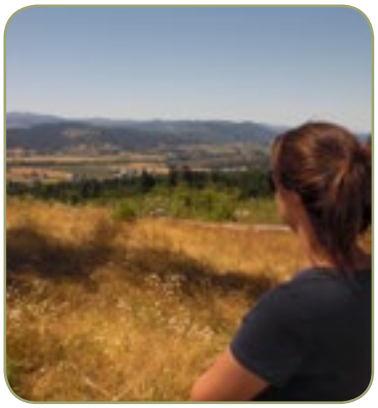
SITE CONSERVATION PLAN

# Chehalem Ridge Natural Area





January 2014

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# SECTION 1: INTRODUCTION

## 1.1 Context

Chehalem Ridge Natural Area lies at the north end of the Chehalem Mountains in rural Washington County. The 1,196-acre property extends over the ridge on both the east and west slopes above the Tualatin River and its floodplains, including parts of the Upper Tualatin-Scoggins and Middle Tualatin sub-basins. Iowa Hill, at 1,122 feet, is the highest elevation on the property and is located near the property center. Most recently managed as an industrial tree farm owned by Stimson Timber Company, the property was purchased from the Trust for Public Lands by Metro as part of the 2006 natural areas bond measure in 2010.

A biological assessment conducted for the Chehalem Ridgetop to Refuge target area in May 2007 identified the Oregon white oak components of the western slopes of the property as the lands with the most significant habitat value, in addition to the large blocks of upland forest habitat. Important biodiversity corridors link the forested ridgetop Douglas-fir, mixed hardwoods and oak woodlands to Wapato Lake and the Tualatin River floodplain, including areas of the Tualatin National Wildlife Refuge. Avian point count surveys have identified the deciduous habitats, particularly those associated with drainages, to be valuable habitat for neotropical migratory birds. Preliminary amphibian surveys have identified several wetland and stream complexes that provide habitat for sensitive amphibian species. Western gray squirrels are found on the site.

In addition, the Chehalem Mountains provide an important scenic panorama when viewed from the urbanized portion of Washington County. The forested upper elevations provide excellent potential for recreational and educational opportunities as well as sweeping landscape views. The young age and small size of the trees across most of the property allow for expansive views of the river valley and multiple Cascade mountain peaks including Mt. St. Helens, Mt. Adams and Mt. Hood.

The Chehalem Ridge Natural Area Site Conservation Plan is a tool for protecting and enhancing the unique characteristics of the site while allowing access by the public. This plan has been developed by Metro staff and includes an overview of the history of the site, existing conditions, conservation targets and recreation and access objectives.

## 1.2 Goal and objectives of the conservation plan

The goal of this plan is to describe a course of action that will protect and enhance the area as an environmental and recreational resource for Washington County and the Portland metropolitan region. With its rare and unique habitats, excellent views and large habitat area, the Chehalem Ridge Natural Area will be preserved as a historical remnant of the large coniferous forest, early successional forest habitat and Oregon white oak woodlands complex that once graced the Willamette Valley. The site will serve to enhance water quality and wildlife habitat and provide public access opportunities. Only those recreational uses that are compatible with the environmental objectives of this plan will be encouraged.

To achieve this goal, this plan establishes a series of priority objectives, including:

- Restore and maintain high quality examples of Willamette Valley Oregon white oak woodlands, upland coniferous forest, shrub and riparian habitats.
- Provide access to Chehalem Ridge Natural Area that supports appropriate types and levels of recreation.
- Provide opportunities for research and education to local schools.
- Develop appropriate funding strategies to implement environmental and recreational improvement projects.

## 1.3 History at the Chehalem Ridge Natural Area

Of the 1,196 acres, 1,143 were managed by Stimson Timber Company as a commercial tree farm. Stimson purchased the majority of the property from John Zaiger in the 1980s. Several smaller parcels were purchased from Starker Forest and area farmers. Stimson converted approximately 550 acres of farmland into densely stocked Douglas-fir plantations in 1991. Prior to Stimson's ownership the property had been in agricultural or forestry use. Zaiger operated a lumber mill on the property and the old mill pond is still present, located just north of Dixon Mill Road near the western property boundary. Although the pond diminishes significantly by late summer, it still provides a small but permanent water source for wildlife. There were several old homesites on the property used by the Zaiger family or farmers, but none of the structures remain.

### Metro's natural areas bond acquisition program and Chehalem Ridge Natural Area

During the last 16 years, two voter-approved natural areas bond measures have allowed Metro to protect over 12,000 acres across the region – the equivalent of more than two Forest Parks, or nearly enough land to cover the city of Beaverton. Voters have protected 90 miles of river and stream banks, opened three major nature parks and supported hundreds of community projects. Metro continues to buy land in 27 key target areas, chosen for their water quality, wildlife habitat and outdoor recreation opportunities.

Additional information about the 2006 natural areas bond measure and goals and objectives for the Chehalem Ridgetop to Refuge target area can be found on the Metro web site, www.oregonmetro.gov/naturalareas.

Since 2006 Metro has acquired 1,196 acres in the Chehalem Mountain area of Washington County, preserving this area for conservation rather than a housing development. Table 1 below shows the history of purchases and Table 2 shows other noteworthy land ownership adjacent to the Chehalem Ridge site.

**Table 1: Metro natural area bond purchased land**

| Property name (previous owner) | Date acquired | Bond year | Management |
|---|---|---|---|
| Berry 48.001 (Hamacher/Ponzi) | 02/11/2008 | 2006 | Metro |
| Berry 48.001A (Hamacher/Ponzi) | 12/31/2007 | 2006 | Metro |
| Trust for Public Land/CRNA 48.002 | 01/07/2010 | 2006 | Metro |
| McKenzie 48.004 | 09/22/2011 | 2006 | Metro |

**Table 2: Noteworthy adjacent land ownership**

| Site name | Landowner | Acres | Noteworthy features |
|---|---|---|---|
| Wapato Lake Unit of the Tualatin River National Wildlife Refuge | U.S. Fish and Wildlife Service | 400+ | 80%+ of the original Wapato Lake bed is protected by the USFWS. |
| Fern Hill Forest | Metro | 192 | This Metro natural area is located one-half mile north of Chehalem Ridge Natural Area. |
| Wapato View | Metro | 147 | This Metro natural area is located a quarter-mile west of Chehalem Ridge Natural Area. |

# SECTION 2: PLANNING PROCESS SUMMARY

## 2.1 Planning area

This plan will consider the entire 1,196 acres of land including four parcels owned and managed by Metro. A map showing Metro ownership and outline of the planning area can be found as Map 1 later in this document.

## 2.2 Planning process

Developing a useful site plan means adequately providing for its preservation, enhancement and management. This plan will build on previous restoration and management efforts while acknowledging that evolution of the ecosystem requires analysis of the site, meaningful engagement of stakeholders and integration of historical, current and future needs. Development of this plan includes several important elements: development of conservation targets, public meetings to receive input from local stakeholders and implementation of projects.

A two-tiered approach is used to improve natural resource conservation and integrate meaningful human experiences through physical and visual access. This plan recognizes that the conservation of species, habitat and natural features must occur simultaneously with the provision for human access to these natural systems. Education and exposure are the cornerstones for protecting the natural area for decades to come. This two-tiered approach also recognizes that conservation and access have different stakeholders, different funding sources and different strategic approaches. Initially this plan reviewed the overarching project goals and objectives common to both conservation and access. The project then developed conservation and access strategies independently. Conservation is discussed in Sections 4 and 5 of this document. Access is discussed in Section 6.

### Planning project goals

The planning goals for both the natural resource conservation and access portions of this plan are listed below.

**Natural resource conservation**

- Map and define major habitat types.
- Establish habitat and species conservation targets.
- Define key ecological attributes and analyze stresses and sources for the conservation targets.
- Establish strategies and actions to restore habitat.
- Identify actions and implement.

**Access**

- Analyze existing public use of the Chehalem Ridge Natural Area.
- Develop a trail and signage plan that provides high-quality experience and preserves sensitive habitats.
- Develop cost estimates.
- Identify actions and implement.

## SECTION 3: EXISTING CONDITIONS

This section of the conservation plan provides background on existing conditions for the Chehalem Ridge site.

### 3.1 Physical environment

The property is located in T1S R3W Sections 28, 29, 30, 32 and 33. It is divided by Dixon Mill Road into north and south sections. The larger portion of the property lies to the north of the road (996 acres) with the smaller portion to the south (200 acres). It is approximately 5 miles east of Gaston and 10 miles from Hillsboro, Oregon

Chehalem Ridge Natural Area has a moderate climate characterized by warm, dry summers and cool, wet winters. Most of the precipitation falls as rain during the months of November through March. Snow occasionally occurs at the high elevations but rarely accumulates. There are no rainfall data for the Chehalem Ridge, but average rainfall amounts are probably between 35 and 60 inches based on records from proximal locations.

The Chehalem Mountains were formed through tectonic folding and uplifting of Columbia River basalt lava flows (predominantly on the east side of Chehalem Ridge) and sedimentary formations. Two major geologic units are associated with the site:

- Geologic Unit Tsd – Sedimentary marine shale, siltstone, sandstone and conglomerate, found primarily on the western slopes of the natural area.
- Geologic Unit Tc – Columbia Gorge Basalt and related flows, found throughout the Chehalem Mountains but particularly along eastern slopes.

Chehalem Ridge Natural Area soils are primarily Laurelwood, Saum, and Melborne alfisol soils. Alfisols are silty loams that develop under a forest canopy. Alfisol soils have experienced moderate leaching and have a high native fertility. The Laurelwood soil unit is represented on over 60 percent of the property and includes the forests located on the old agricultural lands. The Laurelwood series is characterized by very deep, well-drained soils, making them highly favorable for forestry and agricultural use. The Melbourne and Saum soils are primarily on the steeper west and south slopes. Erosion from all of these soils is high in areas not protected by vegetation.

The ridgetops of the Chehalem Mountains, particularly on the west slopes, have an unstable overburden of silt-clay soils. These soils are prone to slumping and sliding, and stream channels tend to incise rapidly through the fine-grained material. A slide occurred along the southern boundary of the property in 1996 as the result of heavy rains. The site of the slide was assessed by

Stimson Timber Company in 1999 and by Metro in 2010. The desired future condition and associated management activities may need to be modified on the slopes identified as prone to landslides. The areas most prone to slides and slumps appear to be at the junction of the two geologic units. The geo-technical report developed for Metro (Preliminary Geotechnical Evaluation, Chehalem Ridge Property, Pacific Geotech LLC, July 2010) is in the property file and should be consulted prior to planning site-disturbing activities.

Property access is primarily via Dixon Mill Road. Dixon Mill Road is a gravel surface county road that provides access to the primary entrance points to the north and south parcels of the site. Gnos Road provides secondary access to the north end of the site. Any future development of the natural area for public access will need to address development of the primary public access points. A potential west-side access off Withycombe Road is being investigated. This access, if developed, would provide more rapid access to the northerly areas of the site for management and emergencies.

The property has a system of gravel roads that provide the main access to and through the property. Numerous dirt logging spurs intersect with the main access roads. Some of the spur roads provide important access for long-term management activities across the property. However, these old dirt "legacy" roads can contribute significant sediment to streams. Stabilizing legacy roads is an important Best Management Practice for protecting water quality. Metro has surveyed the road system, identified problem areas such as rutting and plugged culverts, and completed road repairs. Most dirt-surfaced spur roads are slowly being re-vegetated or closed off through natural recruitment of plants, a process that will continue on roads not needed for routine maintenance or property protection.

