ivy, and to a more limited extent, other exotics, already has occurred in much of the area just below the Oak Knoll Trail. Removal or killing of ivy

should continue in areas where infestation is heaviest: westward to the west property boundary below the trail, and southward, on the uphill side of the trail. (Small patches have been removed already on the uphill side.) Smaller amounts of ivy remain in the eastern portion of the OFMU below (north of) the trail. Annual followup ivy pulls will be necessary to reduce future infestations.

The Nature Conservancy recently has had good success using herbicides to control ivy in the Portland area. Their per-acre cost of killing ivy and reseeding ($1700/acre) is approximately 1/3 the Hendricks Park cost of hiring crews to just pull ivy (approx. $5500/acre), with no reseeding. Intelligent use of herbicides should be considered for the remaining ivy control in the OFMU, following strict safety guidelines and Best Management Practices (see Attachment C) to minimize impacts within and near the Park.

Armenian blackberry (*Rubus armeniacus*) is most common in the southern portion of the site, but also is present in gaps and other pockets throughout the OFMU. Repeated containment by chain saw, weed whacker or mowing (by hand or with a tractor), combined with targeted digging of root balls or topical herbicide application, should result in complete eradication in most areas. Follow-up treatments will be essential in all weed control situations.

VI. Vegetation Restoration Strategy

In general, our recommendation for the OFMU is to both restore the native plant communities that likely were present around 1850, and also to add additional showy, flowering plants and plants valuable to invertebrates and birds. The intent of "supercharging" the habitat with these plants is to accomplish two further objectives: 1) provide visual interest, recognizing the high human use of the area; and 2) provide pollen and nectar sources for native bees and flies (and their relatives), and beetles, nectar and host plants for butterflies, and additional food sources for birds. The tables of native plant communities and species are included here as Attachment B.

In general, restoration of understory species associated with more open sites will occur with native species either existing on the site, or on similar sites nearby and expected to occur on this site. The native species present and associated with the oak-prairie habitats on Skinner Butte should be given highest consideration as a reference site because of proximity, similarity in land form, and simple presence of natives remaining in portions of the understory. The conversion of understory from exotic to native dominated understory will occur following the steps specified in the Action Plan (Attachment A).

The rare Oregon white oak/licorice fern community present along the north and west portions of the knoll should be protected and documented. Other similar, poorly-documented oak woodland/savanna/prairie habitats in the area can be found on the north side of Skinner Butte (near the top), the Oak Knoll on the west side of Interstate 5 at the Goshen Exit, and on the steep bank above the Willamette River, below South 2nd Street in Springfield. These communities all have significant native plant values, and are in need of documentation and protection. Specifically, seasonal transitions to other understory dominants should be observed and recorded in the community at the Oak Knoll.

Climbing vines of hairy honeysuckle (*Lonicera hispida*) in the oaks near the top of the knoll should be protected and encouraged for their multiple values as a native plant, and as food and cover for invertebrates, songbirds and hummingbirds.

A. Benefits to Plants

Oregon white oak woodland, savanna and prairie habitats – and the plant and wildlife species associated with them – all have become very rare in the Willamette Valley. Oregon white oak and other native trees are expected to grow with greater vigor to larger diameters as a result of the treatment to reduce competition. The more open habitats created by the removal of some trees also will benefit understory plants adapted to such habitats – primarily prairie

and savanna species.

Rare plants, such as thin-leaved peavine (*Lathyrus holochlorus*), Willamette daisy (*Erigeron decumbens* var. *decumbens*), wayside aster (*Eucephalus vialis*) and Oregon aster (*Seriocarpus oregonensis*) are reasonable candidates for introduction at the OFMU site. Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) or spurred lupine (*Lupinus arbustus*) could be considered for introduction in a few years as management and vegetation stabilize.

B. Benefits to Wildlife

Many wildlife species associated with oak woodland and oak savanna/prairie habitats in the Willamette Valley ecoregion are in decline. Many of these species need larger habitat patches, but some uncommon species which possibly may benefit from restoration of the OFMU include birds such as white-breasted nuthatch, western bluebird and western-wood pewee, and mammals such as the western gray squirrel, long-eared myotis and long-legged myotis. In particular, many of these species use cavities associated with larger diameter oaks. While there are a few such cavities present, more should form over time. The increase in herbaceous prairie/savanna vegetation will be of particular benefit to pollinators, which are discussed at length in the following section.

POLLINATORS

About 90% of native plants have co-evolved with native pollinators to assist in their reproduction, and a few are completely dependent on pollinators for that function. Most pollination in our area is accomplished by bees and wasps (Hymenoptera), and flies and bee imitators (Diptera). Some also is accomplished by moths and butterflies (Lepidoptera), and a smaller amount by beetles (Coleoptera) and hummingbirds. In some tropical areas, bats also are pollinators.

Of these, we tend to know most about those species which are showier and are easier to observe: butterflies and birds. One of the best known pollinators is the exotic European honey bee, which may compete with native pollinators for nectar and pollen resources. It was introduced here for pollination of agricultural crops and for honey production, but feral colonies now exist in wildland areas, where competition with native pollinators may be more direct.

The presence of insects in any habitat is related more directly to the presence of particular plant species than perhaps any other animal group. Many specialist insects use only one plant species or a small group of closely related plants as larval hosts, or for nectar and pollen gathering by adults. Generalist insects often tolerate or benefit from exotic plant species introductions, whereas specialists seldom do – native specialist insects need native plants for completion of their life cycles. Conversely, there are some correlations between flower shapes and insect structures that require certain plants to be pollinated by specific insects. [not sure what this last sentence is converse to]

When invasive species reduce native plant populations, they concurrently reduce populations of pollinators and other species which may depend on them. Many native pollinators likely go extinct locally not only when habitat is converted to agriculture and development, but also when invasive species replace native plants in the remaining natural landscape.

Following the restoration of native plant diversity in the OFMU, numerous pollinator species likely will visit the area for nectar and pollen, and some may breed there. In addition to many generalist butterflies, the list below represents some native butterfly species associated with native host plants (planned for reintroduction) which could benefit from the OFMU restoration project include:

Possible/likely (based on nearby occurrence):
- anise swallowtail
- pale swallowtail
- Sara orangetip
- Mylitta crescent
- Oreas comma
- California tortoiseshell
- American lady
- painted lady
- West Coast lady

Possible/but unlikely:
- great spangled fritillary
- field crescent
- Sonora skipper

Ground-nesting social and solitary bees both would benefit from the restored, diverse nectar and pollen sources, and small patches of scraped or burned bare ground would provide nesting areas. Solitary bees that nest in wood will benefit from the additional snags and logs created in the area as a part of the project.

Provision of a water source with a muddy area also can benefit pollinators, but the opportunity for creating such a feature within the OFMU is very limited. An excellent opportunity does exist, however, just northeast and downhill of the area, where the small drainageway ponds on the uphill side of the road. (This area is within the park, but outside the scope of this project.)

BMPs which can promote health of pollinator populations in the OFMU restoration area are included in Attachment C.

C. Ongoing Management

Hand-held flaming during moist weather (if allowable) and/or fall mowing will be needed to maintain the open nature of the knoll prairie-savanna portion of the site. Coordination with neighbors will be essential whenever any flaming is considered in the area. Ongoing weed prevention and control (see the strategy section) will be needed to keep invasive exotics from colonizing the OFMU. Training of volunteer "Weed Warriors" is an excellent method to achieve good survey and documentation of invading species.

Ongoing management of nearby park lands, and coordination with neighborhood residents will be essential to reduce the presence of invasive ornamentals in the park, and ideally, to expand the available habitat for native plants, pollinators and other wildlife.

VII. Monitoring Plan

The area to be monitored is only 4 acres in size, and the monitoring objectives are straightforward. They include the need to monitor invasion by exotic species, encroachment of native conifers, and survival (by cover estimate) of the planted native, herbaceous species.

The following table lists monitoring actions in suggested order of priority.

Table 1. Ongoing monitoring activities for the OFMU, in suggested order of priority.

Activity	Details
1. Monitor invasive and encroaching species.	Botanist: Visually survey the OFMU once each year by walking north-south belt transects across the OFMU, separated by a distance allowing slight visual overlap as each belt is surveyed. Attempt to visually survey 100% of the ground surface within the OFMU. Record the approximate location and cover of the invasive, exotic species and encroaching native species. In addition, the two forest management plots that were installed in 1999 should be re-measured as originally prescribed if possible.
2. Monitor survival of restored vegetation.	Botanist: Estimate cover of the native shrub and herbaceous plantings against target cover amounts, after stabilization in 3-5 years. If overall herbaceous native cover drops below 50% in either section (prairie/savanna or woodland), conduct additional work to reduce exotics and increase natives. Monitor health of planted trees and shrubs for excessive mortality. Forester: Assess response of trees to overstory treatment 5 years after initial treatment, and every 10 years thereafter.
3. Monitor wildlife use.	If possible, revisit breeding bird point count stations each spring to monitor use by breeding bird species and spring migrants. As interest and resources allow, conduct butterfly, bee, herptile, western gray squirrel and other wildlife surveys.

Information gathered from monitoring may include needs for treating additional conifer encroachment, treating additional invasive species, replanting native species, and/or for adjusting native plant species compositions and target cover amounts (if needed). Additional prescriptions may be needed to keep the OFMU at or moving toward the desired future condition.

VIII. Action Plan

The itemized action plan for restoring and managing the OFMU habitats is in table form, and is included here as Attachment A. It includes specific tasks, as well as scheduling and approximate budget for each task.

Attachments

A Action Plan: table of tasks, schedule and estimated budget
B Table of desired plant communities and species, and table of prairie grass seed mix
C Best Management Practices
D Excerpts from Hendricks Park Forest Management Plan and Supplemental Report
Excerpts from Hendricks Park Natural Resources Assessment (in Supplemental Report)
E Overstory Assessment (Darin Stringer, Integrated Resource Management).

Attachment A

Oak Forest Management Unit: ACTION PLAN

FH = Friends of Hendricks Park; PC = Project Coordinator; CT = Contractor; PS = Park Staff/Park Contractor; V = Volunteer (may be FoHP)
Note: Conduct all activities within guidelines of BMPs (see Attachment G) P-d = person-day of labor (8 hours)

#	Project	Time	Location	Details	Who	FH grant	In-kind
	ONGOING (beginning ASAP)						
1	Eradicate invasives wherever found	Ongoing as needed.	Anywhere, but particularly, road and trail edges	Eradicate shining geranium and false brome and other aggressive exotics (such as herb-Robert, nipplewort and wall lettuce), in the park or on adjacent City roadsides as soon as possible after discovery. Continue indefinitely.	PS		
2	Hire part-time Project Coordinator	June 2006 - May 07	N/A	Will coordinate all tasks with all parties. Could be FoHP contractor, or City staff or contractor. Average monthly wage $300 for a partial FTE.	FH	3600	
3	Control invasive herbs	March 2006, ongoing	In and near OFMU	This will reduce invasion into restoration areas. Particularly focus on *Geranium robertianum, G. lucidum, Brachypodium sylvaticum, Lapsana communis, Lactuca muralis*. Minimize trampling in fragile native plant areas. Concentrate on trail and road sides, and in ivy-pulled areas. Pull, flame, mulch, etc.	PS, V		
4	Conduct detailed, on-site survey for native, herbaceous plants to protect and/or seed to collect	2006 May - July	Savanna, some in woodland and elsewhere in park	Map and flag any locations to avoid herbicide application. Watch seasonal progression and later native dominants where licorice fern now dominates.	PC or CT	1000	

#	Project	Time	Location	Details	Who	FH grant	In-kind
5	Hold neighborhood meeting and/or mail project flyer	2006 Mid-July	Target minimum of all houses within 2 lots bordering south and west sides of OFMU.	Also, consider "What's going on here?" signs at all trail access points to the OFMU, with target trail closing dates for herbicide application. The BN presentation about this restoration project to the FoHP in March may help fill this need.	FH	500	
6	Collect, or purchase native prairie graminoid seed	2006 June (begin)	Woodland understory and prairie restoration areas	If feasible, arrange collection of native grass seed at: Hendricks, Skinner Butte, Tugman, Alton Baker parks, and along Ridgeline Trail; Masonic Cemetery (with staff coordination in all cases)	PC	1000	
7	Install silt fencing and "treatment area" signage	2006 August 1	See Details	Fencing: south and west borders of OFMU to clearly delineate work limits. Signage along borders and at trail access points. 2 p-d	PC or PS	240	
8	Mechanically control blackberry and dig out root balls	2006 August	Above trail, and in gaps below	Armenian blackberry (*Rubus armeniacus*). Leave all or most trailing blackberry (*Rubus ursinus*) (native). Pile on trails and remove from site. 4 p-d.	CT	480	
9	Cut and kill invasive trees and shrubs	2006 August, after blackberry	Throughout unit.	Cut invasive trees and shrubs (including *Prunus avium, Acer platanoides, Aesculus hippocastanum, Umbellularia californica, Cytisus scoparius, Ilex aquifolium, Prunus lusitanica, P. laurocerasus*, and *Daphne laureola, et al.)* and immediately paint (or squirt) cambium of cut stump with herbicide. Same treatment for the *Prunus cf. mahaleb* at the top of the knoll. Leave boles over 8" dia. as CWD; remove limbs and smaller boles from site to reduce fire danger and facilitate herbaceous veg management. Seedlings can be pulled, but minimize soil disturbance when doing so. 4 p-d	CT	480	