## 3.2 Streams and wetlands

There are four perennial streams within the natural area (Table 3 and Map 2), although the presence of perennial water in the streams on the property in any year may vary due to yearly rainfall amounts. Two first order tributaries to Christensen Creek drain from the southeast corner of the property north of Dixon Mill Road. Both have evidence of old dams but the dams have failed due to lack of maintenance. Three first order tributaries to Harris Creek are located on the west side of the ridge. Two of these streams are located in the northwest corner of the property; they are spring-fed and most years are not perennial. The most southerly tributary to Harris Creek is perennial and fish-bearing in lower reaches. A Hill Creek tributary in the southwest corner of the property drains two ash-cottonwood swales along the south boundary and is perennial in wet years.

**Table 3: Perennial streams at Chehalem Ridge Natural Area**

| Stream | Length | Condition |
|---|---|---|
| Hill | 450 ft | Moderate gradient stream with a narrow riparian forest with scattered large trees, an impounded old mill pond, native understory and beaver activity. There is approximately 1,700 feet of additional intermittent stream. |
| Harris Creek tributaries | 1,700 ft | Moderately steep gradients with narrow riparian forests. |

| Stream | Length | Condition |
|---|---|---|
| Christensen | 1,310 ft | North tributary: Moderate gradient stream with narrow, somewhat fragmented mature riparian forest. Active beaver population in channel.<br>South tributary: Moderate gradient stream with a narrow to absent riparian forest. In places the stream is dominated by non-native grasses. Active beaver population present in the stream channel.<br>There is approximately 2,400 feet of additional intermittent stream. |

There are four developed springs and multiple seeps and ephemeral streams that carry water during the winter or after high rain events, and provide water to adjacent properties (see Map 2). Only one of these has water rights associated with it. This spring, on the site's western boundary, is fenced with a developed spring box and serves eight residences and the structures at Fisher Farms Nursery. There is an additional developed spring that provides water to the house located at 40845 SW Burkarsky Road, located in the northwest corner of the natural area. The house is currently on well water. Another spring on this property has an access easement for the pipeline to the spring but there is no state water right for the withdrawal of water. It is unknown how many homes are withdrawing water from this spring. Another spring draining to Davis Creek is located on the boundary of the property and the James "Mark" Zaiger property along the northern boundary. No water right exists for this withdrawal.

The property includes several small forested wetlands (<2 acres each), composed primarily of Oregon ash, Oregon white oak, black cottonwood, Douglas-fir and bigleaf maple. The rarity of wetlands in the Chehalem Ridge Natural Area increases the wildlife value of these areas. In addition, there is a small abandoned mill pond along Dixon-Mill Road. Two separate ponds lie at the east end of the panhandle; one is likely a fire impoundment, but the origins of the second, an ash-oak swale, are unknown. Both harbor amphibian egg masses in spring. An old degrading impoundment on Christensen Creek is now part of a complex of beaver dams (see Map 2).

## 3.3 Natural habitats

### Historic vegetation

In 1841, Surveyor George F. Emmons described the view from the site as he stood on the ridge of the foothills and looked down into the Willamette Valley:

> *From the top of these [hills] at an altitude of about 1,000 feet – had a panoramic view…prairie to the south as far as the view extends – the streams being easily traced by a border of trees that grew up on either bank…white oak scattered about in all directions.*

The historic vegetation of Chehalem Ridge Natural Area was influenced by climate, soils and human activity such as anthropogenic fire. Oak woodlands probably extended to the ridgeline in many places on the west slopes of the site. Forests on the eastern slopes were described as scattered Douglas-fir timberlands. These were relatively open forested lands that included western red cedar and bigleaf maple in the drainages and occasional western hemlock at the highest elevations.

In the present day, the site can be generally characterized by four natural habitat types, which are also the conservation targets (see Section 4 and Map 3): early successional shrub habitat, riparian

areas, young conifer and mixed conifer-hardwood forests, and scattered stands of oak. More than 85 percent of the forest is closely spaced Douglas fir less than 30 years old, and the long-term goal is to move most of it towards old growth. Snags and down wood are limited or absent and generally not well-distributed across the property. More detailed characteristics of these habitats in western Oregon, including associated plant and wildlife communities, are in Chapter 3 of the Portland-Vancouver *Biodiversity Guide*.

### Wildlife at Chehalem Ridge Natural Area

Information on fish and wildlife habitat and use is still being collected. Further investigations and discussions are needed related to species-specific management issues in this natural area. The property provides good habitat for species favoring young, early successional forests but very limited habitat for species requiring late successional structure and composition. The riparian and wetland areas have narrow buffers generally surrounded by young, dense forest or early successional shrub-sapling communities. The site has springs, seasonal seeps from near-surface groundwater, and perennial streams. Although most water sources are dry or extremely low during the summer months, the presence of some year-round water is a significant benefit to wildlife. Short-term prescriptions will consider how to enhance existing habitats and accelerate development of habitat diversity in the large dense forest plantations. A list of known species of wildlife is in Appendix 1.

Avian point count surveys were conducted in two stands from 2010 to 2013; a dense stand in the stem exclusion stage and a shrub-sapling community. The surveys yielded some surprising results including several species declining in the region, such as the yellow-breasted chat and olive-sided flycatcher. These two at-risk species and many others are associated with early successional habitats, prompting a conservation goal to retain some of this habitat in the natural area. Ruffed grouse are regularly seen on the property, as well as a variety of woodpeckers including downy and hairy woodpeckers, Northern flicker, red-breasted sapsucker and pileated woodpecker. Three point count stations were in areas that were thinned in 2012, and it will be interesting to see changes over time due to forest management. Two or three additional point count stations may be added to better track these changes.

Mammals present at the site include beaver, raccoon, coyote, Columbia black-tailed deer, weasel, Douglas' squirrel, California ground squirrel, porcupine and bobcat. Western gray squirrels have been seen on the property. Cougar have been sighted in the vicinity but not on the property. Wildlife cameras have been useful in capturing the busy nightlife along the perennial streams.

Amphibian presence-absence surveys were conducted at the site in 2011 and 2012. Six amphibian species were found: ensatina, Dunn's salamander, northwestern salamander, rough-skinned newt, red-legged frog and Pacific tree frog. Garter snakes, southern alligator lizards and rubber boas have also been observed.

### Biodiversity corridors

Native animals and plants require the ability to establish or re-establish local populations in order to maintain healthy regional meta-populations. In areas such as ours, where significant habitat fragmentation has occurred, relatively linear corridors can help meet these needs.

In 2010-2011, Metro hosted a series of biodiversity corridor workshops on behalf of The Intertwine Alliance. The results were compiled and made available to participants via a map server. The workshops gathered the opinions of wildlife and habitat professionals in the region; the results are best professional opinion only, are not meant to be property specific, and make no attempt to prioritize or assess on-the-ground issues such as barriers. The focus of the workshops was generally on species requiring woody vegetation for movement. Nonetheless, the information can provide valuable insight into existing and potential connectivity from Chehalem Ridge Natural Area to other important habitat areas in the region. The workshop results suggest biodiversity corridors – some less intact than others – to other important habitats as follow:

- Connections to the east through agricultural lands to key bottomlands are tenuous, with significant woody vegetation gaps. To the west, Metro recently purchased 147 acres that includes 5,840 feet of an unnamed tributary originating on the western edge of Chehalem Ridge Natural Area and draining to the Wapato Lake unit of Tualatin National Wildlife Refuge. The northern and southern branches of Harris Creek also provide connections through farms and fragmented forest and woodland habitat. .
- To the north, relatively intact forested areas connect to Fernhill Wetlands and other key Tualatin River floodplains. A less intact, but mostly riparian corridor initiates from Chehalem Ridge in the same area but veers eastward via Jessie Reservoir to the Tualatin River.
- Christiansen Creek and its tributaries provide a complex of linear connections among wetlands and ponds and to upland forests north of Bald Peak Road.
- A substantial forest complex runs from the southeast portion of the natural area and provides both a large habitat patch and connectivity to other habitats east- and southward.

#### Climate change adaptation considerations for Chehalem Ridge

At Chehalem Ridge, stressors from climate change will likely derive primarily from increased competition from invasive species, intensified summer drought and altered hydrology resulting in less year-round water. More open areas, such as oak habitat and thinned stands of Douglas fir, will be particularly susceptible to invasive species. On the other hand, it is possible that conditions will be more conducive to oak habitat. In forests, drier summer conditions could curtail tree growth and increase the risk of stand-replacing wildfires.

Aggressive forest thinning and dealing appropriately with fuels can increase resilience to climate change. Metro will need to be vigilant in Early Detection-Rapid Response activities, and more staff and financial resources may be needed to deal with invasives in the future. Establishing native plants where needed now can help defend against invasives at Chehalem Ridge. The potential for altered hydrology increases the importance of riparian forest health and width, as well as preserving and enhancing large-scale biological connectivity. These activities are addressed in this plan and the related Site Stewardship Plan.

### 3.4 Fire and fuels

No fire history specific to the Chehalem Ridge was found. However, it is likely that all of the property experienced periodic large-scale wildfires ignited by resident Native Americans (the Che-

ahm-ill people, a sub-group of the Kalapuya), settlers, later residents after 1800 and occasionally by lightning. The historic presence of Oregon white oak woodlands is generally interpreted to indicate periodic fires that prevented conifers from replacing the Oregon white oak.

The fuel complex is mainly young Douglas-fir stands of various ages. The stands approaching 25 years old (approximately 550 acres) are very tightly spaced and have minimal understory vegetation. Stands less than 15 years old (approximately 450 acres) have some shrub component, though chemical control by Stimson Lumber has resulted in lower shrub cover in some regenerating stands. As Metro's management goals differ from Stimson Lumber the shrub component will likely increase in the short term. A few small stands of larger trees with native understory vegetation occur in riparian zones across the property. There are scattered slash piles remaining from former logging operations.

### 3.5 Existing trails and use by the public

To date there has been no formal master plan for public use and public access is not encouraged. However, legacy roads from logging provide pleasant trails for neighbors and a limited number of people from other areas. While this in itself is not necessarily harmful, people do sometimes block the fire lane road at the main gate, and some people bring in leashed and unleashed dogs. There have been significant problems with trails created by off-road vehicles and to a lesser degree equestrian trails; these have been closed and staff continues to monitor the site for this type of unauthorized use. A master planning process is planned for 2015/2016.

## SECTION 4: CONSERVATION

This section provides a comprehensive framework for the Chehalem Ridge site through conservation planning. This framework follows the Conservation Action Planning template (The Nature Conservancy 2007) and includes analyzing the site, establishing conservation targets, evaluating key ecological attributes (KEAs) for each conservation target, analyzing threats affecting conservation targets and developing action plans to abate serious threats.

### 4.1 Conservation targets

**Table 4: Chehalem Ridge conservation targets and relative priority**

| Conservation target | Attributes of healthy habitat |
|---|---|
| Riparian habitats (headwater streams, wetlands and ponds) | Except for herbaceous wetlands, high quality riparian habitat is generally associated with about equal amounts of native tree and shrub cover with good species diversity. Snags and downed wood are key habitat elements. Oregon ash, cottonwood, western red cedar, willow and alder are characteristic tree species. This target includes 3.94 acres of forested wetlands. ***Current cover: approximately 98 acres. Desired future cover: approximately 200 acres.*** |
| Upland shrub habitat | The region's upland shrub habitat is typically early successional forest. Healthy early successional forest communities may be characterized by 30% or greater shrub cover consisting of a variety of seed and nectar sources and trees less than 15' tall, and a range of snags and down wood sizes and decay stages. ***Current cover: approximately 206 acres. Desired future cover: approximately 120 acres.*** |

| Conservation target | Attributes of healthy habitat |
|---|---|
| Upland forest | Healthy conifer-dominated forest includes an overstory of deciduous and conifer trees of varying size, with significant (>25%) shade tolerant shrubs and native herbaceous species in the understory. Snags and downed wood in a variety of sizes and decay stages provide key habitat features. Shrubby forest gaps can increase diversity. ***Current cover: approximately 872 acres. Desired future cover: approximately 750 acres.*** |
| Oregon white oak woodland | Healthy oak woodlands typically may contain more than 60 oak-associated native herbaceous species and 25-60% native tree canopy, most of which is oak. A mixture of ages, including old trees as well as new growth, is desirable. Typically the understory is relatively open with grasses and wildflowers and some shrub cover. ***Current cover: approximately 20 acres. Desired future cover: approximately 125 acres.*** |

### 4.2 Key ecological attributes

Key ecological attributes (KEAs) are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy 2007). KEAs define the conservation target's viability. They are the biological or ecological components that most clearly define or characterize the conservation target, limit its distribution or determine its variation over space and time. They are the most critical components of biological composition, structure, interactions and processes, and landscape configuration that sustain a target's viability or ecological integrity. KEAs are rated from poor to very good. This rating helps establish the restoration goals and guide us in development of restoration actions for the conservation targets.

KEAs and indicators for each of the three conservation targets are further described in Appendix 2, Key Ecological Attributes.

### 4.3 Threats and sources

An effective conservation strategy requires an understanding of threats to targets and the sources of those threats. Adjacent development and subsequent disruption of natural systems place stress on the resource and its inhabitants and threaten the health of the greater ecosystem. More specifically, the following threats are evident:

- Altered vegetation structure due to habitat conversion and forest practices
- Lack of standing dead and downed wood
- Competition from invasive species
- Altered fire regime

The methodology for defining threats and sources was established by The Nature Conservancy. It is a well-established, objective methodology with a scientific basis, and is described in more detail in Appendix 3, Threats and Sources.

## SECTION 5: STRATEGIC RESTORATION AND STEWARDSHIP

### 5.1 Conservation target goals and strategic restoration actions

This plan outlines strategic actions to be carried out at Chehalem Ridge over the next 10-15 years. They are based on the short- and long-term goals for the conservation targets and enhancing the

visitor experience. The strategic actions described here are general courses of action to achieve these objectives and not highly prescriptive courses of action. Specific prescriptions will be developed by Metro staff to address site-specific conditions encountered in the areas targeted for restoration action. Table 7 summarizes KEAs, threats, goals and strategic actions for each conservation target.

About 750 acres of habitat are in need of restoration throughout the Chehalem Ridge natural area. This primarily includes thinning and shrub plantings in the young forests, maintaining areas of early successional shrub habitat, and restoring the small patches of oak woodland habitat. Some of the riparian areas are intact, while others will require invasives removal and replanting. Promoting large standing and downed wood will benefit habitats and wildlife throughout the site.

## 5.2 Prioritizing strategic restoration and stewardship actions

It is important to prioritize restoration and stewardship activities for several reasons. Budgetary or time constraints are likely to limit how much work can be accomplished at a given site. Specific actions may rise to the top due to the scarce or unique nature of a habitat type or because abating a certain threat now will save time and money in the future. Table 5 assigns priority rankings to conservation targets. Because the site is just out of stabilization, work will continue on all conservation targets regardless of rankings, but the rankings will help prioritize time or financial investments for various actions over the next 3-5 years. Conservation target priorities are likely to change over time.

**Table 5: Priority status for Chehalem Ridge conservation targets**

| Conservation target | Priority |
|---|---|
| Riparian habitats | Medium |
| Early successional shrub | High |
| Upland forest | High |
| Oak woodland | Medium |

## 5.3 Ongoing maintenance and stewardship programs

The following actions represent ongoing systems or programs that are in place and practices that will be continued and/or enhanced. These actions align with maintaining conservation targets in good or very good condition.

### Stewardship

Metro's Natural Areas Program is committed to long-term stewardship of the Chehalem Ridge site. Metro staff will conduct multiple site walks each year to monitor natural resource condition and public use of the natural area. As determined necessary by staff, specific treatments or actions will be implemented to ensure that the health and condition of the natural area is maintained. Some periodic stewardship actions that are implemented by Metro staff include visits to monitor for illegal use of the site, clean up of illegal dumping, replacing signage and response to complaints. Table 6 describes high and medium priority maintenance action at the site. Additional details about

the stewardship of the site can be found in the Chehalem Ridge Site Stewardship Plan on file in Terramet under the site name.

**Table 6: High and medium priority stewardship actions**

| Activity | Frequency/duration | Priority |
|---|---|---|
| Site walk | 4 times per year | High |
| EDRR (weed invasion treatments) | Every 1-3 years | High |
| Entry/rule sign inspection | 2 times per year | High |
| Culvert and road inspections | 1 time per year | Medium |
| Property line encroachments | 1 time per year | Medium |

### Invasive species management

Invasive plant species can impact the habitat values for which land is conserved. Natural lands are not fully protected unless they also are managed for the features that first motivated preservation. Invasive species can change community structure, composition and ecosystem processes on these lands in ways that may not be anticipated nor desired. Careful management can minimize these negative impacts. Metro has initiated an early detection and rapid response (EDRR) program for invasive species including false brome and garlic mustard, which have been documented in the area. EDRR species will be controlled by hand-pulling or herbicide application as they are detected in the natural area. Other invasive plant species will be controlled as part of restoration projects or ongoing management of habitat areas.

**Table 7: Summary of conservation targets' KEAs, threats relating to land management and management actions important to maintaining or improving KEAs at Chehalem Ridge Natural Area**

| Conservation target | Key Ecological Attributes | Significant threats | KEAs outside normal range of variation | Short-term goals (by 2017) | Long-term goals | Strategic restoration actions |
|---|---|---|---|---|---|---|
| Early successional shrub habitat | • Size of habitat<br>• Low tree cover<br>• Mix of native shrub species<br>• Snags and down wood | • Competition: trees overtopping shrubs; invasive species issues | • Vegetative structure: Douglas fir and bigleaf maple overtopping shrubs | Maintain or increase number of shrub species to ≥20; decrease cover of non-native grass and shrub species; remove competing trees in designated early seral stands | All condition KEAs at good levels; suitable habitat for shrub-dependent wildlife species | • Control invasive species<br>• Create shrubby gaps in forest as part of thinning process |
| Upland coniferous forest | • Size of habitat<br>• Native woody vegetation<br>• Dead wood/ snags | • Conversion to single-age, single species forest<br>• Past management; lack of snags, dead wood | • Native tree richness and shrub cover low<br>• Tree density too high<br>• No significant snags/dead wood | Thin forest with variable density prescription; create snags and retain as much dead wood from thinning as is feasible | Move toward old growth conditions and all KEAs functioning at a good level | • Variable density thinning<br>• Increase native tree species, shrub cover<br>• Create snags<br>• Control invasives |
| Oregon white oak woodlands | • Size of habitat<br>• Native forbs, grasses<br>• Oak dominated, age mix | • Species competition is key issue due to encroaching conifers and invasive species | • Size: conifer, maple encroachment reducing extent<br>• Native grass and forb species richness: number of native plant species is low<br>• Canopy cover vegetation structure: canopy cover of oaks vs. other tree species | Maintain current trees with selective release; decrease non-native broadleaf weed species to <20% cover; maintain <10% non-oak canopy over oak trees; increase native herb species richness by seeding and planting bulbs and plugs; plant additional oak as restoration actions occur | Desired future condition is to have all condition KEAs ranked as good (size may not be feasible), thereby maintaining and restoring habitat suitable for oak dependent wildlife species. | • Strategic non-oak tree removal<br>• Plant annual grass and forb species<br>• Control invasive species including thistle, ivy, clematis and Scots broom<br>• Remove poison oak patches as needed to open up ground for grass/forb plantings |
| Riparian habitats | • Riparian width<br>• Native woody vegetation<br>• Contiguity/ connectivity<br>• Dead wood/ snags | • All threats are currently at low to medium range | • Vegetative structure: tree and shrub layers are ranked poor or fair along some wetlands and streams<br>• Native tree and shrub species richness is low in certain areas<br>• Standing and dead wood lacking in many riparian habitats | All culverts should be modified as needed and stabilized to reduce negative effects on water and upland resources | All key ecological attributes ranked as good, thereby maintaining and restoring riparian habitats suitable for the species that depend on them | • Remove reed canary-grass and invasives<br>• Replant native shrubs and trees<br>• Possible culvert work<br>• Address gaps in riparian forest canopy as needed |

**Table 8: Summary of short-term management strategies for maintaining or improving KEAs at Chehalem Ridge Natural Area**

| Strategy | Sources of stress it addresses | Focal conservation targets and KEAs affected | Why is it important and any timing issues | Measure(s) of success | Rank |
|---|---|---|---|---|---|
| Reduce competing vegetation in oak habitat | Competition from encroaching firs and other competing vegetation | Oak woodland: size, establish multiple 20-acre woodlands; condition, canopy cover, architecture of woody vegetation | The Chehalem oak woodlands are important remnants and may provide habitat linkages | Improvements to shift KEA ratings from Fair to Good | High |
| Thin young stands established on agricultural fields, strategically plant gaps to jumpstart other woody trees and shrubs | Habitat conversion and competition for resources | Upland forests: native trees and shrub richness; snags and down wood | Research indicates early intervention in dense young stands improves opportunities for achieving desired future conditions | Move native tree and shrub richness to Fair in short term | High |
| Identify and release shrub habitat areas | Altered composition and competition for resources | Shrub habitat: size, create patches from 10-25 acres; and vegetative tree cover, reduce to less than 5% cover | Without intervention shrub cover and diversity will diminish | Improvement in KEA rankings, movement from Fair to Good | High |
| Thin young forest adjacent to riparian areas | Altered composition and competition for resources | Riparian area width and vegetative structure: Promote growth of selected conifers and maintain hardwood and shrub component | Without intervention hardwood tree and shrub cover and diversity will diminish | Retain KEA rating at Good | Moderate |

# SECTION 6: RECREATION AND ACCESS

## 6.1 Public access

The original goal of Metro's bond acquisition for Chehalem Ridge included the idea of recreational access: "Protect large, undeveloped tracts of forestland to protect water quality, wildlife habitat and connections, and to provide public access opportunities." Over the next five years actions will be taken to continue progress toward this goal, and a recreation and access master plan will be initiated in 2015/16.

Today people from the surrounding community walk through the natural area on an informal basis, typically neighbors who have had free access to the site in the past. This use is not discouraged nor actively promoted by Metro. Currently most visitor use is limited to established logging roads, sometimes accompanied by leashed or unleashed dogs.

Dogs are prohibited in Metro natural areas and this will be addressed in future planning efforts. Research shows that even if dogs stay on the trails, they are perceived as predators by wildlife and their zone of influence can be several hundred feet on either side of a trail. Signage, self-policing and enforcement are all needed to effectively manage people with dogs.

Several demand trails have damaged habitat in the site, especially those used by ATVs. These have been blocked and decommissioned, and the site is monitored for new encroachments. A few unnecessary or ecologically harmful roads have been decommissioned, and access planning may reveal other roads that should be decommissioned.