#	Project	Time	Location	Details	Who	FH grant	In-kind
10	Remove or top encroaching PSEMEN and some crowded & declining QUEGAR	2006 Sept	Throughout unit.	Follow IRM prescription: create snags from 6 Douglas-fir, fall 19 Douglas-fir for logs on site. Same for numerous small oaks. Chip limbs and use for park trails. Minimize soil disturbance.	CT	14040	
11	Eradicate exotic grasses (& some exotic forbs, if needed) in prairie/savanna area	2006 Oct	Oak Knoll and eastward	1 - Mow, rake off and remove clippings. $250 2 - Spray once, allow green up (2-3 weeks w/rain) $250 3 - Spot spray again where needed, occasionally.$300	CT	700	
12	Eradicate ivy/vinca and resprouting blackberry	2006 Oct	Mostly above Oak Knoll trail; but also west end below knoll trail	Irish/English ivy (*Hedera hibernica/helix*); greater and lesser periwinkle (*Vinca major/minor*) are the targets. Sword fern (*Polystichum munitum*), may be dug out beforehand, and replanted after spraying to avoid mortality. Much of this will occur in buffer surrounding restoration area.	CT	2000	
13	Site prep and reseed prairie/savanna after exotics eradication	2006 Oct/Nov	Prairie/savanna restoration area	Spot eradications of exotics may be needed for several years. Seed with showy, native annuals fall/winter of 06, and continue spot sprays. (Annuals: Clarkia amoena, Collinsia grandiflora, Collomia grandiflora, Gilia capitata, Madia elegans.) This will allow continued spot spraying of invasives, and additional time for collection and/or growout of perennial grasses for seeding in fall/winter of 07.	CT	720	
14	Reseed after ivy/vinca and blackberry removal if needed	2007 Oct/Nov	See removal areas above	This may not be needed, as existing natives may be sufficient to revegetate when released (monitor closely). See Prairie/Savanna (#12) for planting in areas along south boundary where these invasives are being removed.	CT	250	
15	Seed prairie/savanna with perennial grasses	2007 Oct/Nov	Prairie/savanna restoration area	Spread and gently work in perennial grass seed by hand. $1000 seed, $500 labor.	CT	1500	

#	Project	Time	Location	Details	Who	FH grant	In-kind
16	Propagate herbaceous perennials	2007 Nov	For prairie/savanna restoration areas	Grow out perennials in City and/or Hendricks Park nursery. Propagate 400 plants.	PS?		1500
17	Plant perennial plugs to restored prairie	2008 & beyond Late winter, early spring	Prairie/savanna restoration area	Highlight areas viewable from trails with native butterfly and bird attracting plants. $500 first year, $200 each year thereafter.	PS, V		500
18	Plant locally-propagated native shrubs	2008 & beyond; late fall through early spring	South border; also, gaps if needed	Purchase if necessary or propagate from cuttings. Plant patches of native shrubs to function as partial screening where requested by neighbors bordering to south. *Berberis aquifolium, Ceanothus cuneatus, Ceanothus sanguineus, Ribes sanguineus, Holodiscus discolor, Philadelphus lewisii.* Do not plant in large masses so as to reduce fire danger. Check planting plan with City of Eugene Emergency Services Department.	CT		500
19	Install two rock piles	2008 fall/winter	Prairie/savanna restoration area	Make two small (approx. 4 ft. dia.) rock piles in sunny areas for herps.	PS, V		300
20	Install permanent signage	Winter 2008-09?	Trailhead on street? End of knoll?	Develop explanatory signage, focusing on Kalapuya habitat management, pre-EuroAmerican settlement vegetation, current efforts, what to look for.	PS		1500
					TOTALS	**Est. 30110**	**Est. 4300**
	ONGOING (after restoration)						
	Shrub irrigation, if needed	Late spring through mid summer of first year planted	Generally on prairie/savanna fringe	Install drip irrigation system, or water 2x per week from water truck.	PS		

#	Project	Time	Location	Details	Who	FH grant	In-kind
	Monitoring	Every spring & summer, beginning in 2007	OFMU	Survey for invasive species, continuing conifer encroachment, restoration planting survival, wildlife use. See Monitoring Plan in this report. $1000/yr minimum. Consider securing another grant to fund it.	PC, CT, PS?	(500)	500

Attachment B

Existing and potential native communities and plants for the Oak Forest Management Unit

KEY:
C = Cover, target percent: 1 = 10%, 9 = 90%, etc.; T = Trace.
AHL = Aves (bird), Hymenoptera (bee & relatives) or Lepidoptera (butterfly/moth) use plant; U = Unknown
F = Form (S = Seed, P = Plug herb or Potted woody, ? = unknown)
S = Source - potential: AB = Alton Baker Park, BR = Mt. Baldy/Ridgeline; FB = Friends of Buford Park; HP = Hendricks Park; MC = Masonic Cemetery; R5 = Ridgeline Trail parking lot on Willamette near 52nd; SK = Skinner Butte, SP = Spencer Butte
Note: These lists are not intended to be exhaustive.

UPLAND PRAIRIE/SAVANNA COMMUNITY
Location: Gap at west end of Oak Knoll, and area to east of knoll along southern property boundary. **General description:** Dry & sunny; rocky in some areas. Moist in winter and spring. Openings generally have some shrubs on perimeters, and occasionally in full sun (away from perimeters). Nearly all existing herbaceous veg is exotic, and is to be eradicated.

Layer	Common name	Latin name	C	AHL	F	S	Notes
	Plant:						
Forbs	tapertip onion	Allium acuminatum	T	HL	P	SK	
	showy milkweed	Asclepias speciosa	T	L	P	SK	Or I-105 Springfield
	deltoid balsamorhiza	Balsamorhiza deltoidea	T	HL	P	SK	
	American wintercress	Barbarea orthoceras	T	L	S	FB	Or SB?
	elegant brodiaea	Brodiaea elegans ssp. hooveri	T	?	P	SK	Propagate seed to bulbs in nursery.
	cat's ear lily	Calochortus tolmiei	T	?	P	SK	Propagate seed to bulbs in nursery.
	Lindley's godetia	Clarkia amoena ssp. lindleyi	T	H	S	FB	
	large-flowered blue lips	Collinsia grandiflora	T	U	S	?	Possibly, Cantrell Road.
	large-flowered collomia	Collomia grandiflora	T	U	S	BR	
	Oregon sunshine	Eriophyllum lanatum	1	H	P	FB	Spreads well, so plant sparingly.