Metro staff conducted an internal process to consider an appropriate level of access for each of the natural areas. That process looked at determining, strictly from a working staff level, what would be an appropriate level of access (low, medium, high or no access) to Metro natural area properties. The access designation offered here is a starting point with the understanding that judgment will always be needed on a case-by-case basis, and indicates that some part of the site can accept people at the stated level. It does not suggest that the entire site should have that level of access. Based on that process, it was determined the overall assigned access level for Chehalem Ridge is "natural area high."

This designation indicates the highest level of access is appropriate for some portion of the site. Precisely where and how this would be accomplished will be determined. Some of the issues include the 2006 Refinement Plan goals stating access to the site and an expectation already set for regional nature park development, extremely sensitive habitats, transport of invasive weeds, and potential for habitat fragmentation.

Within the life of this plan Metro expects to make significant progress toward planning for future public access at the site. A goal is to engage the public in a future master plan process. This process would seek stakeholder input to help guide future access and infrastructure investments.

During the planning process, thoughtful consideration will go into the balance of access and conservation of the natural resource area. Some of the potential opportunities/constraints that will be discussed include the natural area experience, environmental education and stewardship, local recreational demand, resource impacts, patch fragmentation, wildlife corridor disruption, public right-of-way access, land use and development permit requirements, long term operations and maintenance, as well as capital development and maintenance funding.

#### Signage

Metro's future management of the site will include enforcement of the posted rules to provide protection for wildlife and water quality, and to protect the safety and enjoyment of any person visiting the site. Signage will be routinely assessed during site visits and updated as needed.

As part of the integration of people into the system, the need for regulatory, wayfinding and interpretive signage will become necessary. The development of this signage system will be addressed during the master planning process.

#### Strategic actions (recreation and access)

In the future there will be more people walking the trails at Chehalem Ridge Natural Area. With increased use there are several areas where adjustments to the trail system will help accommodate people gracefully. The general idea is to incorporate sufficient trail length and options so as to disperse people and allow adequate hiking, wildlife watching and overlook vista areas. The access master planning process, planned for 2015/16, will also identify opportunities for access by people with disabilities.

### 6.2 Programmatic (education and volunteers)

Metro's regional parks and natural areas were created to intentionally give residents within our region opportunities to enjoy, experience, participate in and understand the natural world.

Conservation education staff at Metro work with schools, civic organizations and the general public to provide nature programs that connect people to Metro's parks and natural areas. Schools and civic groups who are interested in programs contact Metro to request a program. Public walks are advertised in Metro's publications. Information about conservation education programming is also available on Metro's website.

### Education program

Currently Chehalem Ridge Natural Area is utilized two to three times per year for nature walks that are open to the public. The themes that have encompassed these programs have included forest management and restoration thinning, bird identification, oak woodland and prairie ecology and open house tours to showcase Metro's natural areas program. Pacific University has utilized the site for some of its science coursework and Gaston Middle School has expressed interest in utilizing the site.

### Volunteer program

The primary goal of the volunteer program is to provide a variety of high-quality, meaningful volunteer opportunities that add value and capacity to Metro's work. Through these opportunities, community members are able to learn about and enjoy the Chehalem Ridge Natural Area, work alongside fellow community members, learn new skills or polish existing ones and gain the satisfaction of contributing to the long-term health and livability of their communities.

**Wildlife monitoring volunteers:** Metro's volunteer wildlife monitoring program provides valuable information about Metro's natural areas while offering a unique and in-depth service opportunity for community members. By focusing on indicator species, such as amphibians and birds, volunteers provide data to help Metro's science and stewardship team gauge the progress of its restoration efforts and track the effects of public use on wildlife. Avian monitoring has been conducted at the site for the past four breeding seasons. Informal amphibian and egg mass surveys have been conducted several times, revealing the presence of red-legged frogs and Northwestern, Dunn's and Ensatina salamanders.

**Native Plant Center volunteers:** Metro's Native Plant Center, located in Tualatin, provides an important supply of rare, locally adapted native seeds and plant stock to support Metro's natural area restoration projects. The native plant center has established a series of shady species test plots at Chehalem Ridge as part of the Shady Species Diversity Project. The project's goal is to develop and implement an herbaceous seed and propagules program for "stewardship" phase revegetation projects to achieve project resilience in riparian and upland mixed and coniferous forests through increased biological and structural diversity.

### Special use permits

Special use permits are required for certain regulated and non-traditional uses of parks and natural areas to ensure public health and safety and to protect natural resources, properties and facilities owned or managed by Metro. Special use permits are required for commercial film, video or photography; educational activities or educational events; festivals and organized sports activities; use of amplified sound; equipment or other elements posing a safety threat or public nuisance; concession services; site restoration or alteration, biological research, scientific collection (soil,

wildlife or vegetation disturbance of any kind); any organized activity, event or gathering involving 25 or more people.

#### Archeological resources

An archeological survey was completed in 2012 as part of the planning for the ongoing restoration thinning project. The survey was conducted by Willamette Cultural Resource Associates, Ltd. No historic or pre-contact archeological materials were found.

## SECTION 7: COORDINATION

This plan has laid out the history and context of the Chehalem Ridge Natural Area, along with the conservation and recreation projects for the next five years. For those projects to be realized, coordination will be needed on a number of fronts. Important coordination points include:

- Balancing the visitor experience with natural resource (habitat) improvements.
- Monitoring restoration efforts to track effectiveness and make changes to the priorities and goals as needed.
- Coordinating with neighbors and local stakeholders to implement projects.
- Funding to realize the priorities of this plan.

With these tools, the priorities established by this plan will be realized.

### 7.1 Monitoring framework

Monitoring at the Chehalem Ridge site is an integral part of an adaptive management approach to restoration and maintenance. Based on the monitoring plan developed by Metro, a feedback loop is created between monitoring and management decisions. Monitoring will be done to evaluate habitat and population responses to management action, as well as progress toward achieving habitat and population objectives.

The monitoring strategy is based on threats and key ecological attributes associated with conservation targets. Generally, the greatest threats to Chehalem Ridge Natural Area are traced to:

- Altered native herbaceous species composition: largely by invasive plant species.
- Altered fire (disturbance) regime: encroachment of woody vegetation (trees and shrubs) in the oak woodland, prairie habitats and early succession forest (trees only).
- Human disturbance (demand trails, ATV use, fires, camping, dogs).

The monitoring plan addresses threats directly and indirectly, by tracking changes in certain ecological attributes. It implements techniques that are well-established and continues many monitoring efforts already in place. The monitoring plan is likely to change over time; however, this is a worthwhile starting point and a useful tool for focusing Metro staff efforts.

### Conservation targets and monitoring techniques

**Early successional shrub habitat:** A combination of transects, existing point counts and GIS work will be used to monitor key ecological attributes of this conservation target.

**Upland coniferous forest:** Existing avian point counts and a combination of photo points, transects, GIS work and ocular estimates of plant and wildlife species will be used to monitor key ecological attributes of this conservation target.

**Oregon white oak woodland patches:** A combination of transects, existing point counts and GIS work will be used to monitor key ecological attributes of this conservation target**.**

**Riparian habitats:** A combination of transects, existing point counts and GIS work will be used to monitor key ecological attributes of this conservation target**.**

## 7.2 Funding

Costs in Tables 9 and 10 are general estimates for the purpose of understanding the magnitude of costs to implement the structural elements of this plan, as described in Sections 5 and 6. The costs are estimated on hiring contractors to complete the work and include a construction contingency for time and materials. In addition to these project implementation costs we have included annual maintenance costs for the Chehalem Ridge site in Table 11.

**Table 9: Access and recreation strategic action cost estimates**

| Strategic action | Cost |
|---|---|
| Master Plan, levy year 5 | $150,000 |
| **Total** | **$150,000** |

**Table 10: Conservation target cost estimates**

| Strategic action | Cost |
|---|---|
| Upland forest restoration thinning* | $300,000 |
| Oregon white oak woodland restoration | $150,000 |
| Early seral habitat release | $120,000 |
| Riparian habitat restoration | $25,000 |
| **Total** | **$595,000** |

*May be reduced by thinning revenues

**Table 11: Annual maintenance cost estimates**

| Annual maintenance | Cost |
|---|---|
| Road maintenance (grading, annual mowing) | $3,500 |
| Routine weed management (including EDRR) | $12,000 |
| **Total** | **$15,500** |

## 7.3 Public involvement

As projects are developed Metro will provide local stakeholders and nearby residents of Chehalem Ridge pertinent information about the work before it is implemented. Project information may include background on the project, timing, cost, materials types and other information as necessary for the public to be aware of the project and its implications.

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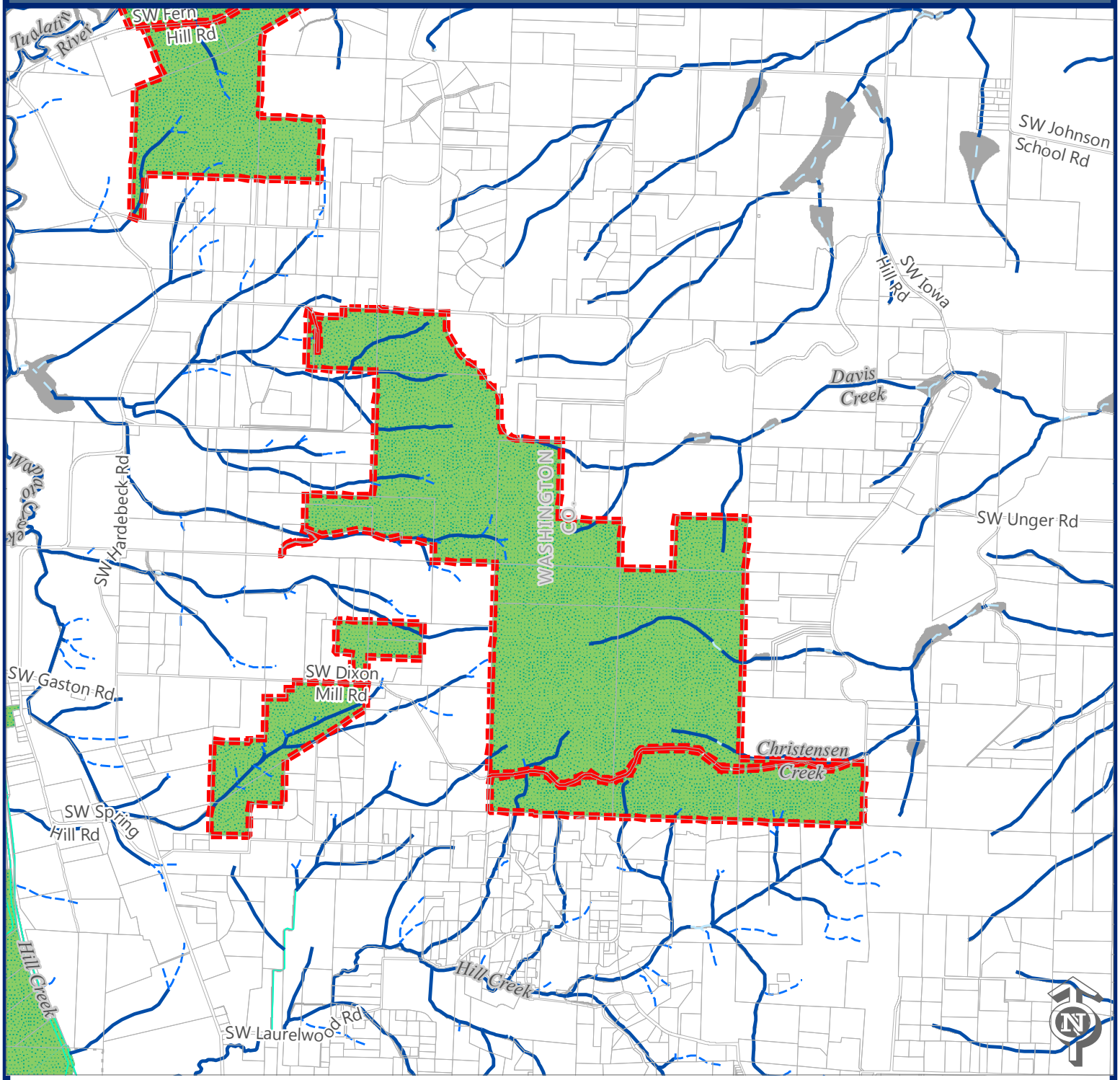
## MAPS