	broadpetal strawberry	Fragaria virginiana var. platypetala	T	HL	P	R5?	
	blue gilia	Gilia capitata ssp. capitata	T	HL	S	FB	
	fern-leaf lomatium	Lomatium dissectum var. dissectum	1	AHL	P	?	S. 2nd (Spfld) or S. Will, or N. Coburg Rd.
	large fruited lomatium	Lomatium macrocarpum	T	HL	P	SK	
	spring gold (lomatium)	Lomatium utriculatum	T	HL	P	BR	
	showy tarweed	Madia elegans	1	HL	S	FB	
	grass widows	Olsynium douglasii	T	U	P	SP	
	sticky cinquefoil	Potentilla glandulosa var. glandulosa	1	H	P	FB	
	self-heal	Prunella vulgaris var. lanceolata	1	L	S	?	Spreads well; plant sparingly on edges.
	rosy checkermallow	Sidalcea virgata	1	HL	P	SK	
	early blue violet	Viola adunca	T	L	P	FB	
	upland yellow violet	Viola praemorsa var. praemorsa	T	L	P	BR	
Graminoids	**Plant:**						
	California brome	Bromus carinatus	2	AL	S	FB	See Prairie Seed Mix table, following.
	California oatgrass	Danthonia californica	2	L	S	FB	See Prairie Seed Mix table, following.
	broad-glumed wheatgrass	Elymus alaskanus ssp. latiglumis	T	L	S	FB	See Prairie Seed Mix table, following.
	blue wildrye	Elymus glaucus ssp. glaucus	1	L	S	FB	See Prairie Seed Mix table, following.
	Roemer's fescue	Festuca roemeri var. roemeri	2	L	S	SK	See Prairie Seed Mix table, following.
	prairie junegrass	Koeleria macrantha	T	L	S	FB	See Prairie Seed Mix table, following.
Edge Shrubs	**Plant:**						
	tall Oregongrape	Berberis aquifolium	T	AHL	P	?	
	buckbrush	Ceanothus cuneatus	T	H	P	?	Plant one cluster of 3-4 plants on very top.
	redstem ceanothus	Ceanothus sanguineus	T	HL	P	?	
	oceanspray	Holodiscus discolor	T	U	P	?	
	Lewis' mockorange	Philadelphus lewisii	T	H	P	?	
	red flowering currant	Ribes sanguineum	T	AHL	P	?	

OAK WOODLAND COMMUNITY **Location:** west end and south sides of OFMU. **General description:** Oaks dominate, but a few other trees may be present. Substantial shrub layer. Herb layer somewhat more dry-tolerant than north slope understories.							
Layer	**Common name**	**Latin name**	**C**	**AHL**	**F**	**S**	**Notes**
Trees	**Present, likely little need to plant (see exceptions):**						
	Oregon white oak	Quercus garryana var. garryana	7	AL	P	?	Natural regen may be enough.
	Douglas-fir	Pseudotsuga menziesii var. menziesii	1	AL	P	?	Natural regen likely too much.
	ponderosa pine	Pinus ponderosa	T	AL	P	?	Exception: plant a few.
	California black oak	Quercus kelloggii	T	AL	P	?	Plant a few.
	Pacific madrone	Arbutus menziesii	T	AHL	P	?	Natural regen may be enough.
	Present, but aggressive (do not plant):						
	bigleaf maple	Acer macrophyllum					
Shrubs and Small Trees	**Present, likely no need to plant:**						
	Pacific serviceberry	Amelanchier alnifolia var. semiinteg.	1	A	P	?	Plant if buffer needed, south side knoll.
	tall Oregongrape	Berberis aquifolium	2	AHL	P	?	Plant if buffer needed, south side knoll.
	redstem ceanothus	Ceanothus sanguineus	T	HL	P	?	Plant if buffer needed, south side knoll.
	California hazel	Corylus cornuta var. californica	1	A	P	?	
	ocean-spray	Holodiscus discolor	2	U	P	?	Plant if buffer needed, south side knoll.
	Lewis' mockorange	Philadelphus lewisii	T	H	P	?	Plant if buffer needed, south side knoll.
	chokecherry	Prunus virginiana var. demissa	T	AHL	P	SB	
	Nootka rose	Rosa nutkana var. nutkana	T	AHL	P	?	
	snowberry	Symphoricarpos albus var. laevigatus	2	HL	P	?	
	Present, but common (do not plant)						
	Osoberry	Oemleria cerasiformis					
	Present, but toxic (do not plant)						
	poison-oak	Toxicodendron diversilobum					

Herbs	**Expected or possible (introduce on a convenient schedule):**						
	lg-flwr. blue-eyed Mary	Collinsia grandiflora	4	U	S	?	Roadside on Cantrell if needed.
	hound's-tongue	Cynoglossum grande	4	U	S	?	Blooms very early (March)
	Menzie's larkspur	Delphinium menziesii	4	H	P	R5	
	fawn lily	Erythronium oreganum	2	U	S	HP	
	chocolate lily	Fritillaria affinis	4	U	P	MC	
	Oregon geranium	Geranium oreganum	4	HL	P	MC	
	cow parsnip	Heracleum lanatum	4	HL	P	HP	Likely present in HP or near.
	Oregon iris	Iris tenax	3	H	P	R5?	
	tiger lily	Lilium columbianum	4	HL	P	HP	
	orange honeysuckle	Lonicera ciliosa	5	A	P	?	
	baby-blue eyes	Nemophila menziesii	3	U	S	FB	
	western buttercup	Ranunculus occidentalis	2	U	S	?	
	Present, but common (do not plant):						
	candyflower	Claytonia sibirica					
	Leichtlin's camas	Camassia leichtlinii var. suksdorfii					
	small-flowered nemophila	Nemophila menziesii var. atomaria					
	sweet cicely	Osmorhiza berteroi					
	licorice fern	Polypodium glycyrrhiza					
	Pacific sanicle	Sanicula crassicaulis var. crassicaulis					
	Present or expected, but too vigorous, too common, or toxic (do not plant)						
	poison-oak	Toxicodendron diversilobum					
	wild cucumber	Marah oreganus					
	cleavers (bedstraw)	Galium aparine					
	trailing blackberry	Rubus ursinus					
	Columbia brome	Bromus vulgaris	2	AL	S	HP	

	California oatgrass	Danthonia californica	3	L	S		See below for source.
	blue wildrye	Elymus glaucus	3	AL	S		See below for source.
	California fescue	Festuca californica	2	AL	S		See below for source.
	Roemer's fescue	Festuca roemeri var. roemeri	3	L	S		See below for source.
	foothill sedge	Carex tumulicola	4	L	S		Tugman Park?

Prairie Seed Mix Table
1.5 ac. needed, but recommend planning on enough for 2 ac.; save leftover for reseeding
Potential sources: PN = Pacific NW Natives (Albany); FB = Friends of Buford Park; SK = Skinner Butte Park
Prices and availability change regularly.

Common name	Latin name	C	lbs/ acre	Lbs. needed for 2 ac. mix	Cost/lb	Total cost	Potential sources:
California brome	Bromus carinatus	3	25	16	$7.90	$126.40	FB
California oatgrass	Danthonia californica	3	25	16	$29.50	$472.00	FB
broad-glumed wheatgrass	Elymus alaskanus ssp. latiglumis	T	15	Any	?	?	FB
blue wildrye	Elymus glaucus spp. glaucus	2	25	10	$15.00?	$150.00	PNW Natives?
Roemer's fescue	Festuca roemeri var. roemeri	3	15	10	$21.90	$219.00	SK
prairie junegrass	Koeleria macrantha	T	15	Any	?	?	FB
				42 (26/acre)		$967.40+	

Attachment C

BEST MANAGEMENT PRACTICES

1) PROTECT THE BEST HABITATS
Identify valuable native communities and species, and strive to protect them as the highest priority. Strive to reduce existing and potential stressors which could negatively impact high-quality, native habitats. Introduction of weed seeds on or near relatively pristine sites is a leading cause of ecological degradation.

2) PHASE LARGE RESTORATION AND MANAGEMENT DISTURBANCES
Phase large-impact restoration activities so that not all of a given habitat patch is affected within a single year. For example, when burning a native prairie, burn no more than half within a single year so as to allow invertebrates in the untreated half to complete their life cycles.

3) MINIMIZE SOIL DISTURBANCE
Minimize soil disturbance by machinery, mountain bikers, and animals. Soil disturbance tends to favor colonization by invasive, exotic species over native species, and can result in erosion. Soil erosion can mean both loss of an on-site resource for plants, and sediment pollution in waterways. Soil-disturbing restoration or construction activities are best accomplished in late summer (after July 15) when soil is dry, before fall rains begin.

4) MINIMIZE DISTURBANCE OF HYDROLOGY
Hydrology changes can affect native communities by producing conditions drier or wetter than optimal. Particularly, channelization (deepening waterways) and soil alterations (compaction, fill, removal, etc.) can affect the amount of water present in soils, which will in turn affect subterranean and terrestrial flora, fungi and fauna. In general, soil work should be conducted when soils are slightly moist, but not when too dry, and especially, not when too wet.

5) CAREFULLY TIME NATIVE VEGETATION DISTURBANCE
Because native species generally are dormant during the hot, dry season until late winter, vegetation disturbance is best conducted between July 15 (after seed set and bird nesting (see above); especially important for annual species) and Dec. 31, to avoid inadvertent damage. Some collateral damage to native species may be expected occur during chemical, mechanical or grazing treatments of exotics.

6) AVOID IMPACTS ON NESTING BIRDS
Minimize noise and vegetation disturbance from March 15 – July 15 so as not to disrupt nesting birds.

7) MINIMIZE WEED TRANSPORT
Identify how exotic invasives are being introduced to the Park, and identify where actions could be taken to reduce introductions, as well as within-site and off-site movement. In general, people, pets, and birds likely are responsible for leapfrog-type plant movement. Many weeds spread by wind or water, and others spread slowly by vegetative growth or local seed fall. So as to minimize transportation of seed during restoration activities, soil should be washed from vehicle tires, and boots and socks should be cleaned when entering or leaving any portion of the site where invasive species are present.

8) USE INTEGRATED PEST MANAGEMENT (IPM) TO TREAT INVASIVE PLANTS
Utilize biological (including manual), mechanical, chemical and other available methods to control invasive plant and animal infestations. Strive to maximize containment and reduction (eradication where possible), balanced with minimizing environmental impacts. Evaluate all feasible options fairly before making a decision for a prescription. Use "Bradley" method of weed control to the maximum extent practicable.

9) CONSIDER NEEDS OF ARTHROPODS
Plants and invertebrates are the foundation of the terrestrial food chain. In particular, insect pollinators are an often overlooked group which need native plant diversity, variety of flower types spread throughout the growing season, many individuals of each plant species. They also need different sizes of standing and down wood (i.e., snags and logs) for nesting (also valuable for other invertebrates). Areas of cleared ground are essential for ground-nesting bees.) Annual seeds can be broadcast in those areas.

- Σ use herbicides intelligently, to minimize impacts on pollinators and other invertebrates
- Σ maximize sunny (prairie) areas with diverse, native plant species, but provide a diversity of habitat types
- Σ provide many individuals of each plant species, and provide flowering throughout the growing season
- Σ use light-touch, ongoing management on restored habitats that do not affect an entire habitat patch in the same year
- Σ provide different sizes of standing and down wood (i.e., snags and logs)
- Σ provide small areas of cleared ground (particularly useful to ground nesting bees) by scraping or flaming; collected annual seeds can be broadcast in those areas
- Σ educate surrounding landowners to follow these same guidelines, thereby effectively enlarging the useful habitat.

10) MINIMIZE INTRODUCTION AND IMPACT OF INVASIVE ANIMALS
Evaluate presence of exotic, invasive animal species such as European starlings, wild turkeys, European honeybees and other species for their impact on native communities and species. Take appropriate actions to deter invasion, and remove where necessary, coordinating with the Oregon Department of Fish and Wildlife.

11) MINIMIZE IMPACTS OF LIGHT
The impacts of night lighting on native plant and wildlife cycles are not well understood. Wherever possible, minimize night lighting near native habitat areas to minimize possible negative effects.

12) ENLIST NEARBY LANDOWNERS
Where possible, educate surrounding landowners to participate in implementing these BMPs on private property, thereby effectively enlarging target habitats, and reducing negative impacts on the adjacent and nearby restored habitats.

Attachment D

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Excerpts from Hendricks Park Forest Management Plan and Supplemental Report
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OAK FOREST MANAGEMENT UNIT

Vision

This remnant oak forest represents a forest type that was more common at the time of EuroAmerican settlement and is now uncommon in the Willamette Valley. This oak forest provides habitat for native plants and animals found nowhere else in the park. A small opening at the west end of the ridge is restored to native, dry-site grasses, wildflowers, and shrubs. To preserve this rare forest type, Douglas-fir and other aggressive trees are removed to maintain oaks as the dominant overstory trees, and non-native invasive species are removed from the understory to allow native shrubs and herbs to recover.

Top Management Priority

Restoration of the remnant oak forest ecosystem is the top priority, while also striving to provide opportunities for visitors to understand, appreciate and enjoy this unique forest environment.

Resource Management Objectives

1. Actively manage the oak forest to preserve this important Willamette Valley vegetation type by preventing Douglas-fir regeneration.
2. Remove and control invasive and other non-native vegetation.

Strategy 1.6 - Restore the Oak Forest by actively managing as a distinctive ecosystem

Actions

1. Undertake actions as outlined in the Habitat Management Plan in the Supplemental Reports, including removing invasive vegetation from the oak forest and maintaining it free of invasives.
2. Prevent Douglas-fir regeneration by selectively removing existing trees and create snags as outlined in the Habitat Management Plan guidelines.

Additional goals and management strategies generally applicable to restoration in the OFMU:

- establish a native nursery on site
- eradicate invasives
- provide snags and logs, and enhance habitat for native bees, butterflies, herptiles, birds, bats
- introduce wayside aster and/or other site-appropriate, rare, natives
- map, maintain and propagate populations of uncommon species

And the following goal was excerpted from the Habitat Management Plan in the Supplemental Report:

Goal 4: Restore the oak forest in the southwest portion of the park.

a. Remove invasives and other non-natives, as previously discussed.
b. Selectively girdle (near the top) to create snags from mature Douglas-fir which are beginning to overtop Oregon white oaks on the southwest ridge, or in other places where overtopping is occurring.
c. If trail is restored, be sensitive to uncommon plants present on the flat rock area at the end of the ridge (i.e., *Saxifraga*).
d. Develop a plan to eliminate non-native grasses, and restore native grasses at the opening at the west end of the southwest ridge.