# Planning Area

Map 1




Sites

Park and/or natural area

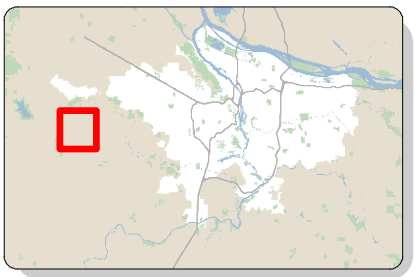
**NHD Flowlines**

Intermittent stream

Perennial stream

Canal

Artificial path

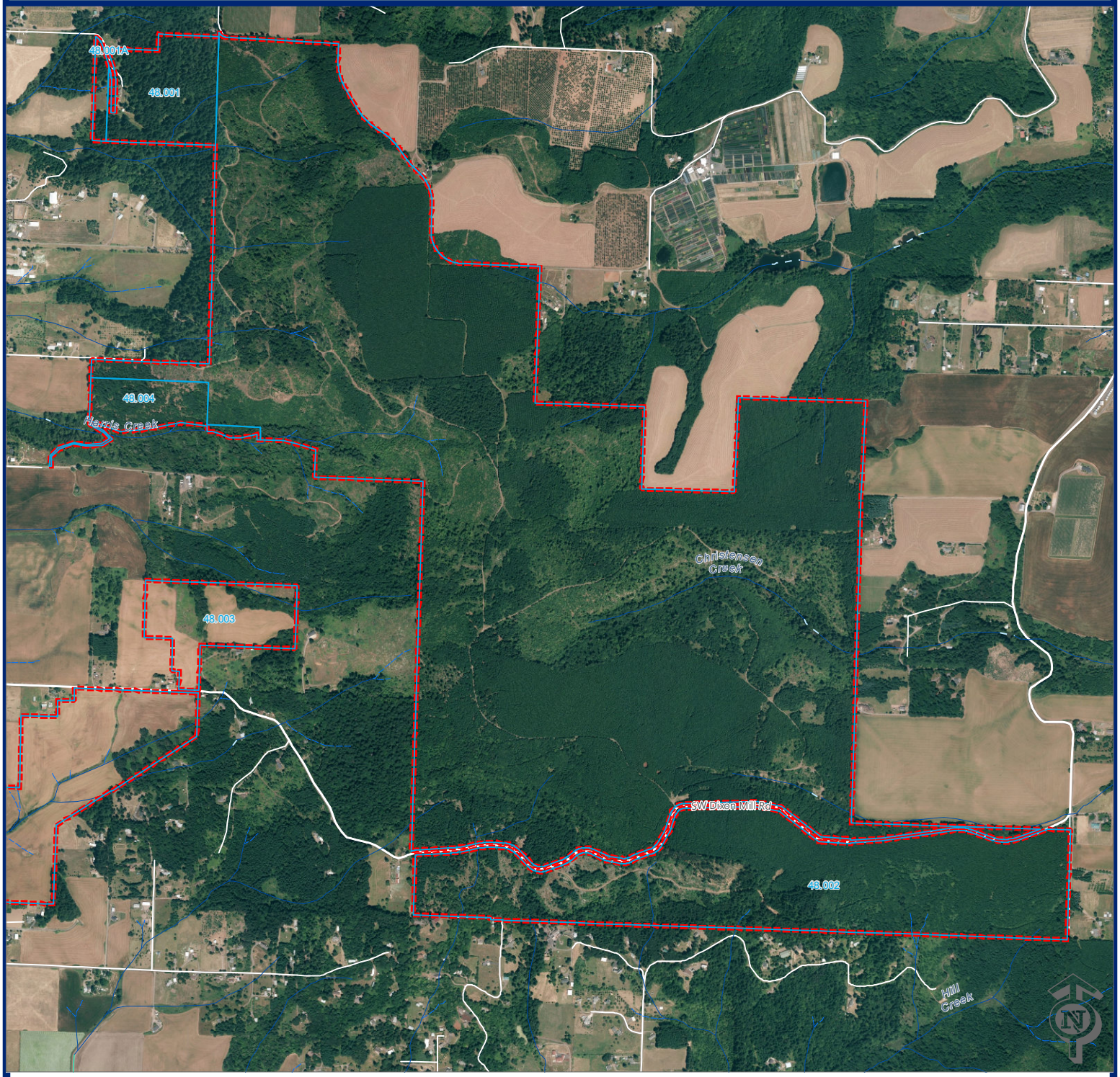


0 3,000 6,000 Feet

Metro

Map 2

# Site Map




Sites

**NHD Flowlines**

- Intermittent stream
- Perennial stream
- Canal
- Artificial path

**Bond Measure**

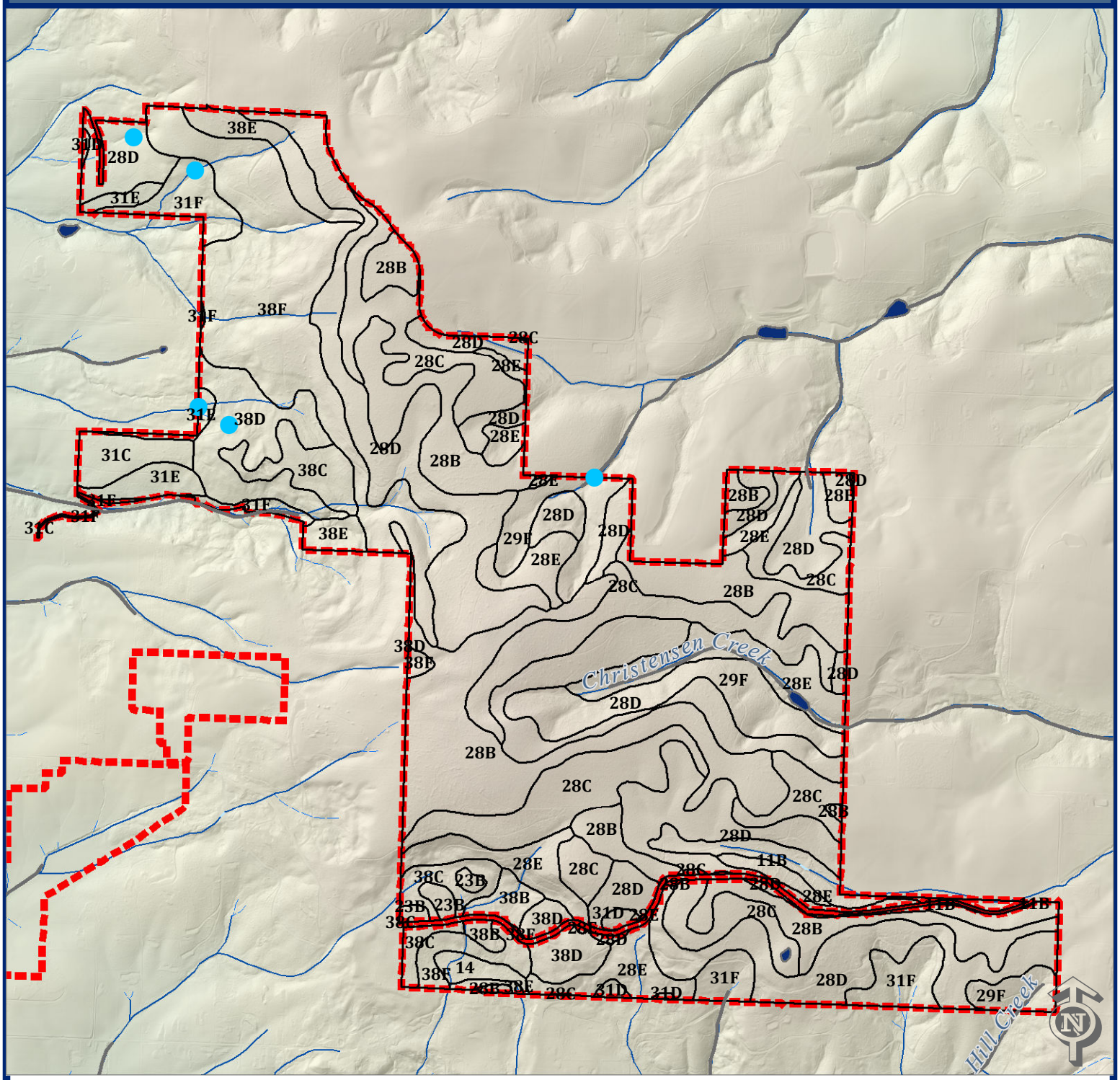
- 2006 Bond Measure

0 1,500 3,000 Feet

Metro

Map 3

# Soils, Topography, and Hydrological Features




Significant springs

Wetlands

NRCS soils

Sites

**NHD Flowlines**

Intermittent stream

Perennial stream

Artificial path

0 1,500 3,000 Feet

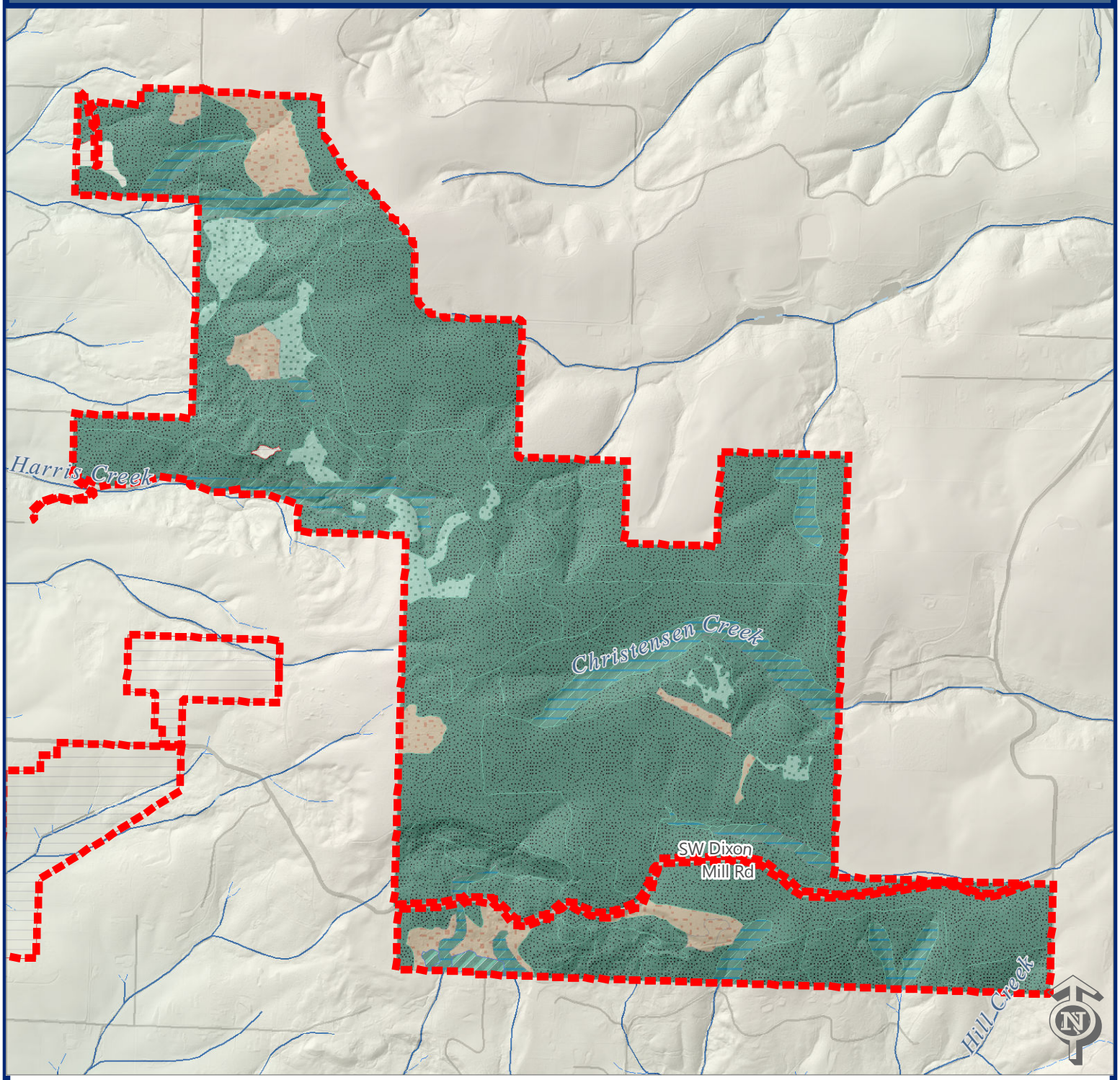
Metro



map date: 10/30/2013

Map 4

# Conservation Targets




Sites

**NHD Flowlines**

Intermittent stream

Perennial stream

Artificial path

**Conservation Targets**

No targets

**Conservation Target**

Forested wetland

Oak woodland

Riparian forest

Upland forest

Upland forest - shrub (early successional)

0 1,500 3,000 Feet

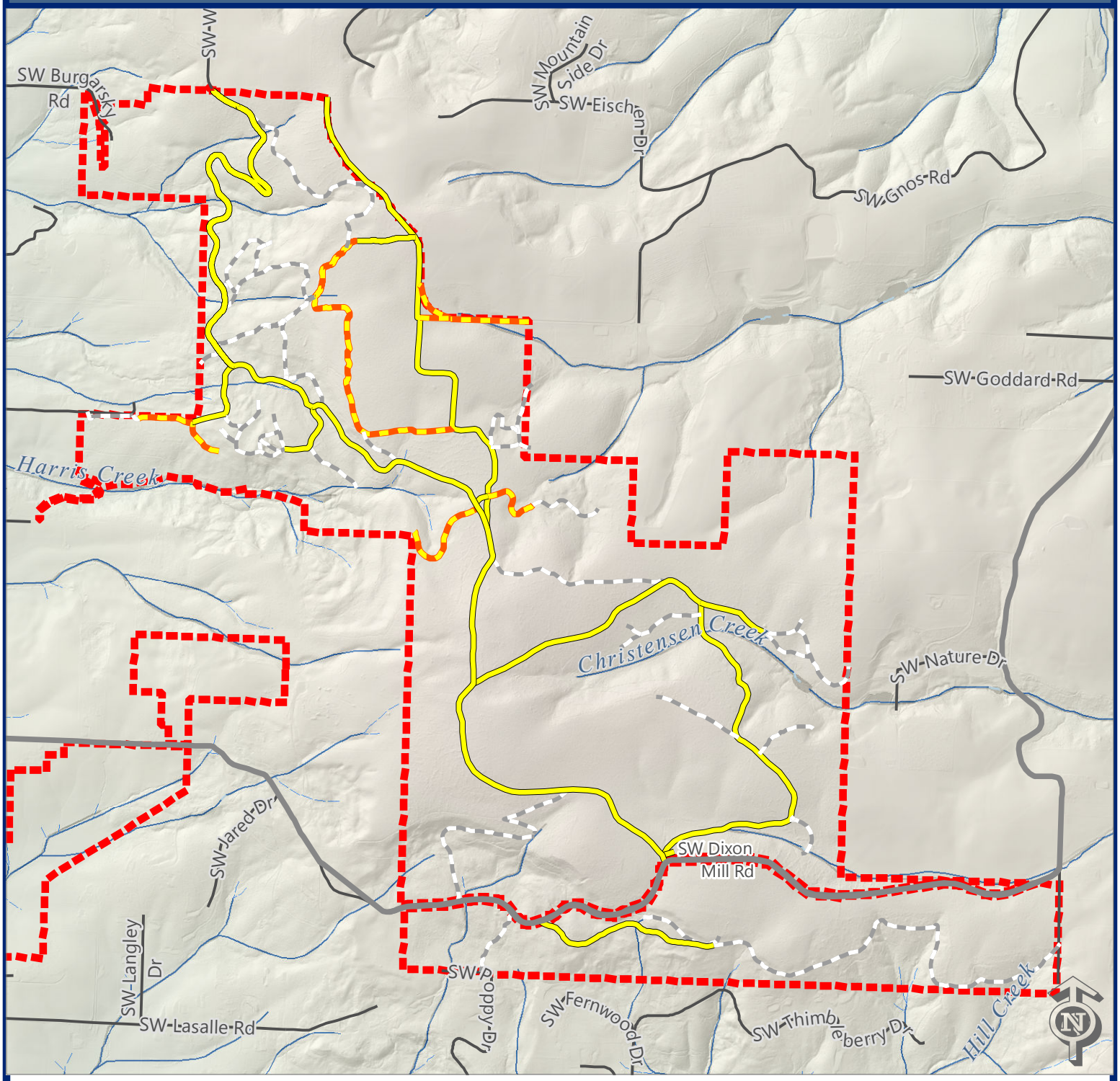
Metro



map date: 10/29/2013

Map 5

# Access & Recreation




Sites

Streets

**Roads for Fire Plan**

- 4x4 / Dry season
- All access
- County road
- Trail/skid road

**NHD Flowlines**

- Intermittent stream
- Perennial stream
- Artificial path

0 1,500 3,000 Feet

Metro



map date: 10/25/2013

## APPENDICES

**Appendix 1:** Wildlife known to occur at Chehalem Ridge Natural Area

**Appendix 2:** Key ecological attributes

**Appendix 3:** Threats and sources

# APPENDIX 1

**Wildlife known to occur at Chehalem Ridge Natural Area as of September 2012**

## Amphibians

Ensatina
Dunn's salamander
Rough-skinned newt
Northern red-legged frog
Northwestern salamander
Pacific tree (chorus) frog

## Reptiles

Rubber boa
Garter snake
Southern alligator lizard

## Birds

American Crow
American Goldfinch
American Robin
Anna's Hummingbird
Band-Tailed Pigeon
Bewick's Wren
Black-Capped Chickadee
Black-Headed Grosbeak
Black-throated Gray Warbler
Brown Creeper
Brown-Headed Cowbird
Cackling Goose (flying over)
Canada Goose (flying over)
Cedar Waxwing
Chestnut-Backed Chickadee
Common Raven
Common Yellowthroat
Cooper's Hawk
Dark-Eyed Junco
Downy Woodpecker
Evening Grosbeak
Fox Sparrow
Golden-Crowned Kinglet
Great Blue Heron
Great Horned Owl
Hairy Woodpecker
Hermit Thrush
Hermit Warbler
House Finch
House Wren
Hutton's Vireo
Lazuli Bunting
MacGillivray's Warbler
Mourning Dove
Northern Flicker
Olive-Sided Flycatcher
Orange-Crowned Warbler
Pacific Wren
Pacific-Slope Flycatcher
Pileated Woodpecker
Pine Siskin
Purple Finch
Red Crossbill
Red-Breasted Nuthatch
Red-breasted Sapsucker
Ring-necked Pheasant
Ruby-crowned Kinglet
Ruffed Grouse
Rufous Hummingbird
Sharp-shinned Hawk
Song Sparrow
Spotted Towhee
Steller's Jay
Swainson's Thrush
Townsend's Warbler
Turkey Vulture
Varied Thrush
Warbling Vireo
Western Bluebird
Western Tanager
Western Wood-Pewee
White-Crowned Sparrow
Willow Flycatcher
Wilson's Warbler
Yellow-Breasted Chat
Yellow-rumped Warbler

## Mammals

Long-tailed weasel
Douglas' squirrel
California ground squirrel
Coyote
Columbian black-tailed deer
American beaver
Common raccoon
Western gray squirrel
Bobcat