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Excerpts from Hendricks Park Natural Resources Assessment (in Supplemental Report)
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4.12 Oregon White Oak Forest

Oregon white oak forests occur on mostly southerly aspects on the ridgeline in the southwest part of the park, and oaks dominate the overstory in the Rhododendron Garden. Drier conditions in these areas initially favored the establishment of oak over Douglas-fir. However, Douglas-fir may become established in the shade of the oaks, grow taller than the oaks and eventually shade them out. The oak forest of the southwest corner consists of many younger trees that have established since the mid-1800s with a few large, older trees scattered through the stand. Several mature Douglas-fir trees have emerged from the oak canopy at the ridgeline, and a few Douglas-fir saplings are present in the understory. Camas is abundant in parts of the oak forest, a legacy of the prairie and savanna communities that existed before the trees occupied the site. Invasive understory plants such as English ivy and Himalaya blackberry may be preventing establishment of Douglas-fir beneath the oaks. The understory of the Rhododendron Garden is primarily lawn and planted ornamentals.

4.24 Oak Forest Stand (Stand F)

This stand is located on the ridge in the southwest corner of the park, and is characterized by an Oregon white oak overstory of closely spaced, small to medium sized trees with a shrubby understory in places. A few Douglas-fir trees are emergent from the oak canopy. Oaks are concentrated in the 10 to 40 cm diameter classes with a few stems in the 50 and 60 cm classes. There are 513 stems/ha of Oregon white oak, 160 stems/ha of sweet cherry, 53 stems/ha of Douglas-fir and 6 stems/ha of bigleaf maple. This stand has the highest snag densities in the park - 227 snags/ha - but all snags sampled are 30 cm dbh or less. Few logs are present. The shrub layer is generally dense; Himalaya blackberry, Scot's broom and osoberry dominate. Leichtlin's camas is dense in the herb layer in some areas, but many introduced species are encroaching from adjacent yards and dumped yard debris. A small opening at the northwest end of the stand was formerly the location of a fire lookout. Small rock outcrops are also present in this part of the stand.

Plant communities recorded on survey plots:

9-1	Oregon white oak / Scot's broom - osoberry / Leichtlin's camas - wild cucumber - bedstraw
9-3	Oregon white oak - sweet cherry / sweet cherry / English ivy

Existing and potential typical communities:

Zone 9: Oregon white oak forest community	
Existing	Oregon white oak / sweet cherry / Himalaya blackberry / English ivy
Potential Native	Oregon white oak / osoberry / Leichtlin's camas

Common and expected species:

Zone 9: Oregon white oak forest, species by layer	
Trees	Oregon white oak, Douglas-fir, Pacific madrone, bigleaf maple, grand fir
Shrubs and Small Trees	Osoberry, poison-oak, snowberry, Pacific serviceberry, California hazel, Douglas' hawthorn, tall Oregon-grape, Lewis' mockorange, Nootka rose, ocean-spray
Forbs	Leichtlin's camas, wild cucumber, bedstraw, licorice fern, small-flowered nemophila, sweet cicely, candyflower, Pacific hound's-tongue, Pacific sanicle, Oregon iris
Graminoids	Blue wildrye, Columbia brome, California brome, Roemer's fescue (not presently in the park), California fescue, California oatgrass, Sitka brome

As with English ivy, two species of periwinkle are invading from neighboring yards. These two species occur only in Zone 9, where they appear to have crept north from yards to the south. We have not noted these species spreading by seed, but only by creeping across the ground. And like ivy, they tend to form monocultures at the exclusion of native herbaceous species.

Attachment E

Forest Restoration Prescription for Oak Knoll, Hendricks Park

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The condition and potential for restoration of Oregon white oak trees was assessed at the oak knoll site in February 2006. While historically dominated by oak, much of Hendricks Park has succeeded to conifer forest. Oaks persist on the oak knoll due to the south aspect, which provides more solar exposure to the sun loving oak trees, and as a result of the development that has occurred along the south park boundary, which has maintained an open conditions. The age of oaks in the project area is unknown. However, most appear to be part of a single cohort containing trees that are likely 120-180 years of age. Some younger oaks occur in the western portion of the project area. Oaks throughout the project area originated in dense patches, after agriculture, or grazing was abandoned on the site. Fire, induced by Native Americans and natural causes kept the site oak and prairie dominated prior to this. We suspect there were some open grown trees on the site. These trees may have been cleared during early settlement by Euro-Americans, or died of natural causes. We only identified a few oaks that appear to predate the settlement period. These trees were open grown, as evidenced by their large low branches

While most of the oaks in the project area were Oregon white oak, several California black oaks were observed. This is the northern edge of that species range. Trees of this species are also highly intolerant of shade. All trees of this species observed were declining due to conifer overtopping and competition with adjacent trees.

Due to the high tree density under which the oaks on this site developed, most of these trees are spindly, lack healthy crowns, and have high height/diameter ratios (a measure of the stability of a tree with high values indicating a tree has grown under dense conditions). Some of this condition results from intraspecific competition (between neighboring oaks). Competition among oaks causes side shading which reduces the live crown of trees. In addition, Douglas-fir trees have overtopped many oaks along the edge of the oak and conifer forest types and has resulted in additional decline and mortality of oaks. Tree health of oaks is positively correlated with aspect. Oaks on the southwest facing slope are generally in a better condition, whereas oaks on the north-facing slope are in poor shape or have already died. Even with the declining nature and poor overall health of nearly all oaks in the project area, we observed differentiation of the oak canopy (separation of trees into dominant, co-dominant, intermediate and suppressed tree classes). This provides the opportunity to pick the best oaks and "release" them from competition by neighboring trees.

We identified nearly 4 acres of oak woodland that are suitable for overstory restoration in two treatment areas (Figure1). Due to the declining trends of many of the oaks on this site due to Douglas-fir competition, we view these treatments as necessary and urgent to reverse the decline of this important habitat. In areas where oak are overstocked, thinning treatment is also needed immediately to increase vigor of select trees. The resulting silvicultural prescriptions for these sites were influenced by the following criteria and observations:

- The recognition of the current habitat value of this site, which is an ecotone between conifer and oak, stands, even though this condition probably did not exist at Oak Knoll during reference period (prior to 1840). This interface between oak and conifer types is the preferred habitat of the western grey squirrel (WGS), a species whose habitat has been declining in the Pacific Northwest, and is threatened in Washington State. This species prefers a mix of Douglas-fir and oak and dense continuous crown cover, which facilitates movement through the canopy for this squirrel. However, this structural condition is transitory, with succession toward Douglas-fir in the absence of disturbance that favors oak. Western grey squirrels use both conifers and oaks for nesting, feeding and cover. Acorns are an important seasonal component of their diet. Many other wildlife species also utilize acorns. Acorn production is heavily influenced by oak vigor (suppressed oaks do not produce many acorns). Loss of the oak component will seriously reduce habitat quality for this species.

- Many of the oaks on the site would benefit from thinning, designed carefully to remove some neighboring trees from around desirable oaks. Both Douglas-fir and oaks will need to be thinned. Thinning adjacent oaks is the best method to help restore oak vigor, and potentially increase mast production (acorns).