# APPENDIX 2

## Key ecological attributes at Chehalem Ridge Natural Area

Key ecological attributes (KEAs) are aspects of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (The Nature Conservancy 2007). KEAs define the conservation target's viability. They are the biological or ecological components that most clearly define or characterize the conservation target, limit its distribution or determine its variation over space and time. They are the most critical components of biological composition, structure, interactions and processes, and landscape configuration that sustain a target's viability or ecological integrity. For each KEA, one or more indicators were selected to assess the health of the KEA.

Indicators are measurable entities related to the condition of the KEA (The Nature Conservancy 2007). A good indicator should be:

- ***Biologically relevant:*** The indicator should represent an accurate assessment of target health.
- ***Sensitive to anthropogenic stress:*** The indicator should be reflective of changes in stress.
- ***Measurable:*** The indicator should be capable of being measured using standard procedures.
- ***Cost-effective:*** The indicator should be inexpensive to measure using standard procedures.
- ***Anticipatory***: The indicator should indicate degradation before serious harm has occurred.
- ***Socially relevant:*** The indicator's value should be easily recognizable by stakeholders.

KEA indicators were categorized by type – size, condition or landscape context:

- ***Size:*** A measure of the area or abundance of the conservation target's occurrence.
- ***Condition:*** A measure of the biological composition, structure and biotic interactions that characterize the occurrence.
- ***Landscape context:*** An assessment of the target's environment including ecological processes and regimes that maintain the target occurrence such as flooding, fire regimes and many other kinds of natural disturbance, and connectivity such as species targets having access to habitats and resources or the ability to respond to environmental change through dispersal or migration.

The status of an indicator will vary over time either within an acceptable range of variation that sustains the conservation target or beyond a critical threshold that threatens the viability of the conservation target. The range is described as very good, good, fair or poor. The very good and good ratings mean that the indicator is functioning within its acceptable rang of variation. Fair and poor ratings mean an indicator is outside its acceptable range of variation. When information was lacking to define all four categories then only a subset of the four categories was defined.

Definitions for the four categorizes follow those used by The Nature Conservancy:

- ***Very Good***: The indicator is functioning within an ecologically desirable status, requiring little human intervention for maintenance within the natural range of variation (i.e., is as close to "natural" as possible and has little chance of being degraded by some random event).

- ***Good:*** The indicator is functioning within its range of acceptable variation, although it may require some human intervention for maintenance.
- ***Fair:*** The indicator lies outside of its range of acceptable variation and requires human intervention for maintenance. If unchecked, the target will be vulnerable to serious degradation.
- ***Poor:*** Allowing the indicator to remain in this condition for an extended period will make restoration or prevention of extirpation of the target practically impossible (e.g., too complicated, costly and/or uncertain to reverse the alteration).

KEAs and their indicators for the Chehalem Ridge Natural Area's conservation targets are provided in the following tables.