- In light of the habitat needs of WGS, thinning should balance need to improve individual oak vigor while maintaining canopy connectively, especially where oaks and fir meet, wherever possible.

- Oak knoll is subject to high winds given its topographic position. Tree thinning should proceed with caution and be more conservative than would normally be recommended to release oak trees; spindly trees are subject to windthrow and stem breakage if too many neighboring trees are removed. Thinning should remove fewer trees where oaks are most spindly.

- Special attention should be given to protecting large diameter Douglas-fir trees; removal should only be recommended if presence is seriously limiting the vigor of a desirable oak.

- Douglas-fir trees identified for removal should preferentially be converted to wildlife trees by topping above the lowest whirl of live branches. Snags

should be away from structures and trails and height should be less than the slope distance to these features.

- Careful consideration should be given to maintaining the aesthetic qualities of oak knoll. This concern needs to be balanced with the need to improve the health of oak trees so they remain a long-term feature of this part of Hendricks Park.

Prescriptions

Overstory Treatment Area # 1

The primary focus of this treatment is to restore oaks to a more open condition. Overstory Treatment Area #1 is approximately 1.2 acres (Figure 1). Oaks in this area are shorter generally, have fuller crowns, and are less sensitive to wind, snow/ice damage, compared to the taller more spindly trees in Overstory Treatment Area # 2. This area is generally free of conifer overtopping but the oaks are overcrowded. Tree marking selected smaller, poor vigor trees. A natural gapy/patchy pattern of trees was encouraged by thinning trees in small groups in some places (removing several trees in a group as opposed to individual tree selection) and individual trees in other places. A desired canopy cover of 40-60% was used as an approximate target. At this level of cover, native savanna understory plant community can be effectively restored.

Oak trees marked for thinning will be hand felled. Some Douglas-fir along the west boundary of this area may be topped to create wildlife snags. Several options are available for dealing with biomass created by tree cutting and topping. This material can be piled and covered with heavy gauge wax paper and burned in the late fall. Given proximity to houses and smoke management issues, a more appropriate method would be to chip the material at a centralized area, where chips can be blown into a truck or in piles for use on trails. A woods chipper (a chipper mounted on a rubber tracked skid steer) is another option, though poor access makes this an unlikely option. Some of the larger oak boles can be retained for small mammals, reptiles and amphibians. These should be arranged in piles. Douglas-fir boles should be left on site as down woody debris.

To maintain visual qualities of the park, all stumps should be cut flush to the ground wherever possible, extreme care should be taken when falling trees or snag topping to insure adjacent trees are not damaged. If a tree can not be removed without damaging desirable adjacent trees, it should not be felled. Most of the Douglas fir should be climbed and limbed prior to felling to reduce stand damage when the tree falls through the oak canopy.

To minimize negative impacts on wildlife, treatments should be completed after forest birds fledge, this is usually completed by early August.

Overstory Treatment Area # 2

The primary focus of this treatment was to improve vigor of select oak trees while maintaining fairly dense canopy cover for WGS, and to reduce potential wind damage. A desired canopy cover of 70-90% was used as an approximate target. At this level of cover, a native oak/conifer woodland understory plant community can be effectively restored. When thinning oak, smaller, poor vigor trees adjacent to desirable oaks were selected for removal. Marking was intended to produce small openings in the canopy, which will allow nearby oaks to expand their crowns. Douglas-fir were marked for removal or snag creation if they were overtopping desirable oaks, and if their removal would not significantly reduce canopy connectivity. Slash and boles will be dealt with similar approach used in Overstory Treatment Area # 1. Maintenance of visual qualities of this area will be insured using same practices described for Overstory Treatment Area # 1.

To minimize negative impacts on wildlife, treatments should be completed after forest birds fledge, this is usually completed by early August

Tree Marking Results

We marked a total of 18 Douglas-fir trees (12 for removal, and 6 for snag creation). Diameters ranged from 14.1 cm- 94.5 cm [5.6-37.8" dbh (diameter at breast height)]. See Figure 2 for location of marked Douglas-fir trees. All trees selected for removal or snag topping were marked on opposite sites of the tree with yellow spots. Method of treatment for Douglas-fir was recorded by tree tag number. This will be provided in final attribute table. Since most oaks were not previously surveyed, their locations are not included on this map. A list of all oaks marked for removal will be provided. We marked an additional 105 oak trees for removal with a diameter range of 2 to 15" DBH.

Project Budget for Overstory Treatments at Oak Knoll, Hendricks Park

	Thinning	*Landing Chip*	*Woods Chip*	*DF Snag/Fall*	*Total-1*	*Total-2*
Overstory Treat # 1	$1,800	$1,500	$1,360	$100-300+/tree	$3,300	$3,160
Overstory Treat # 2	$2,760	$2,500	$2,720	$100-300+/tree	$5,260	$5,480
Total					**$8,560**	**$8,640**

Total-1 includes Landing Chipping option, Total-2 includes Woods Chipping option,

All totals do not include cost of Douglas-fir snag creation/falling, add additional $1800-$5400