**Table 1: Key ecological attributes for riparian forest at Chehalem Ridge Natural Area**

| Category | KEA | Indicator | ---------- Indicator rating ---------- | | | | Current Rating | DFC* for this SCP | Long term DFC | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Poor | Fair | Good | Very good | | | | |
| **Size** | Riparian forest width | Average width of riparian forest | <15 m (50 ft) each side of stream | 15-30 m (50-100 ft) each side of stream | 30-61 m (100-200 ft) each side of stream | >61 m (200 ft) each side of stream | Fair | Fair | Very good | Total width, both sides of stream. Estimate using GIS. Riparian forest width positively correlates with water and wildlife habitat quality, including biodiversity corridors. Width includes both sides of the stream or one side for larger rivers (effective wildlife movement corridor). Title 13 Class I riparian, which accounts for five primary ecological functions, is typically within 30-61 m (100-200 ft) on either side of the stream; steep slopes are encompassed in the wider distances. Optimum width won't always be achievable – e.g., could interact with other priority habitats such as prairie. (Environmental Law Institute 2003; Metro's *Technical Report for Fish and Wildlife Habitat*, 2005; Hennings and Soll 2010; Shandas and Alberti 2009; Cole and Hennings 2006) |
| **Condition** | Vegetative structure: shrub layer | Percent native shrub cover | <10% cover | 10-25% cover | 25-50% cover | >50% cover | Good | Good | Very good | Estimate via site walk. Indicator categories based on data from local study at 54 riparian study sites. Abundance and species richness of many bird and mammal species is associated with native shrub cover and woody vegetation volume. Puget Sound studies suggest that the fragmentation of upland vegetation and the total amount of riparian vegetation explain the greatest amount of variability in riparian bird communities. (Carey and Johnson 1995; Hennings 2001; Hagar 2003; Shandas and Alberti 2009; Hagar 2011) |
| **Condition** | Native herbaceous layer richness | Number of native species of grasses, herbs, forbs and ferns, at least half of which are riparian-associated, per 0.4 ha (1 ac) | <5 species | 6-12 species | 12-18 species | >18 species | Good | Good | Very good | Estimate via site walk. Species numbers based on field experience of Marsha Holt-Kingsley and Lori Hennings; currently using species list from McCain and Christy 2005, Technical Paper R6-NR-ECOL-TP-01-05. |
| **Condition** | Native tree and shrub richness | Number of native tree and shrub species per 0.4 ha (1 ac) | <5 species | 5-10 species | 10-15 species | >15 species | Good | Good | Very good | Estimate via site walk. Some studies show that native wildlife species diversity (particularly Neotropical migratory songbirds) is associated with native deciduous shrub diversity. (Muir et al. 2002; Hagar 2003; Hagar 2011) |
| **Condition**** | Riparian habitat continuity | Gaps in woody vegetation | >2 gaps >50 m (55 yards)<br>OR<br>>3 or more 25-50 m (27-55 yards) gaps | 1 or 2 gaps >50 m (54 yards)<br>OR<br>2 or more gaps between 15-25 m (16-27 yards) | 1, 25-50 m (27-55 y) gap<br>OR<br>2 or more gaps between 15-25 m (16-27 yards) | 0 or 1, 15-25 m (16-27 yards) gap | Good | Good | Very good | Estimate via GIS, per km stream length. Riparian contiguity for water quality and wildlife. Allows for continuity and also some mosaic for wildlife that need (or create, such as beaver) openings. Puget Sound studies suggest that the fragmentation of upland vegetation and the total amount of riparian vegetation explain the greatest amount of variation in aquatic conditions. Studies document that some birds and small mammals are unwilling to cross vegetation gaps, with the most typical threshold being 50 m (164 ft) Hennings and Soll 2010). |
| **Condition** | Standing and downed dead trees | Average number of snags and large wood (> 50 cm, or 20 in, DBH) per 0.4 ha (1 ac) | < 5 snags and <5% down wood | 5-11 snags and 5-10% down wood | 12-18 snags and 10-20% down wood with moderate variety of size and age classes | > 18 snags and >20% cover down wood in a good variety of size and age classes | Fair | Fair | Very good | Estimate via site walk. Rankings distilled from multiple references and particularly from *Habitat Conservation for Landbirds in Lowlands and Valleys of Western Oregon and Washington* (Altman and Alexander 2012) and DecAID results for species' use of dead wood in Westside Lowland Conifer-hardwood forests. |

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** This KEA may not be appropriate where native turtles are present, because nesting turtles require some open habitat. Patches of bare ground may accommodate turtles and are important to native ground-nesting bees.

**Table 2: Key ecological attributes for upland shrub habitat at Chehalem Ridge Natural Area**

| Category | KEA | Indicator | ---------- Indicator rating ---------- | | | | Current rating | DFC* for this SCP | Long term DFC | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Poor | Fair | Good | Very good | | | | |
| **Size** | Area of early successional shrub habitat (may be gap in forest) | Size of patch | <2 ha (5 acres) | 2-4 ha (5-10 acres) | 4-10 ha (10-25 acres) | >10 ha (25 acres) | Fair | Good | Good | The indicator's rating ranges reflect findings in the scientific literature. Native shrub habitat is important to many songbirds and pollinators. Studies in various U.S. areas indicate that some migratory bird species breed in forests then apparently shift habitat preferences during fall to forest openings. A Sacramento Valley study found one breeding pair of chats per 4 ha (10 acres). Another California study indicated Little Willow Flycatcher territory sizes averaged about 0.4 ha (1 acre). Some bat species forage preferentially over openings and early successional habitats. (Sanders and Flett 1989; Kilgo et al. 1999; Moorman and Guynn 2001; Bowen 2007; Butte County Association of Governments 2012) |
| **Condition** | Vegetative structure: tree layer overtopping shrubs | Percent native tree canopy cover | >25% cover | 15-25% cover | 5-10% cover | <5% cover | Fair | Very good | Very good | When trees (e.g. Douglas fir, bigleaf maple) begin to overtop the shrub layer, the shrub habitat may be effectively fragmented rather than a contiguous patch. This can render the habitat unsuitable for area-sensitive shrub species such as Yellow-breasted Chat. Native shrub habitat, as a habitat type, will most often be transient (e.g., 10-15 years) in a landscape, therefore consciously managing to maintain patches of shrub habitat can elevate a site's biodiversity (Cary and Johnson 1995). |

| Category | KEA | Indicator | ---------- Indicator rating ---------- | | | | Current rating | DFC* for this SCP | Long term DFC | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Poor | Fair | Good | Very good | | | | |
| **Condition** | Native shrub richness | Number of native shrub species per acre | <2 species per 0.4 ha (1 acre) | 2-5 species per 0.4 ha (1 acre) | 6-9 species per 0.4 ha (1 acre) | >10 species per 0.4 ha (1 acre) | Very good | Very good | Very good | Estimate via site walk. Native wildlife species diversity is associated with native vegetation. Shrub diversity is particularly important to long-distance migratory songbirds. Partners in Flight biological objective for yellow warbler (sub-canopy, tall shrub foliage in riparian woodland) (Altman 2000). |
| **Condition** | Key habitat feature presence: snags within shrub patch | Average # snags >50 cm (20 inches) DBH per 0.4 ha (1 acre) | < 5 snags | 5-11 snags | 12-18 snags with moderate variety of size and age classes | > 18 snags with good variety of size and age classes | Poor | Poor | Fair | Many species associated with early successional habitat are burn specialists, and snags are a typical product of fire. The presence of one or a few snags or live trees provides a foraging perch for flycatching birds and nesting substrate for early successional cavity-nesters such as Western Bluebird. Presence of Olive-sided Flycatcher in early successional forests appears to depend on availability of snags or live trees that provide suitable foraging and singing perches. An overall loss of Olive-sided Flycatchers of 67 percent has been noted since 1966, with a 5 percent average annual decline in western Oregon over the past three decades. (Hurteau et al. 2010; Cornell Lab of Ornithology 2012; North American Breeding Bird Survey data 2012) |

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**Table 3: Key ecological attributes for oak woodland at Chehalem Ridge Natural Area**

| Category | KEA | Indicator | ---------- Indicator rating ---------- | | | | Current rating | DFC* for this SCP | Long term DFC | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Poor | Fair | Good | Very good | | | | |
| **Size** | Habitat area | Number of 8 ha (20 acre) units: based on a combination of white-breasted nuthatch, acorn woodpecker and gray squirrel territory size | <16 ha (40 ac) of oak woodland or oak forest in a functionally contiguous patch (multiple patches totaling 16 ha, or 40 acres, located in close proximity), i.e. insufficient oak woodland/forest for home range of two nuthatch pairs or acorn woodpecker colonies | 16-49 ha (40-120 ac) oak woodland or forest in a functionally contiguous patch, i.e. enough suitable habitat for 2-5 nuthatch pairs or acorn woodpecker colonies | 49-162 ha (120-400 ac) oak woodland or forest in a functionally contiguous patch, i.e. enough suitable habitat for 6-20 nuthatch pairs or acorn woodpecker colonies; OR three patches of closely associated suitable habitat, each >16 ha (40 ac) in size | >162 ha (400 ac) of oak woodland or oak forest in a functionally contiguous patch, i.e. enough suitable habitat for >20 nuthatch pairs or acorn woodpecker colonies; OR three patches of suitable contiguous or connected habitat, each >57 ha (140 ac) | Poor | Fair | Fair | Estimate via GIS. 4-8 ha (10-20 acres) for acorn woodpecker, 7 ha (17 acres) for one WBNH pair, 16 ha (40 acres) for female WGS (Alverson 2009). |
| **Condition** | Native grass and forb presence | Native species richness (for the patch) | <20 native herbaceous plant species with high and moderate fidelity to oak woodland occur within the patch | 20 -39 native herbaceous plant species with high and moderate fidelity to oak woodland occur within the patch | 40 -59 native herbaceous plant species with high and moderate fidelity to oak woodland occur within the patch | >60 native herbaceous plant species with high and moderate fidelity to the system types present within the patch | Poor | Fair | Fair | Inclusion of moderate species fidelity different from prairie-savanna mosaic because woodlands have lower overall diversity of high fidelity species (Alverson 2009). |
| **Condition** | Native grass and forb abundance | Relative cover of native forb and grass species | <20% of total herbaceous cover | 20-30% of total herbaceous cover | 30-50% of total herbaceous cover | >50% of total herbaceous cover | Poor | Fair | Fair | High quality oak woodlands have a relatively open understory with shrubs, grasses and wildflowers. We used relative rather than total percent cover because herbaceous cover is lower in woodlands compared to savanna and prairie. ODFW's *Oregon Conservation Strategy* 2005, Strategy Habitat description for oak woodlands. |
| **Condition** | Vegetation structure | Canopy cover and architecture of woody vegetation | Woody vegetation (e.g., Douglas fir) is encroaching and total native canopy cover is acceptable (30-60%) over less than half of the target area | Woody vegetation encroaching but total native canopy cover is 30-60% at least half of the target area | Woody vegetation encroaching but total native canopy cover is 30-60% at least 90% of the target area | Woody vegetation encroaching is generally absent, total native canopy cover is 30-60% in the target area, and canopy architecture is appropriate mix of large open grown trees/younger trees | Fair | Fair | Good | Canopy cover based upon densiometer readings taken when all canopy trees are leafed out. If cover is estimated from aerial photography threshold cover categories should be increased by at least 5-10%. Tree species of concern in regard to invasion include in particular: *Pseudotsuga menziesii, Acer macrophyllum, Fraxinus latifolia, Prunus avium, Crataegus monogyna* (Alverson 2009). |

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**Table 4: Key ecological attributes for upland forest at Chehalem Ridge Natural Area**

| Category | KEA | Indicator | ---------- Indicator rating ---------- | | | | Current status | DFC* for this SCP | Long term DFC | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Poor | Fair | Good | Very good | | | | |
| **Size** | Forested habitat patch size | Patch size (includes native shrub patches or natural clearings) | < 12 ha (30 ac) | 12-40 ha (30-100 ac) | 40-61 ha (100-150 ac) | >61 ha (150 ac) | Very good | Very good | Very good | Calculate by delineating forest patch in GIS. If more than one patch present, rank based on a composite. In the Puget Sound, most native forest birds were present in patches ≥ 42 ha (104 ac). Local studies suggest a lowest threshold for birds and mammals of about 12 ha (30 ac). (Environmental Law Institute 2003; Donnelly and Marzluff 2004; Soll and Hennings 2010) |
| **Condition** | Native tree and shrub richness | Number of native tree and shrub species per ac | <5 species per 0.4 ha (1 ac) | 5-8 species 0.4 ha (1 ac) | 8-12 species per 0.4 ha (1 ac) | >12 species per 0.4 ha (1 ac) | Poor | Fair | Very good | Estimate overall via site walk. Native wildlife species diversity is associated with native vegetation. A diversity of shrubs is more likely to provide food and shelter for species over the seasons. Shrub diversity is particularly important to pollinators and songbirds. (Hagar 2003; Hennings 2006; Burghardt et al. 2009) |
| **Condition** | Standing and downed dead trees | Average number of snags and large wood (> 50 cm, or 20 in, DBH) per acre | < 5 snags and <5% down wood | 5-11 snags and 5-10% down wood | 12-18 snags and 10-20% down wood with moderate variety of size and age classes | >18 snags and >20% cover down wood in a good variety of size and age classes | Poor | Poor | Very good | Estimate via site walk. Rankings distilled from multiple references and particularly from *Habitat Conservation for Landbirds in Lowlands and Valleys of Western Oregon and Washington* (Altman and Alexander 2012) and DecAID results for species' use of dead wood in Westside Lowland Conifer-hardwood forests. |
| **Landscape context** | Edge condition | Percent of edge bordered by natural habitats and/or managed for conservation | Patch surrounded by non-natural habitats (0-25% natural habitat) | 25%+ of patch bordered by natural habitats | 50-75% of patch bordered by natural habitats or managed for conservation | 75-100% of patch bordered by natural habitats or managed for conservation | Good | Good | Good | Assess via aerial photographs. The intactness of the edge can be important to biotic and abiotic aspects of the site. Derived from *Ecological integrity assessment: North Pacific dry Douglas-fir forest and woodland* (Crawford/WDNR 2011). |

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# APPENDIX 3

## Threats and sources at Chehalem Ridge Natural Area

### Introduction

A stress is the "impairment or degradation of the size, condition and landscape context of a conservation target, and results in reduced viability of the target," (The Nature Conservancy 2007) or, in other words, a degraded key ecological attribute (KEA) that is outside its acceptable range of variation. Stresses may also reduce the viability of nested conservation targets such as grassland birds. A source of stress is an extraneous factor, either human (e.g., policies, land use) or biological (e.g., non-native species) that infringes upon a habitat or species target in a way that results in stress. Put together, stresses and their sources constitute a threat.

Metro follows The Nature Conservancy's method of identifying threats at a site. Analysis of threats to conservation targets at Chehalem Ridge Natural Area involves three parts:

- Identify stresses and apply stress-rating criteria.
- Identify sources of stress, rank and assign threat-to-system rank.
- Use the combination of stress and source ranks to assign overall threat rank.

Threats for each conservation target are identified and ranked as low, medium, high or very high. The most severe threats are those that are likely to seriously degrade or destroy a large portion in the next 10 years or so, and that we are able to reasonably address. Threats that we have no control over receive low ratings. This method helps identify restoration and stewardship activities that can abate the more severe threats. Threat rankings may change over time, for example if invasive species become a much more severe problem in a given conservation target.

### Threats and source analysis for the Chehalem Ridge Natural Area

Threats for the Chehalem Ridge Natural Area conservation targets are listed in Tables 1-4 below. Instructions and tables for assigning ranks are in Tables 5-7.

**Table 1: Threats to oak woodlands at Chehalem Ridge Natural Area**

| Sources of stress | | **Stresses** (rank each as low, medium, high or very high for contribution, irreversibility and source) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Habitat destruction/ conversion** | **Stress rank** | **Altered composition/ structure**[1] | **Stress rank** | **Competition for resources** | **Stress rank** | **Threat rank** | **Comments** |
| Overtopping by other tree species (previous forest mgmt) | Contribution | Very high | Low | | | Very high | Low | Low | Primary source of stress is Douglas Fir. Threat rank is low because management is underway. Tied to native species abundance and richness KEAs. |
| | Irreversibility | Low | | | | Low | | | |
| | Source rank | High | | | | High | | | |
| Fire suppression | Contribution | Very high | | Very high | Low | | | Low | Build up of fuels degrades habitat and increases risk of a high intensity fire. Threat rank is low because management is underway. Tied to native species abundance, richness and woody species KEAs. |
| | Irreversibility | Low | | Low | | | | | |
| | Source rank | High | | High | | | | | |

[1] Includes lack of down and standing dead wood, poor shrub structure in forest, too much shrub in prairie, etc.

**Table 2: Threats to riparian forest at Chehalem Ridge Natural Area**

| Sources of stress | | **Stresses** (rank each as low, medium, high or very high for contribution, irreversibility and source) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Altered composition/ structure** | **Stress rank** | **Competition for resources** | **Stress rank** | **Human disturbance** | **Stress rank** | **Threat rank** | **Comments** |
| Invasive species; grasses, broad-leaf weeds | Contribution | | | High | High | | | Medium | Non-native broadleaf weeds include blackberry, Scots broom, ivy, thistle and foxglove. Tied to native vegetation and structure KEAs. |
| | Irreversibility | | | Low | | | | | |
| | Source rank | | | Medium | | | | | |
| Human use, dogs, trails, fishing, etc. | Contribution | | | | | Medium | Low | Low | Demand trail users trample vegetation, spread invasive weeds; humans and dogs disturb ground-nesting birds. Tied to structure, native plant KEAs. Could be much more significant issue in the future. |
| | Irreversibility | | | | | Medium | | | |
| | Source rank | | | | | Medium | | | |
| Previous forest management | Contribution | Medium | Very high | | | | | High | Removal of down wood/snags; single-age stands lacking shrub cover. |
| | Irreversibility | High | | | | | | | |
| | Source rank | Medium | | | | | | | |

**Table 3: Threats to upland forest at Chehalem Ridge Natural Area**

| Sources of stress | | **Stresses** (rank each as low, medium, high or very high for contribution, irreversibility and source) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Habitat destruction/ conversion** | **Stress rank** | **Lack of dead wood** | **Stress rank** | **Competition for resources** | **Stress rank** | **Human disturbance** | **Stress rank** | **Threat rank** | **Comments** |
| Fire suppression | Contribution | Medium | Medium | | | | | | | Low | Increased risk of stand-replacing fires in Douglas-fir forest, where build-up of fuels would increase risk of high intensity fire. Tied to all KEAs. |
| | Irreversibility | High | | | | | | | | | |
| | Source rank | Medium | | | | | | | | | |
| Invasive species | Contribution | | | | | Very high | High | | | High | Extensive invasive grasses, broadleaf weeds and invasive shrubs. Tied to native species KEAs. |
| | Irreversibility | | | | | Medium | | | | | |
| | Source rank | | | | | High | | | | | |
| Human use, dogs, trails, fishing, etc. | Contribution | | | | | | | Low | Medium | Low | Stress to wildlife; risk of escaped fire. Disturbance reduces habitat value. Tied to structure/patch size KEAs. Could be more significant issue in the future |
| | Irreversibility | | | | | | | Medium | | | |
| | Source rank | | | | | | | Low | | | |
| Previous forest management | Contribution | Very high | High | Very high | High | | | | | High | Thinning needed; closed canopy stunts trees, prevents development of native herbs/shrub layers. Snags and down wood, native plant, vegetation KEAs. |
| | Irreversibility | Medium | | Medium | | | | | | | |
| | Source rank | High | | High | | | | | | | |

**Table 4: Threats to upland shrub at Chehalem Ridge Natural Area**

| Sources of stress | | **Stresses** (rank each as low, medium, high or very high for contribution, irreversibility and source) | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Altered composition/ structure**[1] | **Stress rank** | **Competition for resources** | **Stress rank** | **Threat rank** | **Comments** |
| Fire suppression | Contribution | Very high | Very high | | | Very high | Loss of fire in the ecosystem can be mitigated through thinning and mastication. Though not a substitute for fire, it does help set the plant community back to an earlier development stage. |
| | Irreversibility | Low | | | | | |
| | Source rank | High | | | | | |
| Invasive species | Contribution | | | Medium | Low | Low | Blackberry and Scots broom may continue to invade more open early seral trails. |
| | Irreversibility | | | Low | | | |
| | Source rank | | | Low | | | |
| Previous forest management | Contribution | Very high | Very high | | | Very high | The loss of snags from previous harvest activities reduces the function of the early seral habitat. |
| | Irreversibility | Medium | | | | | |
| | Source rank | High | | | | | |

[1] Includes lack of down and standing dead wood, poor shrub structure in forest, too much shrub in prairie, etc.

**Instructions and tables for assigning source, stress and threat ranks**

**Step 1: Stresses** List the stresses to the conservation target as column headings in the table.

**Step 2: Sources** List the source of the stresses as rows; note whether actively contributing (expected to contribute additional stress within the next 10 years). A source may contribute to more than one stress.

**Step 3: Source rank** Rank the sources for contribution and irreversibility using L-M-H-VH, then use Table 1 to assign source rank.

**Step 4: Stress rank** Use Table 2 to assign stress rank based on severity and geographic scope.

**Step 5: Threat rank** Use Table 3 to determine the overall threat rank for each source-stress combination.

**Table 5: Source ranking table** (combines *contribution*[1] and *irreversibility*[2]*;* a source may contribute to >1 stress)

| | ---------- Contribution ---------- | | | |
|---|---|---|---|---|
| **Irreversibility** | **Very High** | **High** | **Medium** | **Low** |
| **Very high** | Very high | High | High | Medium |
| **High** | Very high | High | Medium | Medium |
| **Medium** | High | Medium | Medium | Low |
| **Low** | High | Medium | Low | Low |

[1] **Irreversibility:** Reversibility of the source of the stress. How difficult/expensive is it to address the problem, or can it even be realistically addressed?

[2] **Contribution:** If we don't address it, how serious could it be for the conservation target?

**Table 6: Stress ranking table** (combines *severity* and *scope*)

| **Severity:** *How bad is it or will it be within the next 10 years?* | **Scope:** How much does it or will it cover in next 10 years? | | | **Stress rank** |
|---|---|---|---|---|
| | **Very High** | **High** | **Medium** | **Low** |
| **Very High** | Very High | High | Medium | Low |
| **High** | High | High | Medium | Low |
| **Medium** | Medium | Medium | Medium | Low |
| **Low** | Low | Low | Low | Not a stress |

**Table 7: Threat ranking table** (combines *source rank* and *stress rank* for an overall *threat to target* ranking)

| | ---------- Source ---------- | | | |
|---|---|---|---|---|
| **Stress** | **Very High** | **High** | **Medium** | **Low** |
| **Very High** | Very High | Very High | High | Medium |
| **High** | High | High | Medium | Low |
| **Medium** | Medium | Medium | Low | Low |
| **Low** | Low | Low | Low | Not a Threat |