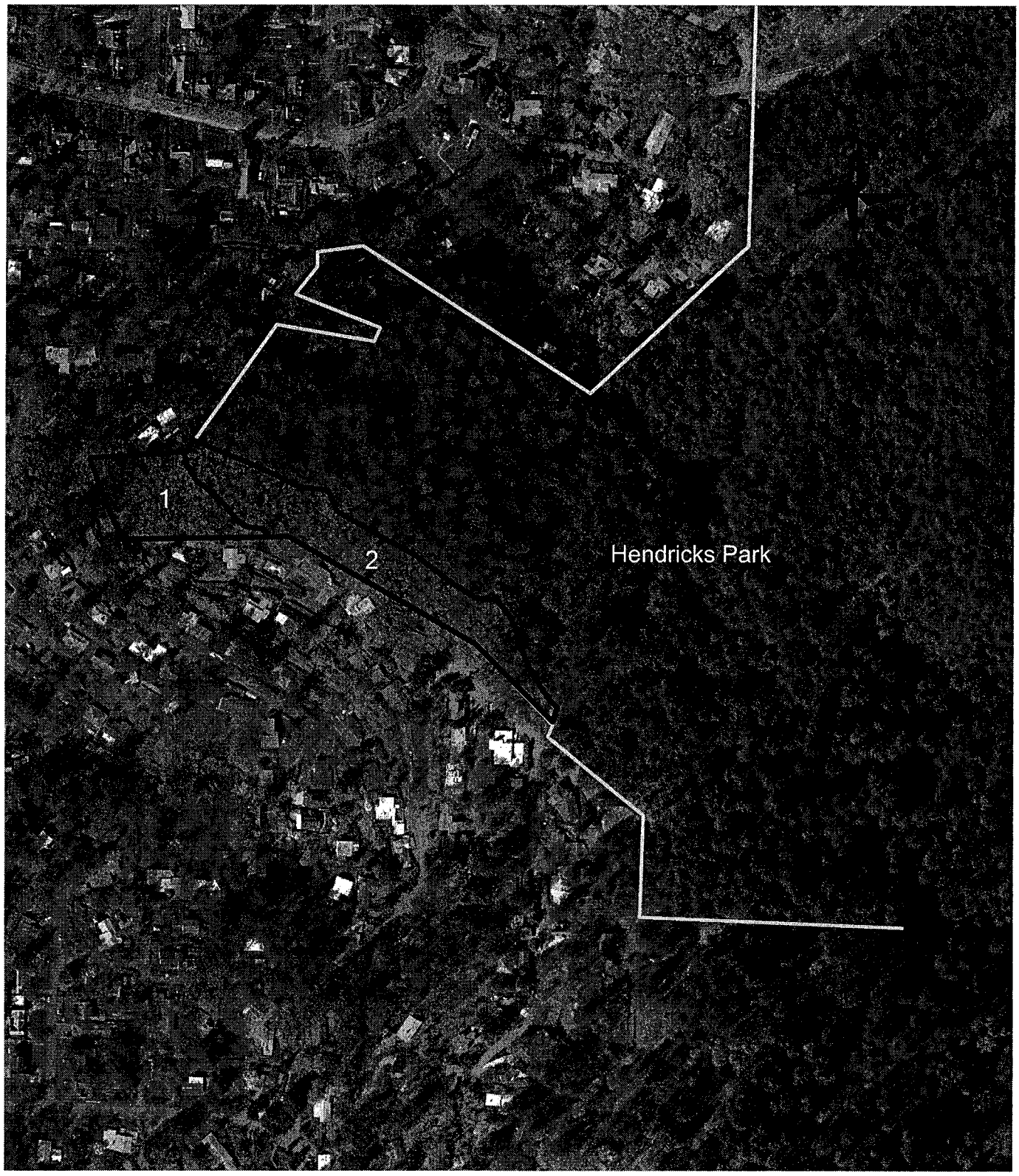

Figure 1. Oak Knoll and Vicinity

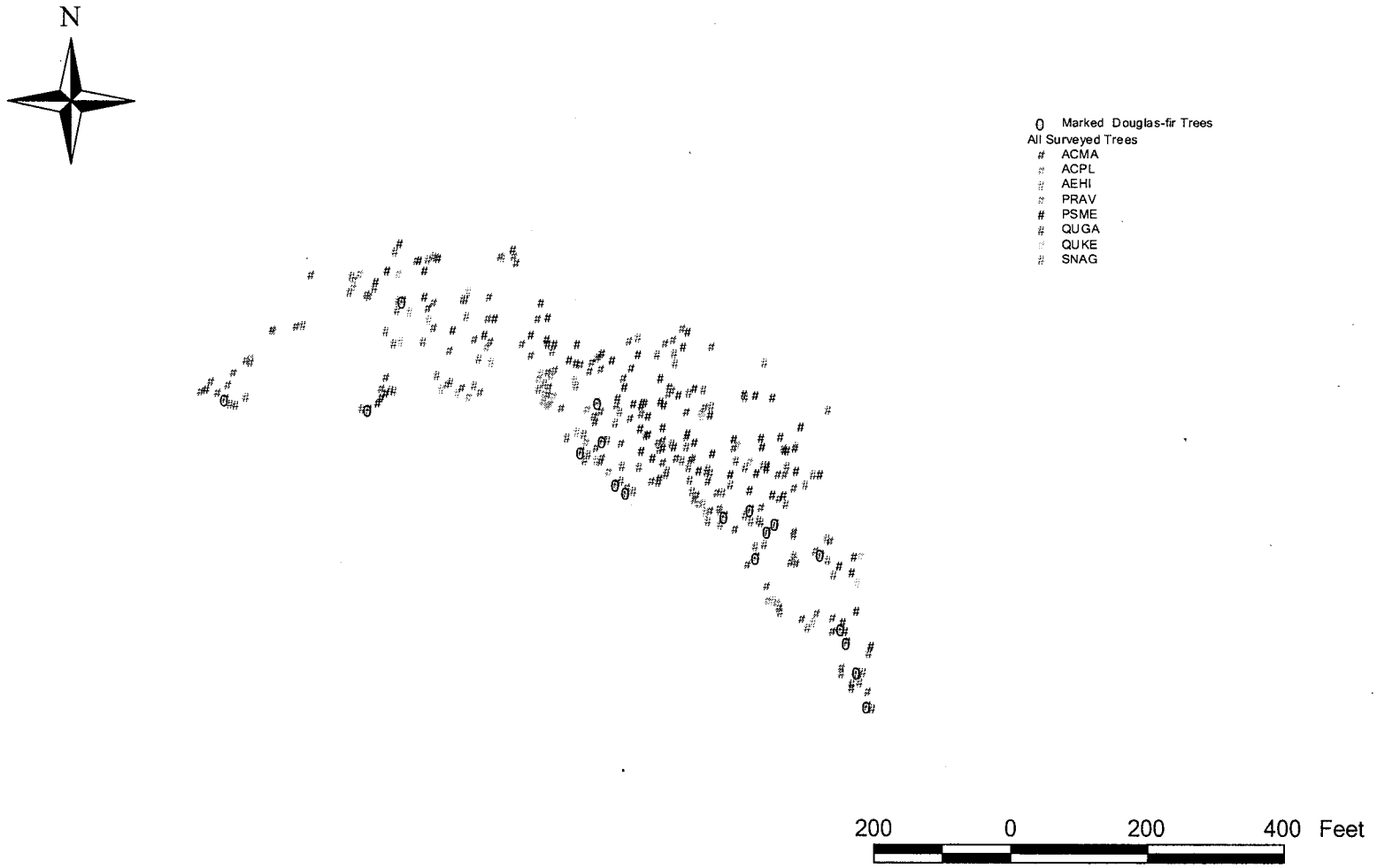

Figure 2. Location of Surveyed and MarkedTrees at Oak Knoll

Trees Planned to Cut or Snag at Oak Knoll

DBH (")	SPECIES	# of Trees			DBH (")	SPECIES	# of Trees
2	QUGA	4			2	PSME	
3	QUGA	15			3	PSME	
4	QUGA	16			4	PSME	
5	QUGA	4			5	PSME	
6	QUGA	4			6	PSME	1
7	QUGA	5			7	PSME	
8	QUGA	11			8	PSME	
9	QUGA	8			9	PSME	2
10	QUGA	20			10	PSME	1
11	QUGA	10			11	PSME	1
12	QUGA	4			12	PSME	
13	QUGA	2			13	PSME	
14	QUGA	1			14	PSME	
15	QUGA	1			15	PSME	2
Total		**105**			16	PSME	
					17	PSME	
					18	PSME	2
					19	PSME	
					20	PSME	1
					21	PSME	1
					22	PSME	1
					23	PSME	
					24	PSME	1
					25	PSME	1
					26	PSME	1
					27	PSME	2
					28	PSME	
					29	PSME	
					30	PSME	
					31	PSME	
					32	PSME	
					33	PSME	
					34	PSME	
					35	PSME	
					36	PSME	
					37	PSME	
					38	PSME	1
					Total		**18**